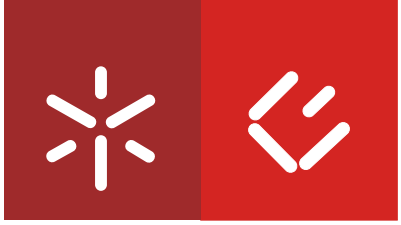
Universidade do Minho
Escola de Economia e Gestão

Miguel Ângelo Pereira Domingues

Backtesting value-at-risk on portfolios of lottery-like stocks

April 2019

Backtesting value-at-risk on portfolios of lottery-like stocks
Miguel Ângelo Pereira Domingues
UMinho | 2019



Universidade do Minho
Escola de Economia e Gestão

Miguel Ângelo Pereira Domingues

Backtesting value-at-risk on portfolios of lottery-like stocks

Master in Finance

Supervisor
Professor Nelson Manuel Pinho Brandão Costa Areal

April 2019

DIREITOS DE AUTOR E CONDIÇÕES DE UTILIZAÇÃO DO TRABALHO POR TERCEIROS

Este é um trabalho académico que pode ser utilizado por terceiros desde que respeitadas as regras e boas práticas internacionalmente aceites, no que concerne aos direitos de autor e direitos conexos.

Assim, o presente trabalho pode ser utilizado nos termos previstos na licença abaixo indicada.

Caso o utilizador necessite de permissão para poder fazer um uso do trabalho em condições não previstas no licenciamento indicado, deverá contactar o autor, através do RepositóriUM da Universidade do Minho.

Licença concedida aos utilizadores deste trabalho

Atribuição-NãoComercial-SemDerivações
CC BY-NC-ND

https://creativecommons.org/licenses/by-nc-nd/4.0/

Acknowledgements

I would especially like to thank Professor Nelson Manuel Pinho Brandão Costa Areal for all the availability he showed throughout the course of the thesis and for the advice and solutions he presented and explained to me.

I also acknowledge my parents for always being by my side when I needed them the most and for supporting me in everything I have done so far. Thank you for giving me motivation to push through the difficulties, both in my academic career and on a personal level.

I want to thank Ana for all the support she has given me and for always believing in me and my friends for every special moment we have been part of and for the constant support and people they are.

I would also like to acknowledge the Master's in Finance and its teaching team who provided me with the necessary knowledge and practical skills for the beginning of my professional and academic life and the many colleagues with whom I studied.

STATEMENT OF INTEGRITY

I hereby declare having conducted this academic work with integrity. I confirm that I have not used plagiarism or any form of undue use of information or falsification of results along the process leading to its elaboration.

I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

Avaliação do *value-at-risk* em carteiras com ações de lotaria

Resumo

O objetivo deste estudo é calcular o *value-at-risk* (VaR) em carteiras com ações de loteria baseadas no mercado dos Estados Unidos. As ações de lotaria são ativos com uma pequena probabilidade de um grande retorno positivo no futuro (Bali, Cakici & Whitelaw, 2011). O método utilizado para identificar ações de lotaria é o método de Bali et al. (2011), que consiste em ordenar as ações pelo seu retorno máximo diário durante o mês anterior. Além disso, métodos de correção de valores atípicos são usados para corrigir possíveis erros de especificação do modelo e inferências inválidas. A amostra total é composta por 40 carteiras diferentes criadas de 2007 a 2016. O período de previsão foi definido para 250 dias para todas as carteiras. Os resultados sugerem que, ao não corrigir os valores atípicos, os procedimentos de Simulação Histórica Filtrada (FHS) e Teoria de Valores Extremos (EVT) fornecem o menor número de violações e o menor número de falhas de modelo em relação à cobertura incondicional, cobertura condicional e independência das estimativas. No entanto, na maioria das vezes, o procedimento paramétrico fornece boas estimativas e, geralmente, não se pode rejeitar as hipóteses nulas de cobertura incondicional, cobertura condicional e independência das estimativas do VaR. Além disso, usando o método de correção de valores atípicos de Ané, Ureche-Rangau, Gambet e Bouverot (2008), várias conclusões foram chegadas. O número de violações permaneceu quase o mesmo em todas as carteiras e o VaR médio diminuiu, o que é importante para muitas instituições devido a exigências de capital. No entanto, a normalidade foi rejeitada em todas as carteiras, contrastando com o que Ané et al. (2008) encontram em seu artigo quando afirmam que, aplicando o método de correção de valores atípicos, a normalidade não pode ser rejeitada nas suas carteiras.

Palavras chave: carteiras, estimação, valores atípicos, *value-at-risk* (VaR), VaR médio.

Backtesting value-at-risk on portfolios of lottery-like stocks

Abstract

The goal of this study is to calculate value-at-risk (VaR) on portfolios of lottery-like stocks based in the U.S market. Lottery-like stocks are assets with a small probability of a large positive return in the future (Bali, Cakici, & Whitelaw, 2011). The method used to identify lottery-like stocks is based on Bali et al. (2011), and it consists in sorting stocks by their maximum daily return during the previous month. Additionally, outlier correction methods are used to correct for possible model misspecifications and invalid inferences. The total sample consists of 40 different portfolios created from 2007 to 2016. The forecasting period was set to 250 days for all portfolios. The results suggest that, when not correcting for outliers, the Filtered Historical Simulation (FHS) and Extreme Value Theory (EVT) procedures provide the least number of violations and the least number of model failures in respect to the unconditional coverage, conditional coverage and independence tests. However, most of the time, the parametric procedure provides good estimates and, generally, one cannot reject the null hypotheses of unconditional coverage, conditional coverage and independence of the VaR estimates. Furthermore, using the outlier correction method of Ané, Ureche-Rangau, Gambet and Bouverot (2008), several conclusions were found. The number of violations remained almost the same in all portfolios and the mean VaR decreased which is important for many institutions due to capital requirements. However, normality was still rejected in all portfolios contrasting to what Ané et al. (2008) find in their paper when they state that, by applying their outlier correction method, normality cannot be rejected in their portfolios.

Keywords: estimation, mean VaR, outliers, portfolios, value-at-risk (VaR).

Index

List of figures

List of tables

List of Appendices

1. Introduction

Downside risk measures are alternative risk measures that are useful in indicating the vulnerability of a portfolio to extreme negative returns. They are important because they provide an estimate of potential loss during a holding period given a certain probability. Therefore, these measures have a great meaning among investors, company risk managers and financial regulators regarding risk. For example, the Basel Committee on Bank Supervision (BCBS) center their Basel Accords extensively on these measures. Looking at the literature, the most researched downside risk measure is the value-at-risk (VaR) measure. There are other downside risk measures such as the expected shortfall (ES). However, in this dissertation, only the VaR downside risk measure is considered because it is much more popular in the literature and because of the consensus in the literature regarding the tests that assess the quality of VaR.

Furthermore, there are stocks that possess features that resemble lotteries. These stocks are assets that usually have a small probability of a large positive return in the future (Bali et al., 2011) and had a very large return in the recent past. In fact, individual investors have a strong propensity for stocks with lottery-like characteristics and the demand for this type of stocks increases during economic downturns (Kumar, 2009). In addition, due to the presence of these high positive returns, these types of stocks are dominated by outliers. The problem is that outliers lead to model misspecifications, poor estimates and forecasts (Ané et al., 2008) and, because of this, the estimates of VaR in lottery stocks may be unreliable. So, the estimation of VaR using different volatility models and methods can be severely affected in lottery stocks due to outliers. It is important, then, to use different outlier correction methods to improve the model's forecasts and estimates of VaR.

Consequently, these types of stocks are chosen to see if the estimates of VaR really improved by detecting and correcting these outliers. Therefore, the goal of this dissertation is, initially, to apply several VaR estimation methods to calculate and backtest VaR and, thereafter, apply methods that are used to correct for the presence of outliers to improve the model's estimates and forecasts in these types of stocks due to the problems that outliers create in several estimation methods. In this context, this dissertation focuses on backtesting VaR on portfolios of lottery-like stocks based in the U.S. market. The main contribution of this dissertation to the literature regarding downside risk measures is to extend the analysis of previous papers by focusing on lottery-like stocks, the correction of its outliers when applying different methods and the importance of correcting for them in portfolios of lottery-like stocks using different methods. To the best of my knowledge, there is no investigation regarding the reasonability of

VaR on portfolios of lottery-like stocks. Also, as said before, individual investors have a strong propensity for stocks with lottery-like characteristics (Kumar, 2009). It is important to estimate measures that indicate vulnerability of a portfolio of lottery-like stocks to extreme negative returns to help these individual investors.

The total sample consists of 40 different portfolios created from 2007 to 2016. They are composed of equally and value-weighted returns. The forecasting period was set to 250 days and the estimation period to roughly 10 years for all portfolios. Moreover, as previously mentioned, backtesting exercises are applied to test our estimates of VaR for different types of methods. Backtesting is a way of evaluating the adequacy of our risk model. The purpose is to compare the ex-ante risk measure forecasts from the model with the ex-post realized portfolio returns (Christoffersen, 2011). In particular, the main backtest methods that are employed are the VaR backtests of unconditional coverage and conditional coverage introduced in Christoffersen (1998). Additionally, the Christoffersen and Pelletier (2004) independence test is applied.

The results show that the EVT and FHS models perform best. However, the parametric method does provide good estimates of VaR and most of the null hypotheses of unconditional coverage, conditional coverage and independence are not rejected. Furthermore, using the outlier correction method of Ané et al. (2008), the number of violations remained almost the same in all portfolios and the mean VaR decreased which is important for many institutions due to capital requirements. However, only one combination of the many possible ways of substituting the outlier provided sensible and expected results. Additionally, by applying this method, normality was still rejected contradicting Ané et al. (2008) which state that normality is not rejected in their portfolios when the method is applied. Furthermore, the mean VaR of the EVT and FHS methods is higher than the parametric method. The mean VaR is much more variable in the 1% VaR estimates and the choice of conditional distribution matters in the parametric case. Finally, 5% VaR estimates have the highest number of model failures particularly during the crisis.

The remainder of the dissertation is organized as follows. Part 2 reviews the literature on lottery-like stocks, downside risk measures, outlier correction methods and backtesting. Part 3 presents the methodology that is going to be used and part 4 describes the data. In part 5, the empirical results are presented. Finally, in part 6, the main conclusions of the dissertation and some suggestions for future research can be found.

2. Literature Review

2.1 Lottery-like stocks

As previously mentioned, lottery-like stocks are assets with a small probability of a high return in the future (Bali et al., 2011). In fact, individual investors have a strong propensity for stocks with lottery-like characteristics (Bali et al., 2011) and the demand for this type of stocks increases during economic downturns (Kumar, 2009). In contrast, Kumar (2009) finds that, even though individual investors prefer stocks with lottery-like features, institutions exhibit a relative aversion for them.

Also, evidence supports that the propensity to gamble and the respective investment decisions are correlated (Kumar, 2009). Gao and Lin (2014) state that there is an implied substitution effect between the activity in which individual investors treat trading as an exciting gambling activity alike other gambling opportunities like lottery jackpots. They refer that it is the skewness feature as stated in Barberis and Huang (2008) and Kumar (2009) that implies the substitution effect. This preference, as described by the authors, can be explained by the existence of some investors that might overweight low probability events and exhibit a preference for stocks with positive skewness (Barberis & Huang, 2008). In fact, Markowitz (1952), in their seminal paper, state that some investors prefer to take large chances of small losses for a small chance of a very large gain.

Furthermore, there are socioeconomic factors that are associated with a greater investment in lottery-like stocks. Kumar (2009) documents that investors which are poor, young, less educated, that live in urban areas and belong to minority and religious groups are the heaviest lottery players and are the greatest investors in stocks with lottery features. Moreover, Kumar (2009) argues that the level of investment in lotteries is higher in regions with favorable lottery environments.

Regarding the performance of lottery-like stocks and portfolios based on lottery-like stocks, Kumar (2009) finds that investors who invest too much in these stocks experience indeed a greater underperformance and this underperformance is greater for low-income investors. Furthermore, Eraker and Ready (2015) suggest that the distribution of OTC stocks is highly positively skewed and find that the returns are extremely negative on average. Han and Kumar (2013) also find that these stocks earn a significant negative alpha. Nevertheless, Doran, Jiang and Peterson (2011), observe that lottery stocks outperform their counterparts in January but tend to underperform in other months of the year. Barberis and Huang (2008) argue that, because the skewness can be priced and not just the coskewness with the market, a positively skewed security can become overpriced and can earn negative excess returns which can be the cause of the underperformance because investors pay too much for the stocks. In fact, Bali

et al. (2011) find, through portfolio-level analyses and firm-level cross-sectional regressions, a negative and significant relation between the maximum daily return over the past one month (MAX) and expected stock returns. They suggest that investors pay too much for these stocks, exhibiting lower returns in the future. Walkshäusl (2014), using a similar methodology, find this relation in non-U.S. equity markets.

Because of the existence of these high positive returns in lottery-like stocks, this feature will induce high-volatility during the months where they occur, generating negative expectations regarding future returns. In fact, this literature is associated with findings of a relationship between stocks with high idiosyncratic volatility and subsequent low returns. For example, Ang, Hodrick, Xing and Zhang (2006) find that stocks with high exposure to aggregate volatility and high idiosyncratic volatility have low average returns. Also, in their following paper, Ang, Hodrick, Xing and Zhang (2009) suggest that stocks with recent past high idiosyncratic volatility have low future average returns around the world. However, recently, Bali et al. (2011) and Walkshäusl (2014), find that, by including the maximum daily return over the past one month (MAX), it reverses the puzzling negative relation of returns with high idiosyncratic volatility. This advocates that MAX is the true effect and idiosyncratic volatility is just a proxy.

Moreover, Conrad, Kapadia and Xing (2014) show that firms with a high probability of default have abnormally low average future returns and note that the stocks associated with those firms have positive skewness like lottery-like stocks, indicating that investors with a strong preference for positive skewness could overpay, leading to low subsequent returns.

Lottery-like stocks have different characteristics from the large universe of equity securities. Kumar (2009) indicates that lottery-like stocks have very low average market capitalization, low institutional ownership, a relatively high book-to-market ratio and lower liquidity. These stocks are also younger, have low analyst coverage and are mostly non-dividend paying stocks. In particular, they suggest that, to identify those stocks that could be perceived as lotteries, one has to find stocks with high stock-specific or idiosyncratic volatility, high stock-specific or idiosyncratic skewness, and low stock price. Gao and Lin (2014) also identify these stocks as those with high individual trading fraction, high past returns, low market capitalization, low earnings per share and high market-to-book. They further characterize such stocks as those with high skewness in which skewness is captured in three ways: the conventional measure of skewness, the mean minus the median divided by the standard deviation and the up-to-down volatility. Bali et al. (2011) also advocate that these stocks tend to be small and illiquid securities and find that lottery-like stocks are associated with high returns in the portfolio formation month and low returns over the prior 11 months.

2.2 Estimation methods for VaR

According to Engle and Manganelli (2004), VaR is the standard measure of downside risk used by financial institutions and regulators due to its simplicity. However, some authors state that the Expected Shortfall (ES) measure is a better alternative with better theoretical properties when compared with VaR. For example, Artzner, Delbaen, Eber and Health (1999) state that a risk measure must satisfy four axioms of translation: invariance, subadditivity, positive homogeneity, and monotonicity. They show that VaR fails to satisfy the subadditivity property and thus they show that it isn't a coherent risk measure. Indeed, for many years, the Basel Committee used VaR as a measure of risk under stress but, since 2016, the Basel Committee (2016) shifted from VaR to ES and still uses this measure till this day (Basel Committee, 2019). However, Cuoco, He and Isaenko (2008) show that VaR and ES risk measures lead to equivalent results if they are recalculated often. Still, VaR backtests are generally well established and more direct and the easiness of calculation is more straightforward for VaR.

Regarding the calculation of VaR estimates, there are several approaches to obtain them. One of such approaches is parametrically using a time-varying approach (RiskMetrics, 1996) and using volatility models to model the return dynamics. Examples of these volatility models are the GARCH model introduced by Bollerslev (1986) and the GJR model introduced by Glosten, Jagannathan and Runkle (1993). Other methods used to estimate VaR are semi-parametrically by Extreme Value Theory (McNeil & Frey, 2000) and non-parametrically through historical simulation (Pritsker, 2006) or using Filtered Historical Simulation (FHS) introduced by Barone-Adesi, Bourgoin and Giannopoulos (1998) and in a more recent paper by Barone-Adesi, Giannopoulos and Vosper (1999). The difference between parametric methods and non-parametric methods is that the first assumes that the returns follow a known probability distribution like the Normal or Student-t distribution and the other does not. Additionally, it is known, in the financial literature, that returns follow three major stylized facts: returns do not follow a normal distribution, are mostly uncorrelated (conditional mean equal to zero) and squared and absolute returns are positively autocorrelated. So, it is important to capture these return stylized facts when estimating VaR using the different VaR estimation methods.

Nevertheless, all methods have their strengths and weaknesses. One of the most used methods in the field is Historical Simulation (HS) and is precisely one of the methods with the most weaknesses. In fact, for U.S and International banks, the HS method is by far the most used method (Pérignon & Smith, 2010). HS is simply the density function of the empirical "past" returns. So, sorting the past returns in an ascending order, we can easily calculate VaR assuming that the distribution remains the same through

time. Therefore, given the simplicity of this method, it is widely used in practice because it does not require a specific model of the return dynamics and no numerical optimization is needed (Christoffersen, 2011). However, Pritsker (2006) suggests that large financial institutions compute VaR using historical simulation methods, but they do not fully understand their properties, finding that historical simulation-based methods are under-responsive to changes in conditional volatility and respond in an asymmetric way to risk changes. Pérignon and Smith (2010) also find that HS contains very little information regarding future volatility. In particular, Pritsker (2006) state that the measures of risk increase when the portfolio experiences large losses, but not when it earns large gains and because historical simulation (HS) assumes equal weights to each day return, it assumes indirectly that returns are independently and identically distributed (i.i.d.) through time which is not the case because of the stylized facts present in return series. Because of this, HS slowly reacts to changes in risk. Furthermore, McNeil and Frey (2000) also suggest that extreme quantiles are notoriously difficult to estimate and, if we consider long samples, the method is incapable of differentiate between periods of high and low volatility. Indeed, to surpass some of these difficulties, Richardson, Boudoukh and Whitelaw (1997) propose the Weighted Historical Simulation method, a variant of the family. They estimate the VaR measure of a portfolio by applying exponentially declining weights to past returns and then finding the appropriate percentile of this past empirical distribution. In fact, it is a hybrid approach because it combines RiskMetrics (1996) (because this method assumes that the weights on past squared returns decline exponentially as we move backward in time) and HS principles. Richardson et al. (1997) find that, using this method, VaR forecasts show a significant improvement. However, they point out that some of the severe HS problems still persist.

Furthermore, a more sophisticated variant of the historical simulation family appeared with the name of Filtered Historical Simulation (FHS) introduced by Barone-Adesi et al. (1998) and in a more recent paper by Barone-Adesi et al. (1999). First, FHS uses a GARCH or other variance model to filter the returns and the standardized residuals of the model are used to simulate a probability distribution of future returns and these are used to estimate the risk measures (Christoffersen, 2011). Because it uses a variance model to capture the stylized facts, FHS has much better results as seen in Barone-Adesi et al. (1998). Another interesting feature of the FHS method is that it can generate large losses in the forecast period, even without having observed a large loss in the recorded past returns (Christoffersen, 2011). Still, FHS has some problems because, as Pritsker (2006) states, the FHS risk estimates are variable in small samples and its assumption of constant correlations is violated in large samples. Furthermore, McNeil and Frey (2000) also states that FHS works well in large samples but in small datasets, EVT is the better method. Finally, FHS relies heavily on the recent series of standardized residuals (Christoffersen, 2011).

Another branch of statistics focuses on explicitly modelling the tails of the distribution. McNeil and Frey (2000), using Extreme Value Theory (EVT), concentrates on modelling the tails of the return's distribution and of those large extreme negative returns. The central result of this theory is that the extreme tail of a wide range of distributions can be approximated by a relatively simple distribution, the so-called Generalized Pareto Distribution (GPD) (Christoffersen, 2011). EVT has been shown to produce good results (McNeil & Frey, 2000) and has two features which makes it attractive to tail estimation: they are based on a sound statistical theory and they offer a parametric form for the tail of a distribution (Christoffersen, 2011). In fact, McNeil and Frey (2000) suggest that this approach reflects two stylized facts exhibited by most financial return series: stochastic volatility and the fat-tailedness of return distributions which is a great positive advantage in relation to HS. However, like FHS, it uses a variance model to filter the returns, and, therefore, these two methodologies are very similar. Still, Barone-Adesi, Giannopoulos and Vosper (2002) state that EVT cannot be used on derivative portfolios and the FHS methodology is needed to study this phenomenon. Longin (2000) also state that EVT covers unstable market conditions which are the focus of stress testing. Additionally, virtually all results in EVT assume that returns are i.i.d. and are not very useful. Even so, as proposed by Diebold, Schuermann and Stroughair (2000), the EVT methodology can be applied in the standardized residuals that we get from the estimated GARCH variance models to at least make them i.i.d and to get free of the return dynamics. This approach is followed by McNeil and Frey (2000). Moreover, there are multiple ways to model extreme values using EVT methodology. The most popular ways to apply the EVT methodology is through the block maxima approach or the peaks-over-threshold approach. This dissertation follows McNeil and Frey (2000) explicitly and, therefore, uses the peaks-over-threshold approach. However, like every methodology, EVT has problems, namely the choice of the threshold parameter (Christoffersen, 2011) in the case of the peaks-over-threshold approach. When choosing the threshold parameter we must balance bias and variance. If it is set too large, the tail estimation will be very noisy but if it is too small, then the EVT theory may not hold (Christoffersen, 2011).

VaR can also be estimated parametrically by RiskMetrics (1996) or by a GARCH family model. In this case, the variance models give us the estimates of conditional volatility and using the assumed distribution for the conditional returns, we calculate the VaR measure. The RiskMetrics (1996) model has some clear advantages. First, the variance changes are consistent with existing returns and it is easy to calculate the one step ahead variance using little data (Christoffersen, 2011). However, the RiskMetrics (1996) model does have certain shortcomings. For example, it does not allow for a leverage effect and it also does not

provide good long horizon forecasts because it is not stationary. More sophisticated models can better capture these features (Christoffersen, 2011).

As a final remark, there are other methods to estimate the risk measures. For example, Engle and Manganelli (2004) introduce the conditional autoregressive value at risk (CAViaR) model and Kuester, Mittnik and Paolella (2006) show that a particular extension of that model outperforms the others.

2.3 Outlier detection and correction methods

The presence of outliers can lead to model misspecifications, poor forecasts and invalid inferences (Ané et al., 2008). In fact, many studies regarding the application of GARCH models focus on the use of different conditional distributions to better account the excess skewness and kurtosis that is left in the estimated standardized residuals. Nevertheless, despite improvements, severe excess kurtosis and skewness is still existent which supports the idea that the cause of these features is the presence of outliers (Franses & Ghijsels, 1999). As previously mentioned, the focus of this dissertation is on lottery stocks and, due to exhibiting occasionally very large positive returns, they have many outliers, so it is important to find methods that can correct them in order to obtain the correct forecasts of the conditional variance to improve the estimates of VaR.

An example of such methods is the Ané et al. (2008) method. This consists of using an AR(1)–GARCH(1,1) model to calculate interval forecasts for one-step ahead returns that are then compared to realized returns to determine if we are in the presence of an outlier. The GARCH model, however, is only used as a filter and many types of GARCH family models can be used (Ané et al., 2008). So, on a particular window size, we estimate our benchmark model and calculate the interval forecasts and, if we detect an outlier, replace it by the one step ahead forecast (Ané et al., 2008). This is done successively until there are no more outliers. Ané et al. (2008) finds that their method improves greatly the forecasting performance of the conditional variance. Another example is the Franses and Ghijsels (1999) method. This one consists of applying the Chen and Lui (1993) method in the context of GARCH models. However, they only focus on the additive outliers and do not provide a method to apply to innovation outliers, level shifts and temporary changes.

Furthermore, Chen and Lui (1993) explain the different types of outliers which exist. First, the innovation outlier is the only type of outlier that its effects are dependent on the model chosen and, in a stationary series, it produces only a temporary effect. Moreover, the temporary changes outlier creates an initial effect that dies out slowly through time. Additive outliers, on the other hand, only cause an

immediate one-time effect and the level change type causes a permanent change in the series. In addition to this, Chen and Lui (1993) procedure does a good job in avoiding spurious outliers and masking effects and, thus, Franses and Ghijsels (1999) method also does a good job because it is based on the Chen and Lui (1993) method. Overall, through the implementation of the Franses and Ghijsels (1999) method, they find that the out-of-sample forecasting properties of the volatility, as defined in Pagan and Schwert (1990), significantly improve over GARCH and GARCH models with student-t innovations doing a good job correcting for outliers.

Comparing the different methods, the Franses and Ghijsels (1999) method has the advantage of being robust to spurious and masking effects and can be applied to various types of outliers which allows to differentiate between outliers. However, Ané et al. (2008) state the fact that the results of these methods are very dependent on the validity of the statistical tests for the standardized returns and thus on the distribution assumption. Because of this, values may be identified as outliers only due to the model misspecifications which is a serious disadvantage.

Finally, there are other authors that apply different methods to detect outliers. For example, Zhang and King (2005) apply influence diagnostics methods to detect outliers in a GARCH framework and find that the procedure is very effective. Also, Tsay (1998) develops a method to detect outliers, level shifts and variance changes in a univariate context and to determine if the outlier present in the data is temporary or lasting. However, none of these authors suggest a procedure to correct the presence of outliers, only to detect them, so the applications are limited in this context.

2.4 Backtesting

In general, when conducting the different backtests, the best performing methods are the FHS and the EVT when accounting for specific conditional distributions, according to the literature. Indeed, Barone-Adesi et al. (2002) state that the results support the suitability of the FHS methodology even though VaR is too high for swap portfolios at long term forecasts and too low for options and futures portfolios at short term forecasts (Barone-Adesi et al., 2002). Furthermore, Kuester et al. (2006) compare the out-of-sample performance of existing methods for VaR in a univariate context. They find that most approaches presented perform inadequately. However, combining a heavy-tailed (for example the skewed-t distribution) GARCH model to filter the variance dynamics with EVT (similar to McNeil and Frey (2000) method) performs best, followed by FHS. They also find that FHS performs relatively well in respect to the window length compared to other models and find that the choice of conditional distributions that account for the skewness and fat tails of returns is important and that these distributions are present

among the best models. Additionally, Kuester et al. (2006) find that, because the EVT and FHS models performance depends on the choice of distribution, these semi-parametric methods do indeed depend on the assumed distribution during the filtering stage. Still, the authors restrict themselves to one-step-ahead forecasts. Mittnik and Paolella (2000) and Giot and Laurent (2004), in the context of GARCH models, find that these models, when using a skewed student-t distribution, provide very good forecasting results. Similarly, Giot and Laurent (2003) find that the skewed student-t distribution outperforms models with a normal or student-t distribution in the context of parametric methods. Bekiros and Georgoutsos (2005) also find that EVT provides the best estimates of VaR compared with other models, like RiskMetrics, using a block maxima and peaks over a threshold approach and Brooks, Clare, Dalle Molle and Persand (2005) compare the different extreme value methods and find that the use of a generalized Pareto distribution performs best for horizons of 250 days. In another study, Berkowitz, Christoffersen and Pelletier (2011) state that the Engle and Manganelli (2004) CAViaR model performs best and all models perform well in relation to the duration-based tests. On the other hand, Bao, Lee and Saltoglu (2006) find that the forecasting performance of several VaR models change before, after and during the crisis that Asian economies faced during the period of 1997-1998.

3. Methodology

3.1 Lottery-like stocks identification

Bali et al. (2011) state that lottery-like stocks are associated with high returns in the portfolio formation month and low returns over the prior 11 months. Also, Bali et al. (2011) state that MAX is the true effect that generates negative expectations regarding future returns in stocks with lottery characteristics. Therefore, the MAX and MAX(5) methodology of Bali et al. (2011) presents itself as a method to identify lottery-like stocks. In this dissertation, it is the one used. It consists in sorting stocks by their highest daily return during the previous month. The difference between the two methods is that the MAX(5) is an average of the five highest daily returns over the previous month. The first step consists in calculating the maximum return per month per stock, and the average highest 5 returns per month per stock for the MAX(5) methodology. Then, in this dissertation, the stocks are divided in 10 quantiles according to the maximum return per month they had. The quantile that corresponds and is composed by the identified lottery-like stocks is the quantile 10. In contrast, the stocks with the lowest maximum return per month correspond to the quantile 1. After this, with the identified lottery-like stocks, portfolios are created, containing equally and value-weighted returns that are calculated with the identified stocks. To calculate value-weighted returns, the market capitalization at the end of period for each stock is used.

3.2 VaR estimation methods

Regarding the mathematical specification of the methodologies used to estimate VaR in this dissertation, I will present them in such a way that closely follows the book of Christoffersen (2011).

Because returns have better statistical properties than prices, risk modelling generally focuses on describing return dynamics. This dissertation uses simple returns and they are defined by the following expression where S_t is the price of the asset in time t.

$$r_{t+1} = \frac{S_{t+1} - S_t}{S_t} = \frac{S_{t+1}}{S_t} - 1$$

Given the limitations of the HS method to estimate VaR, volatility models are needed to provide better estimates. Assuming a generalized model for the return dynamics (Christoffersen, 2011) as

$$R_{t+1} = \mu_{t+1} + \sigma_{t+1} z_{t+1} \text{ where } z_{t+1} \sim i.i.d.\ D(0,1)$$

where the random variable z_{t+1} is the innovation term and assuming it follows an identically and independently distribution with zero mean and variance equal to one with a certain distribution D, the conditional mean of the return and the conditional variance is μ_{t+1} and ${\sigma^2}_{t+1}$ respectively. As stated before, because the conditional mean of returns tends to be zero, the following text assumes that $\mu_{t+1} = 0$.

Furthermore, having said this, the VaR measure is a simple risk measure that tries to answer the following question: "What loss is such that it will only be exceeded $p * 100\%$ of the time in the next K days?" Christoffersen (2011). In mathematical terms, VaR is frequently defined as dollars, so the $VaR loss is defined as the probability of having a larger loss

$$\Pr(\$Loss > \$VaR) = p$$

This means that $(1 - p) * 100\%$ of the time, the $Loss will be smaller than the VaR.

The VaR based on returns is given by

$$\Pr(R_{PF} < -VaR) = p$$

In this case, one would get a worse log return than the -VaR only with p probability. So, we are $(1 - p) * 100\%$ confident that the return will be higher than -VaR (Christoffersen, 2011). Kuester et al. (2006) state that VaR is usually computed for values of p between 1% and 5%. In this dissertation, VaR of 1% and 5% will be computed.

To calculate VaR, one can use the general model introduced before and let ${VaR^p}_{t+1}$ denote the $p * 100\%$ VaR one day ahead. Also, assuming that the returns are normally distributed with a standard deviation of $\sigma_{PF,t+1}$, we can transform our general model and assume a normal distribution in the innovations. The mathematical expression is given

$$R_{t+1} = \sigma_{t+1} z_{t+1} \text{ where } z_{t+1} \sim i.i.d.\ N(0,1)$$

The ${VaR^p}_{t+1}$ is then given by

$$\Pr\left(R_{PF,t+1} < -{VaR^p}_{t+1}\right) = p$$

$$\Pr\left(R_{PF,t+1}/\sigma_{PF,t+1} < -{VaR^p}_{t+1}/\sigma_{PF,t+1}\right) = p$$

$$\Pr\left(z_{t+1} < -{VaR^p}_{t+1}/\sigma_{PF,t+1}\right) = p$$

$$\phi\left(-{VaR^p}_{t+1}/\sigma_{PF,t+1}\right) = p$$

$${VaR^p}_{t+1} = -\sigma_{PF,t+1}{\phi^{-1}}_{p}$$

where ${\phi^{-1}}_{p}$ is the inverse of the cumulative density function of the standard normal distribution, which calculates the number such that $p * 100\%$ of the probability mass is below ${\phi^{-1}}_{p}$. Because the values for ${\phi^{-1}}_{p}$ are easily calculated, we only need an estimation of the volatility for the next day which is given by the different volatility models that characterize the volatility dynamics.

One of such models that characterize the volatility dynamics is the generalized autoregressive conditional heteroskedasticity GARCH(1,1) model of dynamic variance introduced by Bollerslev (1986), and it can be written as

$${\sigma^2}_{t+1} = \omega + \alpha R_t^2 + \beta {\sigma^2}_{t}, \qquad \text{with } \alpha + \beta < 1 \textit{ to ensure stationarity.}$$

The unconditional variance is then given by $\sigma^2 = \omega/(1-\alpha-\beta)$. Also, the general specification of this model as GARCH(p,q) has the following mathematical expression

$$R_t = \sigma_t z_t \text{ where } z_t \sim i.i.d.\ D(0,1)$$

$$e_t = \sigma_t z_t$$

$${\sigma^2}_t = \omega + \sum_{i=1}^{p} \alpha_i \, (e_{t-i})^2 + \sum_{j=1}^{q} \beta_j \, {\sigma^2}_{t-j}$$

This dissertation will also employ models that can capture the presence of asymmetric volatility. These models allow volatility to react in different ways to positive and negative shocks. One of those models generally used is the GJR (p,q) model introduced in Glosten et al. (1993).The GJR(1,1) model, for example, has the following mathematical expression

$$R_t = \sigma_t z_t \text{ where } z_t \sim i.i.d.\ D(0,1)$$

$$e_t = \sigma_t z_t$$

$$\sigma^2{}_t = \omega + \alpha(e_{t-1})^2 + \alpha^{-} S_{t-1}(e_{t-1})^2 + \beta\sigma^2{}_{t-1}$$

$$S_{t-1} = \begin{cases} 1 & if\ e_{t-1} \leq 0 \\ 0 & if\ e_{t-1} > 0 \end{cases}$$

Thus, based on the estimates of the GARCH/GJR, we can estimate the VaR based on the conditional volatility of the model and the assumed distribution, estimating the VaR parametrically.

Because the first GARCH models introduced with normal shocks (standardized residuals), by definition, do not capture conditional nonnormality in the returns due to high kurtosis and skewness different from zero, it is necessary to specify the distribution of the innovations so that the shocks z_t follow different distributions of returns such as the student-t or the asymmetric student-t distribution. So, we can define several distributions of the innovations that better account for the stylized facts of the returns. The first distribution that is tested in the dissertation is the standardized $\tilde{t}(d)$ distribution introduced in GARCH models by Bollerslev (1987) and its density is defined by

$$f_{\tilde{t}(d)}(z;d) = C(d)\left(1 + \frac{z^2}{d-2}\right)^{-\frac{(1+d)}{2}}, \qquad for\ d > 2\,, \qquad C(d) = \frac{\Gamma(\frac{d+1}{2})}{\Gamma(\frac{d}{2})\sqrt{\pi(d-2)}}$$

where $\Gamma(*)$ referes to the gamma function. The distribution only has one parameter (d) and it can be estimated by QMLE or MLE (Christoffersen, 2011). Also, for the kurtosis to be well defined, d must be higher than 4. The VaR given by this distribution is

$$VaR_{t+1}^{p} = -\sigma_{PF,t+1}\tilde{t}^{-1}{}_{p}(d)$$

where $\tilde{t}^{-1}{}_{p}(d)$is the pth quantile of the $\tilde{t}(d)$ distribution.

The other distribution which is used is a generalized, asymmetric version of the Student's t distribution introduced by Fernández and Steel (1998) where $d1 > 2$ and $-1 < d2 < 1$ in which VaR is given by the formula below

$$f_{\text{asyt}}(z; d1, d2) = \begin{cases} BC\left[1 + \frac{(Bz + A)^2}{(1 - d2)^2(d1 - 2)}\right]^{-\frac{(1+d1)}{2}}, & \text{if z} < -\frac{\text{A}}{\text{B}} \\ BC\left[1 + \frac{(Bz + A)^2}{(1 + d2)^2(d1 - 2)}\right]^{-\frac{(1+d1)}{2}}, & \text{if z} \geq -\frac{\text{A}}{\text{B}} \end{cases}$$

$$\text{A} = 4\text{d2C}\frac{d1 - 2}{d1 - 1}, \quad B = \sqrt{1 + 3d2^2 - A^2}, \quad C =, \qquad C(d) = \frac{\Gamma(\frac{d1 + 1}{2})}{\Gamma(\frac{d1}{2})\sqrt{\pi(d1 - 2)}}$$

$$VaR_{t+1}^{p} = -\sigma_{PF,t+1}\text{F}^{-1}{}_{asyt}(p; d1, d2)$$

$$\text{F}^{-1}{}_{asyt}(p; d1, d2) \; is \; the \; pth \; quantile \; of \; the \; asymmetric \; t \; distribution$$

In particular, in the backtests that will be implemented, it will be possible to see if, in fact, the distribution assumed for our z_t has an impact on the quality of the estimates of VaR.

The methods introduced before are parametric methods because they need an estimate of the conditional standard deviation for one day ahead given by the different volatility models assumed. As stated previously, there are non-parametric methods that are used to estimate VaR. FHS attempts to combine model-based methods of dynamic variance, such as GARCH type family model, with model-free methods of distribution (Christoffersen, 2011) and it is applied here. Assuming again a GARCH type model previously presented for our portfolio variance and assuming we are not making a specific distributional assumption about the standardized residuals (in the filtering stage we do assume some distribution) and given a sequence of past returns, $\{R_{PF,t+1-\tau}\}_{\tau=1}^{m}$, we can estimate then our GARCH(1,1) model, estimate our standard deviations and then calculate our standardized residuals as

$$\hat{z}_{t+1-\tau} = \frac{R_{PF,t+1-\tau}}{\sigma_{PF,t+1-\tau}} \quad for \; \tau = 1,2, \dots, m$$

$$\{\hat{z}_{t+1-\tau}\}_{\tau=1}^{m}$$

Given the set of standardized residuals $\{\hat{z}_{t+1-\tau}\}_{\tau=1}^{m}$, at the end of day t we obtain R_t and we calculate $\sigma^2{}_{t+1}$ using the GARCH model. After this, we draw randomly with replacement from our set of standardized returns $\{\hat{z}_{t+1-\tau}\}_{\tau=1}^{m}$ our historical $\hat{z}s$. This drawing can be accomplished, for example, by generating a discrete uniform random variable from 1 to m. In this dissertation, we apply FHS with bootstrap and, given the sequence of the future estimated returns, we calculate the different VaR quantiles. The number of bootstraps used is 10000.

After that, we build up a distribution of hypothetical returns as

$$\hat{z}_{1,1} \rightarrow \hat{R}_{1,t+1} \rightarrow \hat{\sigma}^2{}_{1,t+2} \quad \hat{z}_{1,2} \rightarrow \hat{R}_{1,t+2} \rightarrow \hat{\sigma}^2{}_{1,t+3} \quad \dots\dots \quad \hat{z}_{1,K} \rightarrow \hat{R}_{1,t+k}$$

$$/$$

$$\sigma^2{}_{t+1} - \quad \hat{z}_{2,1} \rightarrow \hat{R}_{2,t+1} \rightarrow \hat{\sigma}^2{}_{2,t+2} \qquad \hat{z}_{2,2} \rightarrow \widehat{\hat{R}_{2,t+2}} \rightarrow \hat{\sigma}^2{}_{2,t+3} \qquad \dots\dots \quad \hat{z}_{2,K} \rightarrow \hat{R}_{2,t+k}$$

$$\backslash \qquad \dots\dots \qquad\qquad \dots\dots\dots\dots \qquad\qquad \dots\dots\dots$$

$$\hat{z}_{FH,1} \rightarrow \hat{R}_{FH,t+1} \rightarrow \hat{\sigma}^2{}_{FH,t+2} \quad \hat{z}_{FH,2} \rightarrow \widehat{\hat{R}_{FH,t+2}} \rightarrow \hat{\sigma}^2{}_{FH,t+3} \quad \dots\dots \quad \hat{z}_{FH,K} \rightarrow \hat{R}_{FH,t+k}$$

where FH is the number of times we draw in the first day and K is number of days of the horizon.

Doing this, we get a set of hypothetical 1-day returns $\{\hat{R}_{i,t+1}\}_{i=1}^{FH}$ and using a similar intuitive formula to calculate VaR with percentiles as presented, we get

$$VaR^p{}_{t+1} = -Percentile(\{\hat{R}_{i,t+1}\}_{i=1}^{FH}, 100p)$$

Finally, we have the Extreme Value Theory (EVT) method which is the final estimation method applied. This dissertation follows McNeil and Frey (2000) explicitly and, therefore, uses the peaks-over-threshold approach. If we let μ be a threshold value on the horizontal axis of the histogram, the key result in extreme value theory is that if the threshold μ goes to infinity, the distribution of observations beyond the threshold y converges to the Generalized Pareto Distribution, $GPD(y;\xi,\beta)$

$$GPD(y;\xi,\beta) = \begin{cases} 1 - \left(1 + \dfrac{\xi y}{\beta}\right)^{-\frac{1}{\xi}}, & \text{if } \xi > 0 \\ 1 - \exp\left(-\dfrac{y}{\beta}\right), & \text{if } \xi = 0 \end{cases}$$

with $\beta > 0$ and $y \geq \mu$. The so-called tail-index parameter ξ is key as it controls the shape of the distribution tail (Christoffersen, 2011). For example, the Student's t distribution has a ξ value greater than zero whereas the normal distribution has a ξ value equal to zero.

The parameter ξ can be estimated by MLE. Following the methodology of McNeil and Frey (2000) that this dissertation applies, there is the necessity to apply a GARCH filter to the sequence of returns to at least transform the standardized residuals in an i.i.d series and to forecast the conditional standard deviation $\sigma_{PF,t+1}$ and conditional mean μ_{t+1}. After that, we estimate the ξ parameter of the EVT model, applied to the negative standardized residuals. Then, we calculate the VaR measure of the estimated

negative standardized residuals using the estimated EVT model by calculating the quantiles and we use the forecast of the conditional standard deviation $\sigma_{PF,t+1}$ and conditional mean μ_{t+1} to get the VaR of the portfolio as follows.[1]

$$VaR_{t+1}^{p} = \sigma_{PF,t+1}Q + \mu_{t+1}$$

where Q is the VaR estimated from EVT model. The filter suggested by McNeil and Frey (2000) to calculate the standardized residuals is an autoregressive AR(1)-GARCH(1,1). In this dissertation, different filters will be used. Additionally, as suggested by McNeil and Frey (2000), a 10% threshold is used so that 10% of the observations are used to estimate the tail of the EVT model.

So, to summarize, in this dissertation, the parametric VaR, the FHS and EVT methods are used. In particular 18 different models are used for the parametric VaR and for the FHS and EVT in the filtering stage, that comprise a normal distribution, a student-t distribution and a skewed student-t distribution as presented before. These 18 models include both the GARCH(1,1) and the GJR(1,1) model to capture the non-linear dependence. The choice of these volatility models is because the GARCH(1,1) is one of the most used models in the literature to forecast volatility and the GJR(1,1) has the advantage of reacting differently to shocks. For the linear dependence, several autoregressive moving average (ARMA) specifications are used in combination with the volatility models. Only 1-day Var estimates are calculated as in Kuester et al. (2006), and they are calculated using a rolling window for a forecasting period of 250 days (roughly one year) as in Brooks et al. (2005). The choice of a forecasting period of 250 days was because the Basel Committee states that banks should do backtests for horizons of 250 days and was also with the intention that our estimates would not overlap. The historical data for the estimation of the parameters was set to 10 years to provide good parameter estimates of the 18 different models. Finally, VaR of 1% and 5% are computed.

As a final remark, other mathematical specifications of the methods to estimate VaR and further conceptual discussion can be found in Dowd (1998), in McNeil, Frey and Embrechts (2005) and in Philippe (2001).

[1] To further help in employing this methodology, the book of Pfaff (2016) was used to help understand and modify the R code to my needs.

3.3 Outlier correction methods

Focusing on the outlier's correction methods, the method applied in this dissertation is the Ané et al. (2008) method. The authors include an AR(1) term together with the GARCH(1,1) model, so the conditional mean can vary, to illustrate their procedure. The model is presented with a certain distribution D as

$$R_t = \alpha_0 + \alpha_1 R_{t-1} + \sigma_t z_t \text{ where } z_t \sim i.i.d.\ D(0,1)\ \ where\ \varepsilon_t = \sigma_t z_t$$

$$\sigma^2{}_t = \omega + \alpha\varepsilon_{t-1}^2 + \beta\sigma^2{}_{t-1}$$

To apply the method, the one period- ahead return forecast and its predicted variance is calculated as

$$R_{t+1|t} = \alpha_0 + \alpha_1 R_t$$

$$\sigma^2{}_{t+1|t} = \omega + (\alpha + \beta)\sigma^2{}_t$$

and, depending on the assumed conditional distribution of standardized residuals, the confidence interval used to compare the realized return is given by

$$R_{t+1} \in [R_{t+1|t} \pm \mathrm{D}^{-1}{}_{p/2}\sigma^2{}_{t+1|t}]$$

where $\mathrm{D}^{-1}{}_{p/2}$ is the number such that $\frac{p}{2} * 100\%$ of the probability mass is below $\mathrm{D}^{-1}{}_{p/2}$ which depends on the distribution assumed. So, on a particular window size, we estimate our benchmark model and calculate the interval forecasts and, if we detect an outlier, replace it by the one step ahead forecast or by the upper and lower value of the confidence interval (Ané et al., 2008). The series is corrected iteratively until no outliers are left. Then, using the cleaned returns, the different estimation methods are applied. The method is, thus, applied to the total length of the series and the resulted series is then used to calculate VaR. Nevertheless, in FHS, the residuals from the raw return series provided from the estimated volatility models are used to forecast future returns, but the conditional mean and conditional variance forecasts used are the ones from the cleaned series. In EVT, the residuals from the raw return series provided from the estimated volatility models are used to estimate the GPD parameters and only the conditional mean and conditional variance forecasts are used for the rest of the expression. This is done to preserve the raw standardized residuals of the series and only to correct the forecasts of the conditional variance and conditional mean as many authors say they are inconsistent. In this method, p stands for the alpha used to construct the confidence interval. During the remaining sections of the

dissertation, when referring that an alpha of 5%, 1% or 0,5% was used to correct for outliers using this method, it refers to p and not the VaR level nor the level of significance used in the backtests. Furthermore, the methodology here applies to different types of ARMA-GARCH models. However, the AR(1)-GARCH(1,1) model is the one used in this dissertation as the filter when correcting for outliers as it is the one used by the authors. Additionally, the normal distribution is used to detect outliers and the window size is of roughly six years when applying it as in the Ané et al. (2008) method.

The method of Franses and Ghijsels (1999) was considered and implemented to some portfolios but, due to high computation times, VaR estimates for most portfolios were not calculated and, therefore, it is not used. However, a general description of the method is provided here. It is important to refer that Chen and Liu (1993) method to deal with additive outliers in an ARMA time series models is also presented here to give readers a solid base for the next GARCH based method. The methodology here presented closely follows Franses and Ghijsels (1999) demonstration. They present the empirical method to analyze the case of a single AO but multiple outliers can be dealt in iterative steps.

First, consider a univariate time series ${R_t}^*$ which can be described by the ARMA(p,q) model

$$\phi_p(L){R_t}^* = \theta(L)\varepsilon_t$$

$$(1 - \cdots - \phi_p L^p){R_t}^* = (1 + \cdots + \theta_q L^q)\varepsilon_t$$

where L is the general known lag operator and ε_t is our white noise process. We also assume that $\theta_q(z)$ and $\phi_p(z)$ are outside the unit circle. Therefore, an additive outlier model can be denoted as

$$R_t = {R_t}^* + \omega\Upsilon_t(\tau)$$

where

$$\Upsilon_t(\tau) = 1 \qquad t = \tau$$

$$\Upsilon_t(\tau) = 0 \qquad t \neq \tau$$

and ${R_t}^*$ is given by the ARMA(p,q) model. Hence, one observes R_t. However, if we fit an ARMA(p,q) to R_t, we can obtain the estimates of the residuals given by

$$\hat{\varepsilon}_t = \pi(L)R_t \quad , \quad \pi(L) = \frac{\phi(L)}{\theta(L)}$$

Modifying our additive outlier model which accounts for the residuals we get

$$\hat{\varepsilon}_t = \varepsilon_t + \omega\pi(L)\Upsilon_t(\tau)$$

which is a regression for the $\hat{\varepsilon}_t$:

$$\hat{\varepsilon}_t = \omega x_t + \varepsilon_t$$

$$x_t = 0 \qquad t < \tau$$

$$x_t = 1 \qquad t = \tau$$

$$x_{t+k} = -\pi_k \qquad t > \tau \quad and \quad k = 1\,, 2, \ldots$$

The estimation for ω which gives the impact of the AO at time $t = \tau$ is then given by

$$\widehat{\omega}(\tau) = \frac{\sum_{t=\tau}^{n} \hat{\varepsilon}_t x_t}{\sum_{t=\tau}^{n} x_t^2}\,, \quad t = 1\,, 2, \ldots, n$$

Now, it is interesting to test the significance of an AO but firstly we need to standardize $\widehat{\omega}(\tau)$. For the standardization we need an estimate of the variance of the residual process. Chen and Liu (1993) suggest three methods of estimation. In Franses and Ghijsels (1999), they present the omit-one method. This method computes the error variance from the sample where the observation at $t = \tau$ has been deleted. Representing the estimated error variance as $\hat{\sigma}_a$ we have

$$\hat{\tau} = \left[\frac{\widehat{\omega}(\tau)}{\hat{\sigma}_a}\right] / \left[\sum_{t=\tau}^{n} x_t^2\right]^{\frac{1}{2}}$$

So, when $\hat{\tau}$ exceeds some value C, the impact of the AO is significant. Because $\hat{\tau}$ is asymptotically standard normal, the value of C can be fixed at the usual level of 4. In case it exceeds, one adjusts the ${R_t}^*$ to correct for outliers by

$${R_t}^* = R_t - \widehat{\omega}\Upsilon_t(\tau)$$

Having set this, lets introduce the GARCH-AO correction method. Consider a return series R_t and consider the GARCH model presented before

$$R_t = \sigma_t z_t$$

$${\sigma^2}_t = \omega + \alpha R_{t-1}^2 + \beta {\sigma^2}_{t-1}$$

The focus of Franses and Ghijsels (1999) paper is on modifying the GARCH model by correcting AOs in z_t.

The GARCH equation can be reformulated as

$$R_t^2 = \omega + (\alpha + \beta)R_{t-1}^2 + Z_t - \beta Z_{t-1}$$

where $Z_t = R_t^2 - {\sigma^2}_t$ is heterogenous. This equation corresponds to an ARMA (1,1) model of R_t^2.

Thereafter, the first step is to estimate the parameters given by the GARCH model and estimate the time series for the conditional variance and standardized returns. Then we construct the time series of $\hat{Z}_t = \hat{R}_t^2 - {\hat{\sigma}^2}_t$ which is going to be used in the second step of examining the presence of the AOs. Following this, we can use the additive outlier model presented before that was used for the residuals and instead we can use it to model $\hat{Z}_t$. After this, we calculate our estimate of $\widehat{\omega_Z}(\tau)$. Next, although $\hat{Z}_t$ series is heterogenous, we calculate the unconditional omit-one variance as explained before and calculate our $\hat{\tau}$ statistics which is then going to be compared by a C value. The observation $\hat{Z}_t$ at $t = \tau$ with a value that exceeds C equal to 4 is then replaced by ${\hat{Z}_t}^*$ in a similar way as previously presented. With ${\hat{Z}_t}^*$ and ${\hat{\sigma}^2}_t$, we construct the time series $R_t^{2^*} = {\hat{Z}_t}^* - {\hat{\sigma}^2}_t$ at time $t = \tau$. Furthermore, we construct the AO-corrected returns as ${R_t}^* = R_t$ for $t \neq \tau$ and

$${R_t}^* = sign(R_t).\left(R_t^{2^*}\right)^{1/2} \text{ for } t = \tau$$

so, there is no sign reversal. The final step is, then, to repeat this procedure again and again to eliminate all the AOs present in the data and generate the one-step ahead forecasts of our conditional variance.

3.4 Backtesting methods

Moving forward, backtesting is a way of evaluating the adequacy of our risk model or downside risk measures. The purpose is, therefore, to compare the ex-ante risk measure forecasts from the model with the ex-post realized portfolio returns (Christoffersen, 2011). Recall that a VaR_{t+1}^p measure states that the actual return will only be worse $p * 100\%$ of the time. Given a time series of ex-ante risk forecasts and past ex post returns, we define the "hit sequence" of VaR violations as

$$I_{t+1} = \begin{cases} 1\,, & if\ R_{PF,t+1} < -VaR_{t+1}^p \\ 0\,, & if\ R_{PF,t+1} \geq -VaR_{t+1}^p \end{cases}$$

The hit sequence returns a 1 on day $t + 1$ if the loss on a given day is larger than the VaR predicted for that day in advance. If the VaR is not violated, then the hit sequence returns a 0. When backtesting, we construct a sequence $\{I_{t+1}\}_{t+1}^T$ across T days indicating when violations occurred.

Efficiency implies that the distribution of the sequence should be a Bernoulli variable that takes the value 1 with probability p and the value 0 with probability $(1-p)$. The null hypothesis is then given by

$$H_0 : I_{t+1} \sim i.i.d\ Bernoulli(p)$$

Having set this, we can now introduce the two tests specified in Christoffersen (1998) used in this dissertation. The first test is the test of unconditional coverage. The null hypothesis and the main goal of this test is to assess if the portion of violations obtained, call it π , is significantly different from the portion p. Under the null hypothesis, we can use a likelihood ratio test as

$$LR_{uc} = -2\ln\left(\frac{(1-p)^{To}p^{T1}}{\left(1-\frac{T1}{T}\right)^{To}\left(\frac{T1}{T}\right)^{T1}}\right) \sim \chi_1^2$$

where To and $T1$ are the number of 0s and 1s in the sample. The larger the LR_{uc}, the greater the probability of rejecting the VaR model because the null hypothesis is rejected.

The second test of Christoffersen (1998) is the conditional coverage test. We can test for independence and correct coverage using the conditional coverage test as

$$LR_{cc} = LR_{ind} + LR_{uc} \sim \chi_2^2$$

where LR_{ind} is the likelihood ratio of the Christoffersen (1998) independence test.

The third and final test used in this dissertation is the Christoffersen and Pelletier (2004) independence test due to having more power in smaller samples and more power against general forms of dependence. Also, as Christoffersen and Pelletier (2004) state, when capital losses are clustered through time, violation clustering could result in bankruptcy for many institutions. To explain the method and considering the duration of time between VaR violations, this should ideally be independent and not clustered. Under the null hypothesis, the no-hit duration should have no memory. Since the only memory-free continuous distribution is the exponential we need to specify an alternative that allows for duration dependence (Christoffersen & Pelletier, 2004). One of them is the Weibull distribution. Following Christoffersen and Pelletier (2004), when the $b = 1$, the Weibull represents the exponential distribution as a special case. So, in this test, we want to test the null hypothesis that $b = 1$, which is the null hypothesis of independence. If b is different from 1, this could be evidence of misspecified volatility dynamics (Christoffersen & Pelletier, 2004).

Further mathematical specification of the tests can be found in Christoffersen (1998) and in Christoffersen and Pelletier (2004).

4. Data

This dissertation will focus on portfolios of lottery-like stocks due to the impact outliers have in the estimates of VaR and due to the importance of correcting for them. As stated before, the MAX and MAX(5) methodology of Bali et al. (2011) is used to identify lottery-like stocks. Moreover, this dissertation focuses only in lottery-like stocks that are based in the U.S. market. The reason for choosing the U.S market is because it is a developed market with a very large number of traded stocks. The portfolio returns were calculated using stock data from the CRSP US Stock Database (2017). To clean the database and to focus only in ordinary common shares based in the U.S market, only stocks with a share code (SHRCD) of 10 and 11 are considered. This values represent ordinary common shares that have not been further defined and do not need to be further defined. Additionally, shares with error codes, as specified in the CRSP documentation, are excluded from the process of identification of lottery-like stocks.

The total sample consists of 40 different portfolios created from 2007 to 2016 in the month of June. The month of June is chosen to avoid possible January effects. They are composed of equally and value-weighted returns calculated with the identified lottery stocks as explained in the methodology and daily frequency is used. This means that, in each year, we have two portfolios created based on the MAX measure with equally and value-weighted returns and two portfolios created based on the MAX(5) measure with equally and value-weighted returns. This is done to increase the robustness of the results and to see if there are differences between lottery stock identification methods (MAX and MAX(5)) and return types (equally and value-weighted) in the estimation of VaR. The forecasting period was set to 250 days for all portfolios and the historical data for estimation was set to 10 years for all the portfolios. Thus, the length of each portfolio's series is more or less than 11 years. To give an example, a portfolio created in 2007 in the month of June has data from June 1997 until June 2008.

Before the creation of the portfolios, the stocks identified as lottery-like stocks in one year may be the same ones identified throughout the other years. Because of this, portfolios may be very similar. In general, based on the investigation performed, when comparing the stocks identified in different years, less than 30% of stocks were the same throughout the years for the MAX and MAX(5) methods of identification. Therefore, portfolios investigated have different characteristics as seen by the descriptive statistics and the stocks identified as lottery in one year may not be the same ones identified in other years.

The quantile with the identified lottery stocks is the quantile 10. The portfolios with the highest return stocks in the portfolio formation month are part of the quantile 10. So, it is expected that the highest maximum return belongs to the portfolios constructed using the quantile 10 identified lottery-like stocks. It is interesting to see what the differences in the maximum return between the portfolios created with the stocks in the quantile 10 and with the portfolios created with the stocks in quantile 1 are. According to table 1, we can see that the maximum return for the equally-weighted and value-weighted portfolios created through the MAX identification method is higher for the portfolios created with the stocks in the quantile 10 as expected. However, there are cases when the maximum return of the quantile 1 portfolios is higher than the quantile 10 portfolios. This seems unusual at first, but the method of identification of lottery-like stocks only sorts stocks by their highest daily return during the previous month and there is no real guarantee that the returns for the portfolios created with the stocks in the quantile 1 will surpass the maximum return of the portfolios created with the stocks in the quantile 10 somewhere along the series. Similar results were found when comparing for portfolios formed based on the MAX(5) measure. The table (table 8) is in the appendix A - in the appendices section of the dissertation.

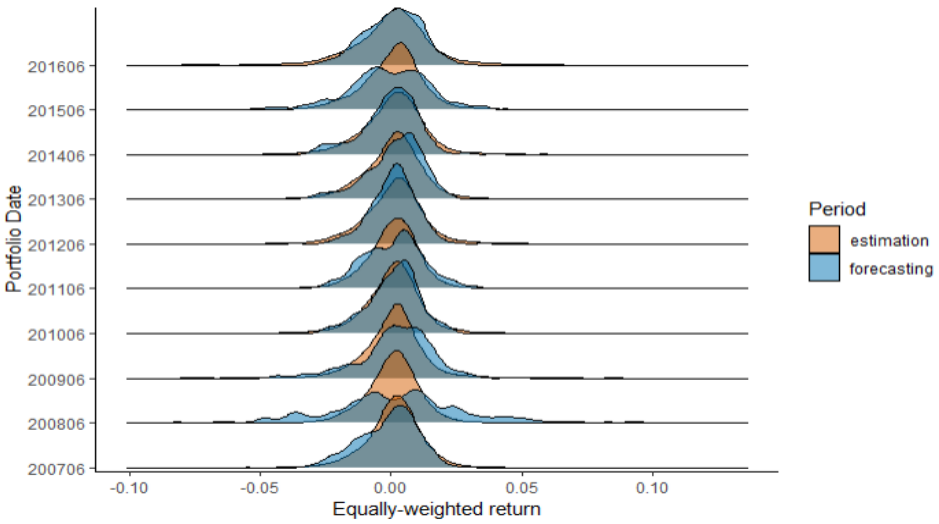
Table 1. Maximum return of the portfolios created using the identified stocks in the quantile 10 and quantile 1 for the total period (including the estimation and forecasting period).

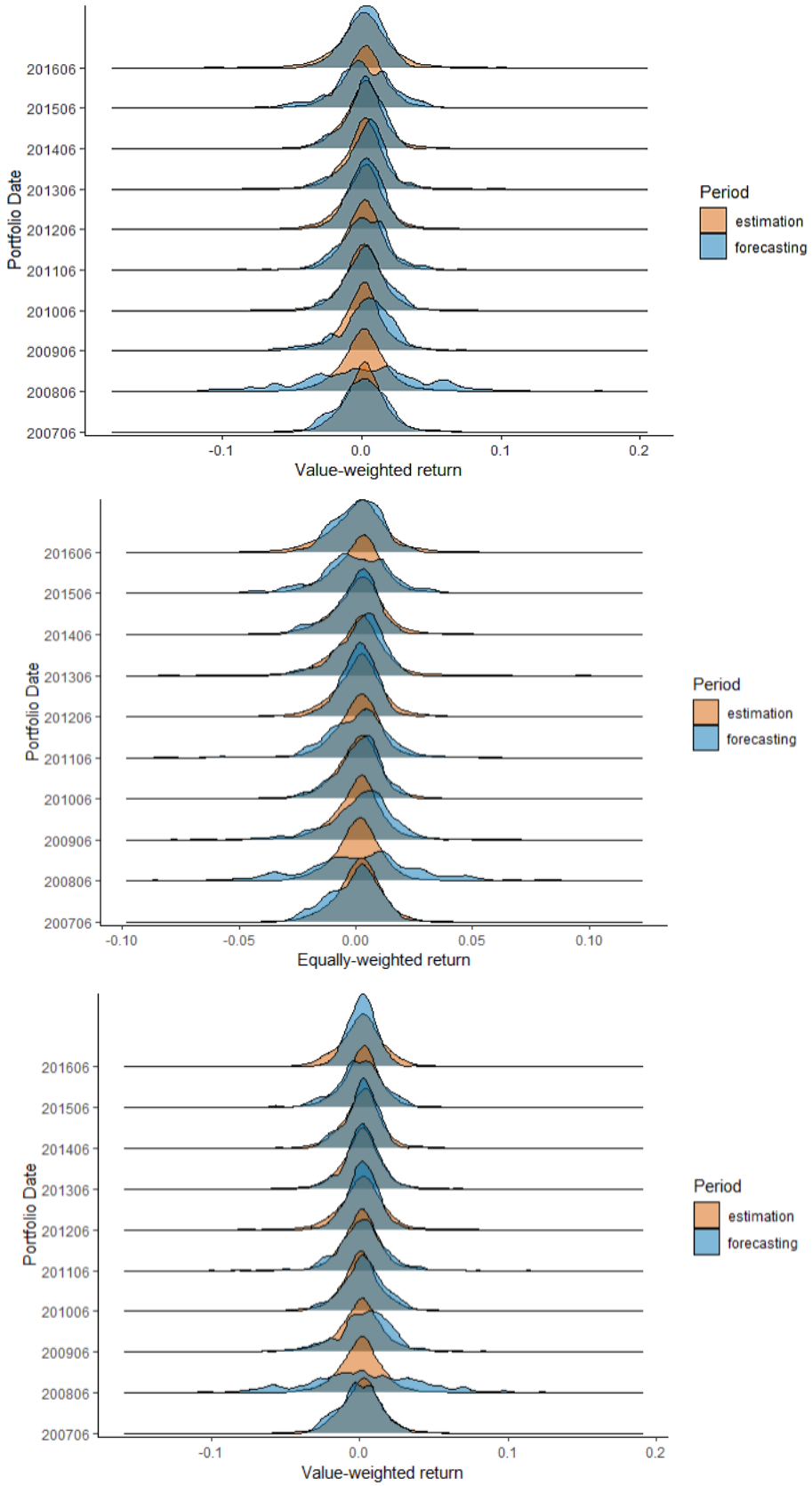
The stocks were identified with the Bali et al. (2011) MAX methodology. Details are available in the methodology section. Portfolio date refers to the year and month of the portfolio creation. Max stands for maximum return.

Quantile	Portfolio Date	Max - Equally-Weighted	Max - Value-Weighted
1	2007-06	0,039	0,052
10	2007-06	0,069	0,103
1	2008-06	0,041	0,054
10	2008-06	0,063	0,129
1	2009-06	0,083	0,106
10	2009-06	0,09	0,116
1	2010-06	0,077	0,098
10	2010-06	0,097	0,168
1	2011-06	0,095	0,098
10	2011-06	0,088	0,113
1	2012-06	0,085	0,1
10	2012-06	0,105	0,144
1	2013-06	0,093	0,122
10	2013-06	0,097	0,108
1	2014-06	0,1	0,107
10	2014-06	0,108	0,152
1	2015-06	0,1	0,112
10	2015-06	0,109	0,156
1	2016-06	0,088	0,111
10	2016-06	0,114	0,18

As previously mentioned, Bali et al. (2011) find that lottery-like stocks are associated with high returns in the portfolio formation month and low returns over the prior 11 months. It is expected, then, that the forecasting period of the portfolios (250 days) is different from the estimation period (10 years) in regard to the descriptive statistics and the density of the return distribution. As we can see from figure 1, which depicts the return densities of the portfolios created with the identified stocks in quantile 10 (lottery-stocks), the forecasting period and the estimation period densities are really different, especially during the crisis. Indeed, during the crisis, the forecasting period of the portfolios has a very high density of extreme positive and negative returns. It is after the crisis that the return densities are more similar. Furthermore, it is important to calculate several statistics to confirm that the return densities are different between the forecasting and estimation period. Even though the statistics are not reported here, the general finding is that the forecasting period has a low kurtosis when compared with the estimation period and the skewness is generally different. In some cases, the excess kurtosis and the skewness are very close to zero in the forecasting period whereas for the estimation period they are very high.

Figure 1. Return densities of the portfolios created with the identified stocks in quantile 10 (lottery-stocks). The first two figures correspond to the portfolios created using the identified stocks by the MAX(5) method and the remaining figures correspond to the portfolios created using the identified stocks by the MAX method of Bali et al. (2011). Portfolio date refers to the date of the portfolio creation and the type of return (value or equally-weighted) is on the bottom of each graph. The forecasting period here was set to 252 days for the 2007, 2008, 2009, 2011, 2013, 2014 and 2016 portfolios, to 253 days for the 2010 and 2015 portfolios and it was set to 249 days to the 2012 portfolios when calculating the forecasting densities, so the forecasting period was set to exactly one year.





As Kumar (2009) indicates that lottery-like stocks are stocks with high stock-specific or idiosyncratic skewness it is interesting to provide some descriptive statistics to see if our constructed portfolios agree with this statement. According to table 2, some conclusions follow. Indeed, in all portfolios created, the

excess kurtosis is positive, and the skewness is also different from zero, giving evidence that our series of returns do not follow a normal distribution. This is expected because, due to the nature of this stocks and the small probability of a very large return, the kurtosis tends to be higher than three. Indeed, to further check if our series of returns follow a normal distribution, we used the Jarque-Bera test. In all portfolios, the null hypothesis of normality was rejected, suggesting that returns do not follow a normal distribution. This suggests that the choice of conditional distributions that account for the skewness and fat tails of returns may be more suitable. With respect to the portfolios and the differences between them, we can see that the portfolios that possess value-weighted returns have a maximum return higher than the others and the highest standard deviation. Specifically, it is the portfolios created based on the identified lottery stocks by the MAX(5) method that also have the highest maximum return. Moreover, the maximum return increases the further way from the crisis the portfolios are created. Finally, there is a large range between the minimum return and the maximum return as it is expected in this type of portfolios.

Finally, after the implementation of the Ané et al. (2008) outlier correction method, some descriptive statistics for the cleaned returns are given in table 3. For presentation, an alpha (p) of 0,5% was used and the detected outliers were substituted by the upper and lower value of the confidence interval. As explained in the methodology section, the alpha here is not the VaR level nor the level of significance. Reasons for these particular choices are available in the results section of the dissertation. According to the table, compared with the descriptive statistics of the raw returns available in table 3, the excess kurtosis decreased in value for most of the portfolios. Additionally, the maximum return for most of the portfolios created in the year 2009, 2010, 2011 and 2012 decreased in value. The skewness of some portfolios turned negative and some got close to zero. The mean and the standard deviation did not change and, in general, normality was still rejected for all portfolios. This does not agree with the authors of the method because, when they applied the method, the standard deviation of the return distribution is significantly reduced, and normality cannot be rejected. In the case of these type of portfolios, normality is still rejected, and the standard deviation did not decrease.

Table 2. Descriptive statistics of the 40 portfolios created when they are not corrected for outliers.

The identification of each portfolio is made firstly by the year when the portfolio is created, followed by the method of identification of lottery-like stocks and, finally, the type of return. EW stands for equally-weighted and VW stands for value-weighed. N stands for the number of observations. These descriptive statistics are for the total period (including the estimation and forecasting period).

Portfolios	N	Mean	Min	Max	Standard deviation	Skewness	Excess Kurtosis
2007 MAX EW	2788	0,001	-0,089	0,069	0,01	-0,48	4,31
2007 MAX VW	2788	0,001	-0,085	0,103	0,02	0,21	3,53
2007 MAX(5) EW	2788	0,001	-0,092	0,077	0,01	-0,46	4,52
2007 MAX(5) VW	2788	0,001	-0,123	0,123	0,02	0,19	6,49
2008 MAX EW	2789	0,001	-0,086	0,086	0,01	0,04	5,94
2008 MAX VW	2789	0,001	-0,106	0,129	0,02	0,29	4,9
2008 MAX(5) EW	2789	0,001	-0,081	0,094	0,01	0,18	6,54
2008 MAX(5) VW	2789	0,001	-0,115	0,17	0,02	0,35	5,53
2009 MAX EW	2789	0,001	-0,078	0,089	0,01	0,02	6,49
2009 MAX VW	2789	0,001	-0,126	0,117	0,02	0,24	4,51
2009 MAX(5) EW	2789	0,001	-0,078	0,087	0,01	0,07	6,34
2009 MAX(5) VW	2789	0,001	-0,136	0,123	0,02	0,28	5,48
2010 MAX EW	2788	0,001	-0,067	0,097	0,01	0,01	6,92
2010 MAX VW	2788	0,001	-0,112	0,168	0,02	0,07	8,56
2010 MAX(5) EW	2788	0,001	-0,071	0,103	0,01	-0,07	6,49
2010 MAX(5) VW	2788	0,001	-0,126	0,178	0,02	-0,08	8,77
2011 MAX EW	2788	0,001	-0,082	0,089	0,01	-0,32	6,14
2011 MAX VW	2788	0,001	-0,1	0,113	0,01	0,03	4,61
2011 MAX(5) EW	2788	0,001	-0,082	0,09	0,01	-0,34	6,33
2011 MAX(5) VW	2788	0,001	-0,094	0,124	0,02	-0,12	4,62
2012 MAX EW	2789	0,001	-0,081	0,106	0,01	-0,36	6,55
2012 MAX VW	2789	0,001	-0,113	0,145	0,02	-0,02	6,23
2012 MAX(5) EW	2789	0,001	-0,088	0,112	0,01	-0,36	6,62
2012 MAX(5) VW	2789	0,001	-0,117	0,158	0,02	-0,03	6,47
2013 MAX EW	2790	0,001	-0,081	0,097	0,01	-0,3	5,31
2013 MAX VW	2790	0,001	-0,1	0,108	0,02	-0,16	5,55
2013 MAX(5) EW	2790	0,001	-0,079	0,098	0,01	-0,31	4,92
2013 MAX(5) VW	2790	0,001	-0,101	0,118	0,02	-0,14	5,18
2014 MAX EW	2790	0,001	-0,091	0,108	0,01	-0,3	6,07
2014 MAX VW	2790	0,001	-0,112	0,152	0,02	-0,06	8,43
2014 MAX(5) EW	2790	0,001	-0,093	0,107	0,01	-0,35	5,93
2014 MAX(5) VW	2790	0,001	-0,117	0,139	0,02	0,19	7,3
2015 MAX EW	2791	0,001	-0,084	0,109	0,01	-0,31	5,4
2015 MAX VW	2791	0,001	-0,113	0,156	0,02	-0,28	8,45
2015 MAX(5) EW	2791	0	-0,084	0,106	0,01	-0,33	4,68
2015 MAX(5) VW	2791	0,001	-0,129	0,186	0,02	-0,15	7,19
2016 MAX EW	2791	0,001	-0,088	0,115	0,01	-0,29	5,16
2016 MAX VW	2791	0,001	-0,149	0,181	0,02	-0,11	9,81
2016 MAX(5) EW	2791	0,001	-0,091	0,128	0,02	-0,28	5,27
2016 MAX(5) VW	2791	0,001	-0,168	0,192	0,02	-0,24	8,23

Table 3. Descriptive statistics of the 40 portfolios corrected for outliers using the Ané et al. (2008) outlier correction method.

The identification of each portfolio is made firstly by the year when the portfolio is created, followed by the method of identification of lottery-like stocks and, finally, the type of return. These statistics are calculated by applying the method with an alpha of 0,5% and only by substituting the outlier by the upper and lower value of the confidence interval. EW stands for equally-weighted and VW stands for value-weighed. N stands for the number of observations. Descriptive statistics are for the total period (including the estimation and forecasting period).

Portfolios	N	Mean	Min	Max	Standard deviation	Skewness	Excess Kurtosis
2007 MAX EW	2788	0,001	-0,089	0,069	0,01	-0,46	4,34
2007 MAX VW	2788	0,001	-0,085	0,103	0,02	0,21	3,54
2007 MAX(5) EW	2788	0,001	-0,092	0,077	0,01	-0,45	4,55
2007 MAX(5) VW	2788	0,001	-0,124	0,123	0,02	0,19	4,39
2008 MAX EW	2789	0,001	-0,082	0,083	0,01	0,09	5,3
2008 MAX VW	2789	0,001	-0,106	0,123	0,02	0,23	4,45
2008 MAX(5) EW	2789	0,001	-0,079	0,092	0,01	0,17	5,84
2008 MAX(5) VW	2789	0,001	-0,115	0,154	0,02	0,28	4,75
2009 MAX EW	2789	0,001	-0,078	0,084	0,01	0,03	5,95
2009 MAX VW	2789	0,001	-0,126	0,117	0,02	0,22	4,33
2009 MAX(5) EW	2789	0,001	-0,078	0,083	0,01	0,08	5,91
2009 MAX(5) VW	2789	0,001	-0,136	0,117	0,02	0,24	5,24
2010 MAX EW	2788	0,001	-0,067	0,084	0,01	-0,05	5,98
2010 MAX VW	2788	0,001	-0,12	0,128	0,02	-0,1	6,62
2010 MAX(5) EW	2788	0,001	-0,071	0,079	0,01	-0,16	5,37
2010 MAX(5) VW	2788	0,001	-0,126	0,136	0,02	-0,19	6,75
2011 MAX EW	2788	0,001	-0,062	0,07	0,01	-0,18	4,44
2011 MAX VW	2788	0,001	-0,1	0,094	0,01	-0,001	3,92
2011 MAX(5) EW	2788	0,001	-0,067	0,068	0,01	-0,22	4,53
2011 MAX(5) VW	2788	0,001	-0,094	0,104	0,02	-0,12	3,78
2012 MAX EW	2789	0,001	-0,067	0,075	0,01	-0,31	4,17
2012 MAX VW	2789	0,001	-0,113	0,114	0,02	-0,02	5,07
2012 MAX(5) EW	2789	0,001	-0,079	0,08	0,01	-0,32	4,49
2012 MAX(5) VW	2789	0,001	-0,117	0,128	0,02	-0,02	5,4
2013 MAX EW	2790	0,001	-0,08	0,097	0,01	-0,17	4,79
2013 MAX VW	2790	0,001	-0,1	0,108	0,02	-0,1	5,27
2013 MAX(5) EW	2790	0,001	-0,072	0,098	0,01	-0,17	4,41
2013 MAX(5) VW	2790	0,001	-0,101	0,118	0,02	-0,13	4,83
2014 MAX EW	2790	0,001	-0,091	0,108	0,01	-0,2	5,67
2014 MAX VW	2790	0,001	-0,112	0,152	0,02	-0,06	8,21
2014 MAX(5) EW	2790	0,001	-0,093	0,107	0,01	-0,23	5,44
2014 MAX(5) VW	2790	0,001	-0,117	0,134	0,02	-0,06	5,66
2015 MAX EW	2791	0,001	-0,082	0,109	0,01	-0,21	5
2015 MAX VW	2791	0,001	-0,113	0,156	0,02	-0,21	8,34
2015 MAX(5) EW	2791	0,001	-0,073	0,106	0,01	-0,22	4,14
2015 MAX(5) VW	2791	0,001	-0,129	0,186	0,02	-0,1	7,07
2016 MAX EW	2791	0,001	-0,088	0,115	0,01	-0,29	5,18
2016 MAX VW	2791	0,001	-0,149	0,181	0,02	-0,12	9,92
2016 MAX(5) EW	2791	0,001	-0,091	0,128	0,02	-0,28	5,31
2016 MAX(5) VW	2791	0,001	-0,168	0,192	0,02	-0,24	8,31

5. Results

Before presenting the results of the portfolios and the portfolios corrected for outliers, a few details are needed to be pointed out. First, many portfolios, especially during the crisis, had problems of convergence when estimating the methods with different filters. Also, the problems of convergence increased when the portfolios were corrected for outliers. These problems were remedied by applying multiple restarts to the nonlinear optimization using augmented Lagrange method solver. Furthermore, the NLopt free/open-source library of free nonlinear optimization routines and algorithms was used to solve problems of convergence that the first solution was not able to solve. The specific solvers used of this library were the augmented lagrangian algorithm (Conn, Gould & Toint, 1991) that is designed to emulate a Lagrangian multiplier, the Nelder-Mead Simplex algorithm (Nelder & Mead, 1965), the Subplex Algorithm which is a variant of the Nelder-Mead Simplex algorithm and the PRAXIS algorithm of Brent (2013).

Turning, now, to the results of the parametric VaR, FHS VaR and EVT VaR, table 4 illustrates the expected and realized violations, p-values of the backtests employed and the mean VaR of each method and ARMA-GARCH specification for the 250 VaR forecasts. The different 18 model specifications used are all presented in the table. Results are presented with respect to the VaR of 1% and 5%. Considering a level of significance of 5%, if the p-value is higher than or equal to the level of significance, the null of unconditional coverage, conditional coverage and independence of the VaR estimates cannot be rejected and the method/model combination was successful in respect to the particular test. Due to the large number of portfolios, table 4 illustrates the results for the portfolio created in 2016 using the MAX(5) identification method and composed of value-weighted returns. The choice of this portfolio was completely random. Looking at the table, the number of violations for the 1% VaR is lower in the FHS and EVT methods independently of the filter used. For the 5% VaR, the methods have the same performance regardless of the filter/model used. In general, one does not reject the null hypotheses of unconditional coverage, conditional coverage and independence for a level of significance of 5%. In fact, the choice of conditional distribution does not seem to matter for this particular portfolio, contrasting what Kuester et al. (2006) state when they find that the distributions that account for the fat tails and skewness are among the best methods. Regarding the mean VaR, the mean VaR for the 1% case is much more variable than the 5% case for the parametric, EVT and FHS method. Additionally, the mean VaR is higher for the1% VaR as expected and much more variable in the case of the parametric method. This is expected because the parametric VaR is much more dependent in the estimates of the conditional volatility and conditional

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,63	-0,036	12	11	0,66	0,54	0	-0,025
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,038	12	11	0,66	0,54	0,3	-0,024
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,63	-0,036	12	11	0,66	0,54	0,3	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,038	12	11	0,66	0,54	0,3	-0,024
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,63	-0,036	12	11	0,66	0,54	0,3	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,038	12	11	0,66	0,54	0,3	-0,024
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,83	-0,035	12	11	0,66	0,54	0,14	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,15	-0,037	12	12	0,88	0,54	0,2	-0,024
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,04	12	10	0,45	0,5	0,19	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,83	-0,035	12	11	0,66	0,54	0,14	-0,024
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,15	-0,037	12	12	0,88	0,54	0,2	-0,024
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,04	12	10	0,45	0,5	0,19	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,83	-0,035	12	11	0,66	0,54	0,14	-0,024
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,15	-0,037	12	12	0,88	0,54	0,2	-0,024
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,04	12	10	0,45	0,5	0,19	-0,025
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,04	12	10	0,45	0,5	0,19	-0,025
	ARMA(0,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	10	0,45	0,5	0,19	-0,025
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	10	0,45	0,5	0,19	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,04	12	10	0,45	0,5	0,19	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	10	0,45	0,5	0,19	-0,025
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	10	0,45	0,5	0,19	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,04	12	10	0,45	0,5	0,19	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	10	0,45	0,5	0,19	-0,025
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	10	0,45	0,5	0,19	-0,025
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,042	12	11	0,66	0,54	0,3	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,042	12	11	0,66	0,54	0,3	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,042	12	10	0,45	0,5	0,91	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,042	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,042	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,042	12	10	0,45	0,5	0,91	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,042	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,042	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,042	12	11	0,66	0,54	0,3	-0,027
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	10	0,45	0,5	0,19	-0,025
	ARMA(0,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,04	12	10	0,45	0,5	0,19	-0,025
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,04	12	10	0,45	0,5	0,19	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	10	0,45	0,5	0,19	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,04	12	10	0,45	0,5	0,19	-0,025
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,04	12	10	0,45	0,5	0,19	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	10	0,45	0,5	0,19	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	10	0,45	0,5	0,19	-0,025
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,04	12	10	0,45	0,5	0,19	-0,025

Table 4. VaR estimation results of the chosen portfolio when not corrected for outliers.

Portfolio created in 2016 using the MAX(5) identified lottery stocks and composed of value-weighted returns. Expected violations are denoted by Pred. Viola. and realized violations are denoted by Viol.. The p-values of the unconditional, conditional and independence tests used in this dissertation and the mean VaR of the 250 VaR forecasts that were calculated with each method and model combination are given. The different 18 model specifications used are all presented in the table. Results are presented with respect to the VaR of 1% and 5%. To interpret the table, consider a level of significance of 5%. If the p-value is higher than or equal to the level of significance of 5%, the null of unconditional coverage, conditional coverage and independence of the VaR estimates cannot be rejected and the method/model combination was successful in respect to the particular test.

mean than the FHS and EVT methods that can be considered to be semi-parametric methods. Furthermore, Kuester et al. (2006) state that EVT and FHS do indeed depend on the assumed distribution during the filtering stage but, in this portfolio, it does not seem to impact the performance. However, the choice of conditional distribution matters in the parametric case which is in line with Mittnik and Paolella (2000) and Giot and Laurent (2004).

The tables for the other portfolios are available in the appendix B - available in the appendices section of the dissertation. The tables go from table 9 until table 47. However, the general results are presented. For the 2007 portfolios, the parametric, EVT and FHS methods have almost the same number of violations across filters and the mean VaR is much more variable for the parametric case. Additionally, the mean VaR is the highest for the FHS and EVT cases. However, it can be pointed out that, sometimes, the number of violations increase with the FHS and EVT methods. In general, the 1% VaR estimates have a good performance in relation to the backtests but the 5% VaR fails the unconditional and conditional coverage tests for the three methods and for a significance level of 5%. Furthermore, the choice of identification method for the lottery-like stocks does not matter in respect to the backtests. However, the mean VaR is higher for the portfolios created with the MAX(5) methodology. For the 2008 portfolios, the portfolios composed of equally-weighted returns fail, sometimes, the unconditional coverage and conditional coverage tests for a significance level of 5% suggesting a high number of VaR violations. In all the remaining portfolios, the null hypotheses are not rejected and, therefore, the models are successful in estimating VaR. In respect to the independence test, the models have very good results and the number of violations is lower in the FHS and EVT methods. Also, the mean VaR is higher for the portfolios created with the MAX(5) methodology. For the 2009 portfolios, the three methods have a very good performance in respect to the 1% and 5% VaR. The mean VaR is less variable with the FHS and EVT methods. However, the equally-weighted portfolios seem to have very low p-values regarding the independence tests, suggesting that the VaR violations are clustered through time in these portfolios. For the 2010 portfolios, in the portfolios composed of value-weighted returns, the number of realized violations is lower than the expected violations in some cases. The number of violations is lower using the FHS and EVT methodology and the number of realized violations that are lower than the expected violations are higher for these methods. The mean VaR is much more variable in the 1% and parametric case. For the 2011 portfolios, p-values are very high for the FHS and EVT case. Depending on the choice of filter, in these portfolios, FHS and EVT lead to the best backtest results. For the 2012 portfolios, the p-values are again very high but, in the equally-weighted portfolios, the independence hypothesis is rejected for a level of significance of 5%. For the 2013 portfolios, there is generally a good performance for each method. However, the

independence hypothesis is rejected for a significance level of 10% suggesting that violations are clustered through time. Furthermore, the MAX(5) method leads to portfolios with a high number of violations. For the 2014 portfolios, in the equally-weighted portfolios, the parametric method has some null hypothesis rejections considering a significance level of 5% for all methods. Also, the mean VaR is higher for FHS and EVT and much more variable for the 1% case and parametric case. For the 2015 portfolios, the 5% VaR estimates have a poor performance in relation to the unconditional coverage and conditional coverage tests. For the 2016 portfolios, the number of the realized violations is lower than the expected violations in most cases. In fact, sometimes, for the 5% VaR, the number is so low that the p-value is zero and the null hypotheses are rejected. When looking at the overall sample, along the years, the number of violations seemed to decrease, especially in the 5% VaR, leading to better results in the backtests. In particular, the crisis is the period with the most model failures for the 5% VaR which is in line with Bao et al. (2006) when they find that the performance of several methods changes before, after and during the crisis that Asian economies faced during the period of 1997-1998. Also, the mean VaR is much more variable in the 1% case and in the parametric method. However, even though the EVT and FHS method generally are the better methods in estimating VaR, the parametric method did a fairly good job and most of the null hypotheses are not rejected. Also, the method of identification does not matter when looking at the number of model failures for each particular year.

In light of the above, it is interesting to see what the best method and filter combination is when accounting for all the universe of portfolios considered. Looking at table 5, we can see that the 5% VaR is the one with the most null hypothesis rejections. Also, the EVT and FHS method perform best in relation to the parametric which support the suitability of the FHS methodology as in Barone-Adesi et al. (2002) and of EVT (Bekiros & Georgoutsos, 2005), having the EVT a slight advantage as in Kuester et al. (2006). However, it is impossible to choose the best method and filter combination because some perform better in some tests than the others, but the choice of a skewed student-t distribution seems to cause a greater impact in the parametric case as in Giot and Laurent (2003). Tables for each type of portfolio were also created. The results are in the appendix C available in the appendices section of the dissertation. The tables go from table 48 until table 51. The conclusions are the same as the overall sample. However, the number of null hypothesis rejections is higher for the portfolios created with the MAX(5) method of Bali et al. (2011) and containing equally-weighted returns.

Moving forward, the results for the portfolios corrected for outliers follow. The method of Ané et al. (2008) was applied with an alpha (p) of 0,5% and the detected outliers were substituted by the upper and lower

value of the confidence interval. As explained in the methodology section, the alpha here is not the VaR level nor the level of significance. The reason for this particular choice is explained here with the help of the tables in appendix D that are available in the appendices section of the dissertation. Those tables correspond to the portfolio created in 2009 using the MAX identified lottery stocks and including value-weighted returns and go from table 52 until table 63. The tables in appendix D represent VaR estimation results for a forecasting period of 500 and 250 days and for combinations of three different alphas with the two different ways of substituting the outliers as stated in Ané et al. (2008). The tables in appendix D resemble table 4 of the dissertation and their analyses is done the same way. The alphas used are of 5%, 1% and 0,5% and the ways of substituting the outliers are by its predictive return and by the upper and lower value of the confidence interval. As we can see from the tables, when using an alpha (p) of 5% and by substituting the outliers by its predictive return, the number of violations is extremely high and the mean VaR is even positive. Even by substituting by the upper and lower value of the confidence interval, the number of violations increase a lot and most of the null hypotheses of unconditional and conditional coverage and independence are rejected for a significance level of 5%. When using an alpha (p) of 1% and the predictive return substitution, again the number of violations is extremely high and the mean VaR positive. Using the upper and lower value of the confidence interval, the results do improve. The number of violations remain almost the same when compared with the estimation results of the raw returns for the 250 days forecasting period but, for the 500 days forecasting period, the number of violations continues very high. Using an alpha (p) of 0,5% and the predictive return substitution, most of the null hypotheses of unconditional and conditional coverage and independence are again rejected for a significance level of 5%. Only by combining both an alpha (p) of 0,5% and the upper and lower value substitution, the null hypotheses of unconditional and conditional coverage and independence are not rejected for a significance level of 5% and the mean VaR decreases in most of the cases. Because of these results in respect to this particular portfolio, an alpha (p) of 0,5% and the upper and lower value substitution is applied for every single portfolio when applying the Ané et al. (2008) outlier correction method. Some additional estimations were performed to see if these results applied to other portfolios and, in most cases, they applied. The results found do not agree with the findings of the authors. Ané et al. (2008) state that an alpha of 5% enables a perfectly detection of outliers and that it does not matter how you substitute the outliers. In the case of these particular portfolios, the alpha and the way you substitute the outliers really does matter.

		1 % VaR			5 % VaR		
		N 1	N 2	N 3	N 1	N 2	N 3
Parametric	ARMA(0,0)-GARCH(1,1) - norm	13	8	5	10	5	4
	ARMA(0,0)-GARCH(1,1) - student-t	7	2	4	11	7	2
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	6	4	4	2
	ARMA(1,0)-GARCH(1,1) - norm	12	9	5	6	5	3
	ARMA(1,0)-GARCH(1,1) - student-t	6	3	4	10	6	2
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	5	5	4	1
	ARMA(1,1)-GARCH(1,1) - norm	12	8	6	8	6	2
	ARMA(1,1)-GARCH(1,1) - student-t	6	3	5	9	7	2
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	5	5	4	2
	ARMA(0,0)-GJR(1,1) - norm	14	8	3	8	2	4
	ARMA(0,0)-GJR(1,1) - student-t	4	2	4	10	3	2
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	5	4	2	5
	ARMA(1,0)-GJR(1,1) - norm	9	8	4	8	4	5
	ARMA(1,0)-GJR(1,1) - student-t	2	1	5	8	4	2
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	5	5	3	3
	ARMA(1,1)-GJR(1,1) - norm	12	8	4	8	6	4
	ARMA(1,1)-GJR(1,1) - student-t	4	2	3	8	6	4
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	3	5	4	4
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	0	6	5	5	2
	ARMA(0,0)-GARCH(1,1) - student-t	0	0	6	3	4	2
	ARMA(0,0)-GARCH(1,1) - skewed student-t	1	0	7	4	4	2
	ARMA(1,0)-GARCH(1,1) - norm	0	0	6	4	5	3
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	6	4	4	2
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	7	4	4	2
	ARMA(1,1)-GARCH(1,1) - norm	1	0	7	4	6	5
	ARMA(1,1)-GARCH(1,1) - student-t	0	0	7	4	4	5
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	8	4	4	5
	ARMA(0,0)-GJR(1,1) - norm	0	0	3	6	5	3
	ARMA(0,0)-GJR(1,1) - student-t	1	0	3	4	3	3
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	0	4	3	3	3
	ARMA(1,0)-GJR(1,1) - norm	0	0	5	7	3	1
	ARMA(1,0)-GJR(1,1) - student-t	0	0	5	5	3	3
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	6	3	3	3
	ARMA(1,1)-GJR(1,1) - norm	0	0	2	7	6	3
	ARMA(1,1)-GJR(1,1) - student-t	0	0	3	4	4	3
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	3	4	4	5
EVT	ARMA(0,0)-GARCH(1,1) - norm	1	0	6	6	5	3
	ARMA(0,0)-GARCH(1,1) - student-t	0	0	6	6	4	2
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	7	6	4	2
	ARMA(1,0)-GARCH(1,1) - norm	0	0	8	5	5	1
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	6	4	4	1
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	6	5	4	2
	ARMA(1,1)-GARCH(1,1) - norm	0	0	5	4	6	3
	ARMA(1,1)-GARCH(1,1) - student-t	0	0	5	6	4	3
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	5	6	4	3
	ARMA(0,0)-GJR(1,1) - norm	0	0	5	8	4	3
	ARMA(0,0)-GJR(1,1) - student-t	0	0	5	4	3	4
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	6	4	4	4
	ARMA(1,0)-GJR(1,1) - norm	0	0	6	8	3	1
	ARMA(1,0)-GJR(1,1) - student-t	0	0	5	6	3	4
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	7	5	3	3
	ARMA(1,1)-GJR(1,1) - norm	0	0	3	9	7	4
	ARMA(1,1)-GJR(1,1) - student-t	0	0	4	5	4	5
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	4	5	4	4

Table 5.Total number of null hypothesis rejections per combination of method and filter for all the 40 portfolios.

In this table, N 1 corresponds to the number of times the null hypothesis of unconditional coverage was rejected per combination of method and filter for all portfolios. Similarly, N 2 corresponds to the number of times the null hypothesis of conditional coverage was rejected, and N 3 corresponds to the number of times the null hypothesis of independence was rejected per combination of method and filter for all portfolios. A significance level of 5% was used.

Turning to the results for the parametric VaR, FHS VaR and EVT VaR applied to the corrected returns that are adjusted with the Ané et al. (2008) method, table 6 illustrates the expected and realized violations, p-values of the backtests employed and the mean VaR of each method and ARMA-GARCH specification for the 250 VaR forecasts. The different 18 model specifications used are all presented in the table. Results are presented with respect to the VaR of 1% and 5%. Considering a level of significance of 5%, if the p-value is higher than the level of significance, the null of unconditional coverage, conditional coverage and independence of the VaR estimates cannot be rejected and the method/model combination was successful in respect to the particular test. Due to the large number of portfolios, table 6 illustrates the results for the portfolio created in 2016 using the MAX(5) identification method and composed of value-weighted returns to compare with the table 4 results. Looking at the table, the number of violations for the 1% VaR is lower for the FHS and EVT method. For the 5% VaR, the methods perform almost the same regardless of the filter used. In general, one does not reject the null hypotheses of unconditional coverage, conditional coverage and independence of the VaR estimates for a level of significance of 5%. In fact, once more, the choice of conditional distribution does not seem to matter for this particular portfolio, contrasting what Kuester et al. (2006) state. The mean VaR is much more variable in the case of the parametric method and the choice of conditional distribution seems to matter in the parametric method which is in line with Mittnik and Paolella (2000) and Giot and Laurent (2004) find. Compared with table 4, the mean VaR of the methods is much lower for the portfolio when it is corrected for outliers and the number of violations and the p-values of the backtests do not show any significant differences. Additionally, the null hypotheses of unconditional coverage, conditional coverage and independence of the VaR estimates are not rejected for a significance level of 5% as in table 4. The outlier correction method, using the specific choices stated before, do improve the estimates of VaR because they reduce the mean VaR without sacrificing the power of the backtests. This is especially important for financial institutions and banks due to capital requirements. For the rest of the portfolios, the mean VaR is also reduced, with the portfolios created during the crisis having an increase in the mean VaR in some filters. Additionally, the violations do not change that much, and the conclusions presented before apply to the portfolios corrected for outliers. When looking at the overall sample, along the years, the number of violations seemed to decrease. Also, the mean VaR is much more variable in the 1% case and in the parametric method. However, even though the EVT and FHS method generally are the better methods in estimating VaR, the parametric method does again a good job estimating VaR. However, the number of violations is higher for the parametric method in relation to the EVT and FHS methods. The tables for the remaining portfolios are available in appendix E and go from table 64 until table 102.

Finally, it is interesting to see what the best method and filter combination is when correcting for outliers. Looking at table 7, we can see that the 5% VaR is the one with the most null hypothesis rejections again. Also, the EVT and FHS method perform best which corroborate with the suitability of the FHS methodology as in Barone-Adesi et al. (2002) and of EVT (Bekiros & Georgoutsos, 2005), having the EVT a slight advantage again. However, it is again impossible to choose the best method and filter combination when comparing the FHS and EVT methods, but the choice of a skewed student-t distribution causes a greater impact in the parametric case which is in line with Giot and Laurent (2003). Compared with table 5, the total number of null hypotheses rejections are higher for the portfolios corrected for outliers for the unconditional coverage, conditional coverage and independence tests. Nevertheless, the number of rejections does not show any significant increases when compared with the portfolios not corrected for outliers. Additionally, as stated before, the mean VaR of the analyzed portfolios decreased in value while achieving almost the same number of hypotheses rejections for the estimates of VaR using the raw returns which is important for many institutions. Therefore, given the importance of correcting for outliers in portfolios of lottery-like stocks, the Ané et al. (2008) methodology improved the estimates of VaR by decreasing the mean VaR and by achieving almost the same number of hypotheses rejections as for the portfolios when not corrected

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,28	-0,035	12	11	0,66	0,54	0,3	-0,024
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,63	-0,036	12	11	0,66	0,54	0,3	-0,024
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,039	12	11	0,66	0,54	0,3	-0,025
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,28	-0,035	12	11	0,66	0,54	0,3	-0,024
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,63	-0,036	12	11	0,66	0,54	0,3	-0,024
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,039	12	11	0,66	0,54	0,3	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,28	-0,035	12	11	0,66	0,54	0,3	-0,024
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,63	-0,036	12	11	0,66	0,54	0,3	-0,024
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,039	12	11	0,66	0,54	0,3	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,38	-0,034	12	11	0,66	0,54	0,14	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,2	-0,035	12	12	0,88	0,54	0,2	-0,024
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,038	12	11	0,66	0,54	0,14	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,38	-0,034	12	11	0,66	0,54	0,14	-0,024
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,38	-0,035	12	12	0,88	0,54	0,2	-0,024
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,038	12	11	0,66	0,54	0,14	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,38	-0,034	12	11	0,66	0,54	0,14	-0,024
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,2	-0,035	12	12	0,88	0,54	0,2	-0,024
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,038	12	11	0,66	0,54	0,14	-0,025
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,3	-0,025
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,04	12	11	0,66	0,54	0,3	-0,025
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,04	12	11	0,66	0,54	0,3	-0,025
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,3	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,04	12	11	0,66	0,54	0,3	-0,025
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,04	12	11	0,66	0,54	0,3	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,3	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,04	12	11	0,66	0,54	0,3	-0,025
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,04	12	11	0,66	0,54	0,3	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(0,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,039	12	11	0,66	0,54	0,14	-0,025
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,04	12	11	0,66	0,54	0,3	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,04	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,04	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,04	12	11	0,66	0,54	0,3	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,041	12	11	0,66	0,54	0,3	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(0,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,54	0,14	-0,025
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,039	12	11	0,66	0,54	0,14	-0,025

Table 6. VaR estimation results of the chosen portfolio when corrected for outliers using the Ané et al. (2008) method. Portfolio created in 2016 using the MAX(5) identified lottery stocks and composed of value-weighted returns. The method was applied with an alpha of 0,5% and only by substituting the outlier by the upper and lower value of the confidence interval. Expected violations are denoted by Pred. Viola. and realized violations are denoted by Viol.. The p-values of the unconditional, conditional and independence tests used in this dissertation and the mean VaR of the 250 VaR forecasts that were calculated with each method and model combination are given. Results are presented with respect to the VaR of 1% and 5%. To interpret the table, consider a level of significance of 5%. If the p-value is higher than the level of significance of 5%, the null of unconditional coverage, conditional coverage and independence of the VaR estimates cannot be rejected and the method/model combination was successful in respect to the particular test.

		1 % VaR			5 % VaR		
		N 1	N 2	N 3	N 1	N 2	N 3
Parametric	ARMA(0,0)-GARCH(1,1) - norm	13	10	6	12	6	2
	ARMA(0,0)-GARCH(1,1) - student-t	11	8	6	13	8	3
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	6	5	4	2
	ARMA(1,0)-GARCH(1,1) - norm	12	9	6	10	6	2
	ARMA(1,0)-GARCH(1,1) - student-t	8	6	6	11	7	3
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	4	6	4	1
	ARMA(1,1)-GARCH(1,1) - norm	13	7	6	11	6	3
	ARMA(1,1)-GARCH(1,1) - student-t	9	6	4	12	8	2
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	4	6	5	2
	ARMA(0,0)-GJR(1,1) - norm	14	9	3	11	2	2
	ARMA(0,0)-GJR(1,1) - student-t	11	7	3	13	2	2
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	5	5	2	4
	ARMA(1,0)-GJR(1,1) - norm	15	9	6	9	4	1
	ARMA(1,0)-GJR(1,1) - student-t	10	2	6	10	5	2
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	5	5	3	2
	ARMA(1,1)-GJR(1,1) - norm	15	8	5	9	5	3
	ARMA(1,1)-GJR(1,1) - student-t	10	5	5	10	6	4
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	0	4	8	5	4
FHS	ARMA(0,0)-GARCH(1,1) - norm	3	0	6	3	4	2
	ARMA(0,0)-GARCH(1,1) - student-t	2	0	5	3	4	2
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	0	6	4	4	2
	ARMA(1,0)-GARCH(1,1) - norm	2	0	5	5	4	2
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	5	5	4	2
	ARMA(1,0)-GARCH(1,1) - skewed student-t	1	0	4	5	4	2
	ARMA(1,1)-GARCH(1,1) - norm	2	0	6	4	4	4
	ARMA(1,1)-GARCH(1,1) - student-t	2	0	5	5	4	4
	ARMA(1,1)-GARCH(1,1) - skewed student-t	1	0	5	5	4	3
	ARMA(0,0)-GJR(1,1) - norm	2	0	4	6	5	3
	ARMA(0,0)-GJR(1,1) - student-t	3	1	5	6	2	4
	ARMA(0,0)-GJR(1,1) - skewed student-t	3	0	6	5	3	4
	ARMA(1,0)-GJR(1,1) - norm	2	0	6	7	4	2
	ARMA(1,0)-GJR(1,1) - student-t	2	0	4	6	4	3
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	0	5	5	4	3
	ARMA(1,1)-GJR(1,1) - norm	4	0	3	6	4	4
	ARMA(1,1)-GJR(1,1) - student-t	3	0	3	6	5	4
	ARMA(1,1)-GJR(1,1) - skewed student-t	4	0	4	6	5	4
EVT	ARMA(0,0)-GARCH(1,1) - norm	1	0	6	6	4	4
	ARMA(0,0)-GARCH(1,1) - student-t	1	0	5	5	4	4
	ARMA(0,0)-GARCH(1,1) - skewed student-t	1	0	6	5	4	2
	ARMA(1,0)-GARCH(1,1) - norm	0	0	5	6	4	1
	ARMA(1,0)-GARCH(1,1) - student-t	1	0	5	5	4	1
	ARMA(1,0)-GARCH(1,1) - skewed student-t	1	0	5	5	4	1
	ARMA(1,1)-GARCH(1,1) - norm	0	0	4	6	4	2
	ARMA(1,1)-GARCH(1,1) - student-t	1	0	4	6	4	2
	ARMA(1,1)-GARCH(1,1) - skewed student-t	1	0	3	6	4	2
	ARMA(0,0)-GJR(1,1) - norm	1	0	7	9	4	4
	ARMA(0,0)-GJR(1,1) - student-t	0	0	5	6	3	3
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	6	5	3	4
	ARMA(1,0)-GJR(1,1) - norm	1	0	8	8	4	2
	ARMA(1,0)-GJR(1,1) - student-t	0	0	6	8	4	4
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	6	5	4	2
	ARMA(1,1)-GJR(1,1) - norm	3	0	4	7	6	4
	ARMA(1,1)-GJR(1,1) - student-t	1	0	4	7	5	4
	ARMA(1,1)-GJR(1,1) - skewed student-t	1	0	5	7	5	4

Table 7 . Total number of null hypothesis rejections per combination of method and filter for all the 40 portfolios when they are corrected for outliers using the Ané et al. (2008) method.

In this table, N 1 corresponds to the number of times the null hypothesis of unconditional coverage was rejected per combination of method and filter for all portfolios. Similarly, N 2 corresponds to the number of times the null hypothesis of conditional coverage was rejected, and N 3 corresponds to the number of times the null hypothesis of independence was rejected per combination of method and filter for all portfolios. A significance level of 5% was used. The method was applied with an alpha of 0,5% and only by substituting the outlier by the upper and lower value of the confidence interval.

for outliers. Tables for each type of portfolio were also created. The results are in the appendix F section of the dissertation. The tables go from table 103 until table 106. Generally, the conclusions are the same as the overall sample.

6. Conclusion

This dissertation focused in the estimation of VaR on stocks that possess features that resemble lotteries. These stocks are assets that usually have a small probability of a large positive return in the future (Bali et al., 2011) and had a very large return in the recent past. Due to the presence of these high positive returns, these types of stocks are dominated by outliers. The problem is that outliers lead to model misspecifications, poor estimates and forecasts (Ané et al., 2008). Therefore, the estimates of VaR may be biased due to the presence of a high number of outliers. Consequently, portfolios of lottery-like stocks were chosen and constructed to see if the estimates of VaR really improved by detecting and correcting for these outliers.

In general, according to the literature, the best performing methods are the FHS and the EVT when accounting for specific conditional distributions when estimating VaR. Indeed, Barone-Adesi et al. (2002) state that the results support the suitability of the FHS and Kuester et al. (2006) find that most approaches presented perform inadequately. Kuester et al. (2006) state that only combining a heavy-tailed (for example the skewed-t distribution) GARCH model to filter the variance dynamics with EVT (similar to McNeil and Frey (2000) method) performs best, followed by FHS. They also find that FHS performs relatively well in respect to the window length and find that the skewed student-t distribution is among the best models. They conclude that the EVT and FHS model's performance depends on the choice of distribution. Similarly, Mittnik and Paolella (2000) and Giot and Laurent (2004), in the context of GARCH models, find that these models, when using a skewed student-t distribution, provide very good forecasting results. In another study, Berkowitz et al. (2011) state that the Engle and Manganelli (2004) CAViaR model performs best and all models perform well in relation to the duration-based tests and Bao et al. (2006) find that the forecasting performance of several VaR models change before, after and during the crisis that Asian economies faced during the period of 1997-1998. So, it was expected, in this dissertation, that the FHS and EVT methods would result in the best estimates of VaR when correcting and not correcting for outliers. Furthermore, when applying the outlier correction methods used in this dissertation, namely the Ané et al. (2008) outlier correction method, to correct the outliers present in the lottery-like portfolios constructed, it was expected that the estimates of conditional volatility would improve, thus improving the estimates of VaR in respect to the different backtests used in this dissertation.

The results show that the EVT and FHS model lead to best results when looking at the overall sample. However, the parametric method does provide good estimates of VaR and most of the null hypotheses of unconditional coverage, conditional coverage and independence are not rejected for a significance level of 5%. Also, the choice of conditional distribution matters in the parametric case which is in line with Mittnik and Paolella (2000) and Giot and Laurent (2004). However, Kuester et al. (2006) find that the skewed student-t distribution is among the best models in the FHS and EVT case. In this dissertation, the choice of conditional distribution does not impact the reliability of the VaR estimates for the FHS and EVT methods. Also, it was not possible to choose the best method and filter combination when looking at the overall sample and, in the FHS and EVT methods, no combination of filter produces significantly better results than the rest. Furthermore, using the outlier correction method of Ané et al. (2008), an alpha (p) of 0,5% was used and the outlier is substituted by the upper and lower value of the confidence interval. This alpha relates to the construction of the confidence interval and not the VaR level nor the significance level. Using other alphas (p), the number of violations were very high, and the null hypotheses of unconditional coverage, conditional coverage and independence are rejected for a significance level of 5%. Only by using this alternative, the number of null hypotheses rejections remained almost the same in all portfolios and the mean VaR decreased which is important for many institutions due to capital requirements. Furthermore, the mean VaR of the EVT and FHS methods is higher than the parametric method. The mean VaR is much more variable in the 1% VaR estimates and in the parametric case. Finally, 5% VaR estimates have the highest number of model failures but, when portfolios are created away from the crisis period, the estimates get better.

For future research, it is interesting to see how different lottery-like stock detection methods and different VaR estimation methods accounting for different conditional distributions and models change the performance of the VaR estimates for these type of portfolios. Also, it is interesting to see how the estimates of VaR perform for forecasting periods greater than 250 days. Finally, due to the increase importance of the ES measure, future research can be conducted to see how the estimates of ES perform in relation to portfolios of lottery-like stocks.

References

"Calculated (or Derived) based on data from *CRSP US Stock Database* ©2017 Center for Research in Security Prices (CRSP), The University of Chicago Booth School of Business."

Ané, T., Ureche-Rangau, L., Gambet, J. B., & Bouverot, J. (2008). Robust outlier detection for Asia–Pacific stock index returns. *Journal of International Financial Markets, Institutions and Money, 18(4)*, 326-343.

Ang, A., Hodrick, R. J., Xing, Y., & Zhang, X. (2006). The cross-section of volatility and expected returns. *The Journal of Finance, 61(1*), 259-299.

Ang, A., Hodrick, R. J., Xing, Y., & Zhang, X. (2009). High idiosyncratic volatility and low returns: International and further US evidence. *Journal of Financial Economics, 91(1*), 1-23.

Artzner, P., Delbaen, F., Eber, J. M., & Heath, D. (1999). Coherent measures of risk. *Mathematical finance, 9(3*), 203-228.

Bali, T. G., Cakici, N., & Whitelaw, R. F. (2011). Maxing out: Stocks as lotteries and the cross-section of expected returns. *Journal of Financial Economics, 99(2)*, 427-446.

Bao, Y., Lee, T. H., & Saltoglu, B. (2006). Evaluating predictive performance of value-at-risk models in emerging markets: a reality check. *Journal of forecasting, 25(2*), 101-128.

Barberis, N., & Huang, M. (2008). Stocks as lotteries: The implications of probability weighting for security prices. *American Economic Review, 98(5)*, 2066-2100.

Barone-Adesi, G., Bourgoin, F., & Giannopoulos, K. (1998). Don't look back.

Barone-Adesi, G., Giannopoulos, K., & Vosper, L. (1999). VaR without correlations for portfolios of derivative securities. *Journal of Futures Markets, 19(5*), 583-602.

Barone-Adesi, G., Giannopoulos, K., & Vosper, L. (2002). Backtesting derivative portfolios with filtered historical simulation (FHS). *European Financial Management, 8(1*), 31-58.

Basel Committee on Banking Supervision. (2016). ''Minimum capital requirements for market risk'' Available at http://www. bis.org.

Basel Committee on Banking Supervision. (2019). ''Minimum capital requirements for market risk'' Available at http://www. bis.org.

Bekiros, S. D., & Georgoutsos, D. A. (2005). Estimation of Value-at-Risk by extreme value and conventional methods: a comparative evaluation of their predictive performance. *Journal of International Financial Markets, Institutions and Money, 15(3*), 209-228.

Berkowitz, J., Christoffersen, P., & Pelletier, D. (2011). Evaluating value-at-risk models with desk-level data. *Management Science, 57(12*), 2213-2227.

Bollerslev, T. (1986). Generalized autoregressive conditional heteroskedasticity. *Journal of econometrics, 31(3)*, 307-327.

Bollerslev, T. (1987). A conditionally heteroskedastic time series model for speculative prices and rates of return. *Review of economics and statistics, 69(3*), 542-547.

Brent, R. P. (2013). *Algorithms for minimization without derivatives.* Courier Corporation.

Brooks, C., Clare, A. D., Dalle Molle, J. W., & Persand, G. (2005). A comparison of extreme value theory approaches for determining value at risk. *Journal of Empirical Finance, 12(2*), 339-352.

Chen, C., & Liu, L. M. (1993). Joint estimation of model parameters and outlier effects in time series. *Journal of the American Statistical Association, 88(421*), 284-297.

Christoffersen, P. (1998). Evaluating interval forecasts. *International economic review*, 841-862.

Christoffersen, P. (2009). *Value–at–risk models*. In Handbook of Financial Time Series (pp. 753-766). Springer, Berlin, Heidelberg.

Christoffersen, P. (2011). *Elements of financial risk management*. Academic Press.

Christoffersen, P., & Pelletier, D. (2004). Backtesting value-at-risk: A duration-based approach. *Journal of Financial Econometrics, 2(1*), 84-108.

Conn, A. R., Gould, N. I., & Toint, P. (1991). A globally convergent augmented Lagrangian algorithm for optimization with general constraints and simple bounds. *SIAM Journal on Numerical Analysis, 28(2*), 545-572.

Conrad, J., Kapadia, N., & Xing, Y. (2014). Death and jackpot: Why do individual investors hold overpriced stocks*?. Journal of Financial Economics, 113(3*), 455-475.

Cuoco, D., He, H., & Isaenko, S. (2008). Optimal dynamic trading strategies with risk limits. *Operations Research, 56(2*), 358-368.

Diebold, F. X., Schuermann, T., & Stroughair, J. D. (2000). Pitfalls and opportunities in the use of extreme value theory in risk management. *The Journal of Risk Finance, 1(2*), 30-35.

Doran, J. S., Jiang, D., & Peterson, D. R. (2011). Gambling preference and the new year effect of assets with lottery features*. Review of Finance, 16(3*), 685-731.

Dowd, K. (1998). *Beyond Value at Risk: The New Science of Risk Management, Frontiers in Finance Series.* John Wiley and Sons. England.

Engle, R. F., & Manganelli, S. (2004). CAViaR: Conditional autoregressive value at risk by regression quantiles. *Journal of Business & Economic Statistics, 22(4*), 367-381.

Eraker, B., & Ready, M. (2015). Do investors overpay for stocks with lottery-like payoffs? An examination of the returns of OTC stocks. *Journal of Financial Economics, 115(3*), 486-504.

Fernández, C., & Steel, M. F. (1998). On Bayesian modeling of fat tails and skewness. *Journal of the American Statistical Association, 93(441*), 359-371.

Franses, P. H., & Ghijsels, H. (1999). Additive outliers, GARCH and forecasting volatility. International *Journal of Forecasting, 15(1*), 1-9.

Gao, X., & Lin, T. C. (2014). Do individual investors treat trading as a fun and exciting gambling activity? Evidence from repeated natural experiments. *The Review of Financial Studies, 28(7*), 2128-2166.

Giot, P., & Laurent, S. (2003). Value-at-risk for long and short trading positions. *Journal of Applied Econometrics, 18(6*), 641-663.

Giot, P., & Laurent, S. (2004). Modelling daily value-at-risk using realized volatility and ARCH type models. *Journal of empirical finance, 11(3*), 379-398.

Glosten, L. R., Jagannathan, R., & Runkle, D. E. (1993). On the relation between the expected value and the volatility of the nominal excess return on stocks. *The journal of finance, 48(5*), 1779-1801.

Han, B., & Kumar, A. (2013). Speculative retail trading and asset prices. *Journal of Financial and Quantitative Analysis, 48(2*), 377-404.

Inclan, C., & Tiao, G. C. (1994). Use of cumulative sums of squares for retrospective detection of changes of variance. *Journal of the American Statistical Association, 89(427*), 913-923.

Kuester, K., Mittnik, S., & Paolella, M. S. (2006). Value-at-risk prediction: A comparison of alternative strategies. *Journal of Financial Econometrics, 4(1)*, 53-89.

Kumar, A. (2009). Who gambles in the stock market?. *The Journal of Finance, 64(4)*, 1889-1933.

Longin, F. M. (2000). From value at risk to stress testing: The extreme value approach. *Journal of Banking & Finance, 24(7)*, 1097-1130.

Markowitz, H. (1952). The utility of wealth. *Journal of political Economy, 60(2)*, 151-158.

McNeil, A. J., & Frey, R. (2000). Estimation of tail-related risk measures for heteroscedastic financial time series: an extreme value approach*. Journal of empirical finance, 7(3-4)*, 271-300.

McNeil, A. J., Frey, R., & Embrechts, P. (2005). *Quantitative risk management: Concepts, techniques and tools (Vol. 3)*. Princeton: Princeton university press.

Mittnik, S., & Paolella, M. S. (2000). Conditional density and value-at-risk prediction of Asian currency exchange rates. *Journal of Forecasting, 19(4)*, 313-333.

Morgan, J. P. (1996). Riskmetrics technical document.

Nelder, J. A., & Mead, R. (1965). A simplex method for function minimization. *The computer journal, 7(4)*, 308-313.

Pagan, A. R., & Schwert, G. W. (1990). Alternative models for conditional stock volatility. *Journal of econometrics, 45(1-2)*, 267-290.

Pérignon, C., & Smith, D. R. (2010). The level and quality of Value-at-Risk disclosure by commercial banks*. Journal of Banking & Finance, 34(2)*, 362-377.

Pfaff, B. (2016)*. Financial risk modelling and portfolio optimization with R*. John Wiley & Sons.

Philippe, J. (2001). *Value at risk: the new benchmark for managing financial risk*. NY: McGraw-Hill Professional.

Pritsker, M. (2006). The hidden dangers of historical simulation. *Journal of Banking & Finance, 30(2)*, 561-582.

Richardson, M., Boudoukh, J., & Whitelaw, R. (1997). The best of both worlds: A hybrid approach to calculating value at risk. *Risk, 11(5)*, 64-67.

Tsay, R. S. (1988). Outliers, level shifts, and variance changes in time series. *Journal of forecasting, 7(1)*, 1-20.

Walkshäusl, C. (2014). The MAX effect: European evidence. *Journal of Banking & Finance, 42*, 1-10.

Zhang, X., & King, M. L. (2005). Influence diagnostics in generalized autoregressive conditional heteroscedasticity processes. *Journal of Business & Economic Statistics, 23(1)*, 118-129.

Appendices

Appendix A. Maximum return of the portfolios created using the stocks identified in quantile 10 and quantile 1 with the MAX(5) methodology for the total period (including the estimation and forecasting period).

Quantile	Portfolio Date	Max – Equally-Weighted	Max – Value-Weighted
1	2007-06	0,037	0,054
10	2007-06	0,076	0,123
1	2008-06	0,038	0,055
10	2008-06	0,061	0,143
1	2009-06	0,082	0,106
10	2009-06	0,087	0,117
1	2010-06	0,073	0,096
10	2010-06	0,102	0,178
1	2011-06	0,095	0,099
10	2011-06	0,09	0,124
1	2012-06	0,085	0,105
10	2012-06	0,112	0,157
1	2013-06	0,087	0,12
10	2013-06	0,098	0,118
1	2014-06	0,099	0,105
10	2014-06	0,107	0,139
1	2015-06	0,104	0,106
10	2015-06	0,105	0,186
1	2016-06	0,084	0,103
10	2016-06	0,128	0,192

Table 8. Maximum return of the portfolios created using the identified stocks in the quantile 10 and quantile 1 for the total period (including the estimation and forecasting period). The stocks were identified with the Bali et al. (2011) MAX(5) methodology. Details are available in the methodology section. Portfolio date refers to the year and month of the portfolio creation. Max stands for maximum return.

Appendix B. VaR estimation results of the portfolios when not corrected for outliers. Help in how to read these tables is available in table 4.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,75	0,91	0,53	-0,031	12	20	0,04	0,02	0,15	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,032	12	20	0,04	0,02	0,15	-0,021
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,033	12	19	0,08	0,04	0,27	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,37	-0,031	12	19	0,08	0,04	0,34	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,75	0,91	0,53	-0,032	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,75	0,91	0,53	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,37	-0,031	12	19	0,08	0,04	0,34	-0,021
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,37	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,75	0,91	0,53	-0,034	12	19	0,08	0,04	0,27	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,031	12	18	0,13	0,08	0,11	-0,022
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,033	12	18	0,13	0,08	0,11	-0,022
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,034	12	17	0,21	0,13	0,13	-0,023
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,75	0,91	0,63	-0,032	12	14	0,67	0,4	0,23	-0,022
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,75	0,91	0,63	-0,033	12	17	0,21	0,13	0,13	-0,022
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,75	0,91	0,63	-0,034	12	16	0,33	0,21	0,24	-0,023
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,75	0,91	0,63	-0,032	12	16	0,33	0,21	0,43	-0,023
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,75	0,91	0,74	-0,033	12	17	0,21	0,13	0,23	-0,022
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,75	0,91	0,74	-0,035	12	15	0,48	0,3	0,43	-0,023
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,74	-0,031	12	19	0,08	0,04	0,27	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,75	0,91	0,53	-0,031	12	19	0,08	0,04	0,27	-0,022
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,75	0,91	0,53	-0,031	12	19	0,08	0,04	0,27	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,75	0,91	0,53	-0,031	12	19	0,08	0,04	0,27	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,75	0,91	0,53	-0,031	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,75	0,91	0,53	-0,031	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,37	-0,031	12	19	0,08	0,04	0,34	-0,022
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,37	-0,032	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,37	-0,032	12	20	0,04	0,02	0,15	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,031	12	19	0,08	0,04	0,09	-0,022
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,032	12	16	0,33	0,2	0,27	-0,022
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,032	12	16	0,33	0,2	0,27	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,032	12	17	0,21	0,13	0,27	-0,022
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,75	0,91	0,53	-0,032	12	17	0,21	0,13	0,23	-0,022
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,75	0,91	0,53	-0,032	12	17	0,21	0,13	0,23	-0,022
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,75	0,91	0,53	-0,032	12	17	0,21	0,13	0,23	-0,022
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,37	-0,032	12	16	0,33	0,2	0,43	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,37	-0,032	12	16	0,33	0,2	0,43	-0,023
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,74	-0,031	12	20	0,04	0,02	0,15	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,75	0,91	0,53	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,75	0,91	0,53	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,75	0,91	0,53	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,75	0,91	0,53	-0,033	12	19	0,08	0,04	0,34	-0,022
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,75	0,91	0,53	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,75	0,91	0,53	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,033	12	19	0,08	0,04	0,08	-0,022
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,033	12	19	0,08	0,04	0,15	-0,022
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,033	12	19	0,08	0,04	0,15	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,033	12	18	0,13	0,08	0,12	-0,022
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,033	12	18	0,13	0,08	0,12	-0,022
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,033	12	18	0,13	0,08	0,12	-0,022
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,032	12	18	0,13	0,08	0,35	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,032	12	18	0,13	0,08	0,35	-0,023

Table 9. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2007 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,74	-0,037	12	23	0,01	0,02	0,7	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,039	12	24	0,002	0,01	0,41	-0,025
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,04	12	22	0,01	0,03	0,75	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,75	0,92	0,53	-0,037	12	25	0,001	0,003	0,38	-0,026
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,039	12	25	0,001	0,003	0,38	-0,027
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,04	12	24	0,003	0,007	0,43	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,75	0,92	0,53	-0,037	12	24	0,003	0,007	0,29	-0,026
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,039	12	26	0,001	0,001	0,32	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,04	12	24	0,003	0,007	0,43	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,037	12	21	0,02	0,06	0,23	-0,026
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,039	12	21	0,02	0,06	0,23	-0,026
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,04	12	21	0,02	0,06	0,23	-0,026
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,037	12	22	0,01	0,01	0,2	-0,026
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,04	12	22	0,01	0,01	0,2	-0,026
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,04	12	22	0,01	0,01	0,2	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,038	12	23	0,003	0,02	0,33	-0,026
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,04	12	22	0,01	0,01	0,2	-0,026
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,04	12	22	0,01	0,01	0,2	-0,026
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,75	0,92	0,02	-0,036	12	23	0,003	0,02	0,7	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,75	0,92	0,02	-0,037	12	22	0,01	0,03	0,76	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,75	0,92	0,02	-0,037	12	22	0,01	0,03	0,76	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,75	0,92	0,53	-0,037	12	25	0,001	0,003	0,38	-0,026
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,75	0,92	0,53	-0,037	12	24	0,003	0,007	0,43	-0,026
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,73	-0,037	12	24	0,003	0,007	0,43	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,75	0,92	0,53	-0,037	12	23	0,003	0,02	0,35	-0,026
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,75	0,92	0,53	-0,037	12	24	0,003	0,007	0,43	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,75	0,92	0,53	-0,037	12	23	0,003	0,02	0,89	-0,027
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,75	0,92	0,02	-0,036	12	22	0,01	0,03	0,33	-0,026
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,037	12	22	0,01	0,03	0,33	-0,026
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,037	12	22	0,01	0,03	0,33	-0,026
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,75	0,92	0,13	-0,037	12	23	0,006	0,02	0,33	-0,026
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,75	0,92	0,13	-0,037	12	22	0,01	0,005	0,2	-0,026
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,75	0,92	0,13	-0,037	12	22	0,01	0,005	0,2	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,75	0,92	0,13	-0,037	12	23	0,006	0,02	0,33	-0,026
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,75	0,92	0,13	-0,037	12	21	0,02	0,01	0,55	-0,026
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,75	0,92	0,13	-0,037	12	21	0,02	0,01	0,55	-0,026
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,74	-0,038	12	23	0,003	0,02	0,7	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,039	12	24	0,003	0,007	0,42	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,039	12	23	0,003	0,02	0,7	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,74	-0,039	12	26	0	0	0,32	-0,026
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,039	12	25	0,001	0,003	0,38	-0,026
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,039	12	25	0,001	0,003	0,38	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,74	-0,039	12	26	0	0	0,32	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,039	12	25	0,001	0,003	0,38	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,039	12	25	0,001	0,003	0,38	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,038	12	22	0,01	0,03	0,33	-0,025
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,039	12	21	0,02	0,06	0,23	-0,026
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,039	12	22	0,01	0,03	0,33	-0,026
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,039	12	23	0,006	0,02	0,33	-0,026
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,75	0,92	0,12	-0,039	12	22	0,01	0,005	0,2	-0,026
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,75	0,92	0,12	-0,039	12	22	0,01	0,005	0,2	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,038	12	23	0,006	0,02	0,33	-0,026
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,75	0,92	0,12	-0,039	12	22	0,01	0,005	0,2	-0,026
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,75	0,92	0,12	-0,039	12	22	0,01	0,005	0,2	-0,026

Table 10. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2007 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,77	-0,023	12	27	0	0	0,04	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,86	-0,025	12	28	0	0	0,01	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	21	0,02	0,01	0,89	-0,017
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,339	0,28	-0,023	12	28	0	0	0,046	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,339	0,28	-0,025	12	30	0	0	0,02	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,28	0,64	0,47	-0,027	12	23	0	0	0,33	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,86	-0,024	12	24	0	0	0,15	-0,016
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,86	-0,025	12	23	0	0	0,11	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	22	0,01	0,005	0,09	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,339	0,33	-0,024	12	27	0	0	0,04	-0,016
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,86	-0,025	12	29	0	0	0	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,028	12	21	0,02	0,01	0,63	-0,017
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,339	0,28	-0,024	12	23	0	0	0,0499	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,339	0,28	-0,026	12	25	0	0	0,01	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	23	0	0	0,0499	-0,017
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,339	0,74	-0,024	12	23	0	0	0	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,32	-0,026	12	24	0	0	0	-0,017
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,61	-0,028	12	20	0,04	0,02	0,56	-0,018
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,64	-0,026	12	22	0,01	0,005	0,28	-0,017
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,64	-0,026	12	20	0,04	0,02	0,35	-0,017
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,026	12	20	0,04	0,02	0,81	-0,017
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,47	-0,026	12	22	0,01	0,005	0,27	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,47	-0,027	12	21	0,02	0,01	0,21	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,47	-0,027	12	21	0,02	0,01	0,21	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,64	-0,026	12	22	0,01	0,005	0,09	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,64	-0,027	12	20	0,04	0,02	0,11	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	20	0,04	0,02	0,11	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,64	-0,026	12	23	0	0	0,14	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,64	-0,027	12	21	0,02	0,01	0,21	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,026	12	20	0,04	0,02	0,36	-0,017
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,47	-0,026	12	22	0,01	0,005	0,22	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,64	-0,027	12	21	0,02	0,01	0,14	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	19	0,08	0,04	0,32	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,64	-0,026	12	22	0,01	0,005	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,32	-0,027	12	21	0,02	0,01	0,33	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,32	-0,027	12	23	0	0	0	-0,018
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,64	-0,027	12	22	0,01	0,005	0,68	-0,017
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,64	-0,027	12	23	0	0	0,07	-0,017
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	21	0,02	0,01	0,89	-0,017
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,47	-0,027	12	22	0,01	0,005	0,27	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,47	-0,027	12	21	0,02	0,01	0,21	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	22	0,01	0,005	0,27	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,64	-0,027	12	22	0,01	0,005	0,09	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,64	-0,027	12	21	0,02	0,01	0,04	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	22	0,01	0,005	0,09	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,64	-0,027	12	24	0	0	0,16	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,64	-0,027	12	22	0,01	0,005	0,12	-0,017
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	24	0	0	0,21	-0,017
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,64	-0,027	12	22	0,01	0,005	0,22	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,64	-0,028	12	22	0,01	0,005	0,02	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	23	0	0	0,0499	-0,017
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,64	-0,027	12	23	0	0	0	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,61	-0,028	12	21	0,02	0,01	0,003	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,61	-0,028	12	23	0	0	0	-0,018

Table 11. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2007 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,77	-0,024	12	30	0	0	0,02	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,47	-0,026	12	31	0	0	0,01	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,6	-0,029	12	21	0,02	0,01	0,4	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,6	-0,024	12	28	0	0	0,046	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,339	0,96	-0,026	12	30	0	0	0	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,28	0,64	0,47	-0,028	12	26	0	0	0,06	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,02	0,052	0,12	-0,024	12	26	0	0	0,02	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,32	-0,026	12	26	0	0	0,02	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,82	-0,028	12	26	0	0	0,02	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,77	-0,024	12	28	0	0	0,01	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,49	-0,026	12	28	0	0	0,01	-0,017
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,61	-0,029	12	21	0,02	0,01	0,4	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,339	0,96	-0,025	12	26	0	0	0,02	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,339	0,96	-0,027	12	29	0	0	0,01	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,27	-0,028	12	25	0	0	0,051	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,39	-0,025	12	26	0	0	0	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,37	-0,027	12	25	0	0	0	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,82	-0,028	12	23	0	0	0	-0,018
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,6	-0,027	12	22	0,01	0,005	0,12	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,6	-0,027	12	22	0,01	0,005	0,12	-0,018
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,6	-0,027	12	22	0,01	0,005	0,12	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,47	-0,027	12	25	0	0	0,09	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0	-0,028	12	24	0	0	0,14	-0,018
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0	-0,028	12	24	0	0	0,14	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,6	-0,028	12	26	0	0	0,02	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,82	-0,028	12	25	0	0	0	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,6	-0,028	12	25	0	0	0,02	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,28	0,64	0,49	-0,027	12	23	0	0	0,3	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,64	-0,027	12	22	0,01	0,005	0,21	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,6	-0,027	12	22	0,01	0,005	0,12	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0	-0,027	12	24	0	0	0,054	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,27	-0,028	12	24	0	0	0,02	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,27	-0,028	12	23	0	0	0,02	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,82	-0,027	12	25	0	0	0	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,37	-0,028	12	23	0	0	0,02	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,37	-0,028	12	22	0,01	0,005	0	-0,018
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,6	-0,028	12	22	0,01	0,005	0,12	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,6	-0,028	12	22	0,01	0,005	0,12	-0,018
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,6	-0,028	12	21	0,02	0,01	0,4	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0	-0,028	12	26	0	0	0,06	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0	-0,028	12	25	0	0	0,09	-0,018
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0	-0,028	12	25	0	0	0,09	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,6	-0,028	12	26	0	0	0,01	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,82	-0,028	12	25	0	0	0	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,6	-0,028	12	26	0	0	0,01	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,6	-0,028	12	23	0	0	0,3	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,6	-0,028	12	23	0	0	0,04	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,6	-0,028	12	21	0,02	0,01	0,4	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,82	-0,028	12	25	0	0	0,051	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,28	0,64	0,27	-0,029	12	24	0	0	0,02	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0	-0,029	12	25	0	0	0,051	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,82	-0,028	12	25	0	0	0	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,82	-0,029	12	23	0	0	0	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,82	-0,029	12	24	0	0	0	-0,018

Table 12. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2007 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,084	12	18	0,13	0,08	0,25	-0,059
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,01	-0,09	12	19	0,08	0,2	0,48	-0,059
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,091	12	18	0,13	0,08	0,25	-0,06
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,084	12	18	0,13	0,08	0,25	-0,059
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,089	12	18	0,13	0,08	0,25	-0,058
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,091	12	18	0,13	0,08	0,25	-0,059
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,084	12	20	0,04	0,11	0,38	-0,059
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,089	12	19	0,08	0,2	0,48	-0,059
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,091	12	18	0,13	0,08	0,25	-0,06
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,082	12	17	0,215	0,133	0,12	-0,058
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,085	12	17	0,215	0,133	0,12	-0,057
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,088	12	16	0,33	0,207	0,08	-0,059
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,082	12	16	0,33	0,207	0,14	-0,058
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,086	12	16	0,33	0,207	0,14	-0,057
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,088	12	15	0,48	0,3	0,09	-0,059
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,082	12	15	0,48	0,3	0,09	-0,058
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,085	12	16	0,33	0,207	0,23	-0,057
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,088	12	15	0,48	0,3	0,09	-0,059
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,089	12	16	0,33	0,207	0,27	-0,061
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,09	12	16	0,33	0,207	0,27	-0,062
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,09	12	16	0,33	0,207	0,27	-0,062
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,088	12	17	0,215	0,133	0,2	-0,061
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,089	12	17	0,215	0,133	0,2	-0,062
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,089	12	17	0,215	0,133	0,2	-0,062
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,088	12	17	0,215	0,133	0,2	-0,062
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,088	12	17	0,215	0,133	0,2	-0,062
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,089	12	17	0,215	0,133	0,2	-0,062
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,085	12	19	0,08	0,04	0,13	-0,057
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,085	12	18	0,13	0,08	0,25	-0,057
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,086	12	17	0,215	0,133	0,2	-0,057
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,085	12	17	0,215	0,133	0,2	-0,057
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,086	12	17	0,215	0,133	0,3	-0,058
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,086	12	17	0,215	0,133	0,3	-0,058
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,084	12	16	0,33	0,207	0,23	-0,057
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,085	12	16	0,33	0,207	0,23	-0,058
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,085	12	16	0,33	0,207	0,23	-0,058
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,092	12	17	0,215	0,133	0,33	-0,061
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,093	12	17	0,215	0,133	0,33	-0,062
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,093	12	17	0,215	0,133	0,33	-0,061
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,092	12	18	0,13	0,08	0,25	-0,061
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,093	12	18	0,13	0,08	0,25	-0,061
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,093	12	18	0,13	0,08	0,25	-0,061
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,093	12	18	0,13	0,08	0,25	-0,061
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,093	12	17	0,215	0,133	0,2	-0,061
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,093	12	17	0,215	0,133	0,2	-0,061
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,086	12	17	0,215	0,133	0,12	-0,057
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,087	12	16	0,33	0,207	0,08	-0,058
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,087	12	16	0,33	0,207	0,08	-0,058
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,086	12	16	0,33	0,207	0,14	-0,057
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,087	12	16	0,33	0,207	0,14	-0,058
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,087	12	16	0,33	0,207	0,14	-0,058
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,087	12	15	0,48	0,3	0,09	-0,057
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,087	12	15	0,48	0,3	0,09	-0,058
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,087	12	15	0,48	0,3	0,09	-0,058

Table 13. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2008 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,56	-0,095	12	16	0,33	0,21	0,16	-0,067
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,91	0,52	-0,1	12	16	0,33	0,21	0,16	-0,066
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,103	12	16	0,33	0,21	0,16	-0,067
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,56	-0,095	12	16	0,33	0,21	0,16	-0,068
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,91	0,52	-0,1	12	18	0,13	0,08	0,35	-0,066
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,103	12	16	0,33	0,21	0,16	-0,067
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,56	-0,095	12	17	0,215	0,133	0,2	-0,067
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,91	0,52	-0,1	12	17	0,215	0,133	0,2	-0,066
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,103	12	16	0,33	0,21	0,16	-0,067
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,96	-0,093	12	16	0,33	0,21	0,051	-0,066
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,56	-0,097	12	16	0,33	0,21	0,051	-0,065
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,56	-0,1	12	14	0,67	0,4	0,03	-0,066
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,96	-0,093	12	15	0,48	0,3	0,06	-0,066
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,96	-0,098	12	16	0,33	0,21	0,051	-0,065
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,56	-0,1	12	15	0,48	0,3	0,06	-0,066
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,96	-0,093	12	16	0,33	0,21	0,051	-0,066
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,96	-0,098	12	16	0,33	0,21	0,051	-0,065
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,56	-0,1	12	16	0,33	0,21	0,051	-0,066
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,02	-0,099	12	14	0,67	0,4	0,18	-0,069
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,02	-0,099	12	14	0,67	0,4	0,18	-0,069
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,1	12	14	0,67	0,4	0,18	-0,069
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,91	0,52	-0,099	12	14	0,67	0,4	0,18	-0,068
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,91	0,51	-0,099	12	14	0,67	0,4	0,18	-0,068
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,91	0,51	-0,099	12	14	0,67	0,4	0,18	-0,068
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,91	0,51	-0,099	12	14	0,67	0,4	0,03	-0,069
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,91	0,51	-0,099	12	14	0,67	0,4	0,03	-0,069
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,91	0,51	-0,099	12	14	0,67	0,4	0,03	-0,069
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,96	-0,095	12	15	0,48	0,3	0,06	-0,066
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,96	-0,095	12	15	0,48	0,3	0,06	-0,066
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,96	-0,095	12	15	0,48	0,3	0,06	-0,066
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,96	-0,095	12	15	0,48	0,3	0,06	-0,066
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,96	-0,096	12	15	0,48	0,3	0,06	-0,066
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,96	-0,096	12	15	0,48	0,3	0,06	-0,066
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,96	-0,095	12	16	0,33	0,21	0,051	-0,066
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,96	-0,096	12	16	0,33	0,21	0,051	-0,066
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,96	-0,096	12	16	0,33	0,21	0,051	-0,066
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,02	-0,103	12	15	0,48	0,3	0,06	-0,068
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,02	-0,104	12	15	0,48	0,3	0,06	-0,068
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,104	12	15	0,48	0,3	0,06	-0,068
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,02	-0,103	12	15	0,48	0,3	0,06	-0,068
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,02	-0,103	12	14	0,67	0,4	0,18	-0,068
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,103	12	14	0,67	0,4	0,18	-0,068
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,02	-0,104	12	15	0,48	0,3	0,06	-0,068
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,02	-0,104	12	15	0,48	0,3	0,06	-0,068
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,104	12	16	0,33	0,21	0,15	-0,068
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,56	-0,1	12	16	0,33	0,21	0,051	-0,066
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,56	-0,1	12	16	0,33	0,21	0,051	-0,066
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,56	-0,101	12	15	0,48	0,3	0,06	-0,066
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,56	-0,1	12	16	0,33	0,21	0,051	-0,066
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,56	-0,1	12	16	0,33	0,21	0,051	-0,066
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,56	-0,1	12	15	0,48	0,3	0,06	-0,066
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,56	-0,1	12	16	0,33	0,21	0,051	-0,066
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,56	-0,1	12	16	0,33	0,21	0,051	-0,066
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,56	-0,1	12	16	0,33	0,21	0,051	-0,066

Table 14. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2008 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,01	0,052	0,48	-0,051	12	18	0,13	0,31	0,59	-0,036
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,14	0,5	-0,055	12	18	0,13	0,31	0,59	-0,036
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,06	12	16	0,33	0,62	0,45	-0,039
	ARMA(1,0)-GARCH(1,1) - norm	2	7	0,01	0,052	0,28	-0,049	12	16	0,33	0,21	0,74	-0,034
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,14	0,5	-0,053	12	16	0,33	0,21	0,74	-0,035
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,058	12	16	0,33	0,21	0,74	-0,037
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,01	0,052	0,76	-0,048	12	19	0,08	0,04	0,25	-0,033
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,14	0,5	-0,053	12	19	0,08	0,04	0,25	-0,034
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,056	12	17	0,22	0,13	0,7	-0,036
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,01	0,052	0,49	-0,049	12	20	0,04	0,11	0,54	-0,035
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,14	0,5	-0,053	12	19	0,08	0,04	0,86	-0,035
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,059	12	16	0,33	0,621	0,45	-0,039
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,005	0,02	0,49	-0,047	12	19	0,08	0,04	0,26	-0,033
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,14	0,5	-0,051	12	18	0,13	0,08	0,37	-0,034
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,33	0,16	-0,056	12	17	0,22	0,13	0,7	-0,036
	ARMA(1,1)-GJR(1,1) - norm	2	8	0,005	0,02	0,94	-0,046	12	21	0,02	0,01	0,13	-0,032
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,14	0,62	-0,05	12	20	0,04	0,02	0,12	-0,033
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,33	0,66	-0,053	12	17	0,22	0,13	0,19	-0,034
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,14	0,5	-0,054	12	16	0,33	0,62	0,45	-0,039
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,14	0,5	-0,057	12	15	0,48	0,29	0,68	-0,04
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,057	12	15	0,48	0,78	0,25	-0,04
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,14	0,5	-0,054	12	16	0,33	0,21	0,74	-0,036
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,33	0,16	-0,056	12	16	0,33	0,21	0,74	-0,038
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,057	12	16	0,33	0,21	0,74	-0,038
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,14	0,5	-0,052	12	19	0,08	0,04	0,25	-0,035
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,14	0,5	-0,055	12	16	0,33	0,21	0,79	-0,036
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,055	12	16	0,33	0,21	0,79	-0,036
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,14	0,5	-0,052	12	15	0,48	0,29	0,68	-0,037
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,14	0,5	-0,053	12	15	0,48	0,29	0,68	-0,038
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,055	12	15	0,48	0,29	0,68	-0,039
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,14	0,5	-0,052	12	18	0,13	0,08	0,37	-0,035
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,33	0,16	-0,054	12	18	0,13	0,08	0,37	-0,036
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,33	0,16	-0,054	12	17	0,22	0,13	0,7	-0,036
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,14	0,62	-0,05	12	20	0,04	0,02	0,12	-0,033
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,33	0,66	-0,052	12	16	0,33	0,21	0,23	-0,034
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,33	0,66	-0,052	12	16	0,33	0,21	0,23	-0,034
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,14	0,5	-0,058	12	17	0,22	0,46	0,52	-0,038
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,14	0,5	-0,059	12	16	0,33	0,62	0,45	-0,039
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,06	12	16	0,33	0,62	0,45	-0,039
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,14	0,5	-0,055	12	16	0,33	0,21	0,74	-0,036
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,33	0,16	-0,057	12	16	0,33	0,21	0,74	-0,037
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,33	0,16	-0,058	12	16	0,33	0,21	0,74	-0,037
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,14	0,5	-0,054	12	19	0,08	0,04	0,25	-0,035
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,14	0,5	-0,056	12	16	0,33	0,21	0,74	-0,036
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,056	12	16	0,33	0,21	0,78	-0,036
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,14	0,5	-0,055	12	18	0,13	0,31	0,97	-0,036
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,33	0,85	-0,057	12	15	0,48	0,29	0,68	-0,037
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,059	12	16	0,33	0,62	0,45	-0,038
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,33	0,16	-0,052	12	18	0,13	0,08	0,37	-0,034
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,52	-0,055	12	17	0,22	0,13	0,7	-0,036
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,33	0,16	-0,058	12	17	0,22	0,13	0,7	-0,036
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,14	0,62	-0,051	12	20	0,04	0,02	0,12	-0,033
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,33	0,66	-0,053	12	17	0,22	0,13	0,19	-0,034
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,33	0,66	-0,053	12	17	0,22	0,13	0,19	-0,034

Table 15. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2008 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	8	0,005	0,02	0,3	-0,052	12	17	0,22	0,46	0,51	-0,036
	ARMA(0,0)-GARCH(1,1) - student-t	2	7	0,01	0,052	0,49	-0,057	12	16	0,33	0,62	0,28	-0,037
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,33	0,85	-0,064	12	15	0,48	0,78	0,27	-0,041
	ARMA(1,0)-GARCH(1,1) - norm	2	9	0,001	0,004	0,54	-0,051	12	17	0,22	0,13	0,58	-0,035
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,14	0,5	-0,056	12	17	0,22	0,13	0,58	-0,036
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,061	12	15	0,48	0,3	0,73	-0,038
	ARMA(1,1)-GARCH(1,1) - norm	2	8	0,005	0,02	0,77	-0,05	12	18	0,13	0,31	0,89	-0,035
	ARMA(1,1)-GARCH(1,1) - student-t	2	7	0,01	0,052	0,76	-0,05	12	17	0,22	0,13	0,58	-0,035
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,33	0,85	-0,059	12	16	0,33	0,21	0,97	-0,037
	ARMA(0,0)-GJR(1,1) - norm	2	8	0,005	0,02	0,3	-0,051	12	18	0,13	0,31	0,94	-0,036
	ARMA(0,0)-GJR(1,1) - student-t	2	7	0,01	0,052	0,49	-0,055	12	17	0,22	0,46	0,51	-0,036
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,33	0,85	-0,062	12	15	0,48	0,78	0,27	-0,04
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,005	0,02	0,77	-0,049	12	17	0,22	0,13	0,58	-0,034
	ARMA(1,0)-GJR(1,1) - student-t	2	7	0,01	0,052	0,76	-0,054	12	17	0,22	0,13	0,58	-0,035
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,52	-0,058	12	16	0,33	0,21	0,7	-0,037
	ARMA(1,1)-GJR(1,1) - norm	2	9	0,001	0,004	0,53	-0,048	12	19	0,08	0,04	0,18	-0,033
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,14	0,62	-0,052	12	19	0,08	0,04	0,18	-0,034
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,14	0,62	-0,056	12	19	0,08	0,04	0,18	-0,036
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,01	0,052	0,49	-0,057	12	16	0,33	0,62	0,28	-0,04
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,14	0,99	-0,059	12	15	0,48	0,78	0,27	-0,041
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	7	0,01	0,052	0,49	-0,06	12	15	0,48	0,78	0,27	-0,041
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,14	0,5	-0,057	12	17	0,22	0,13	0,58	-0,037
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,14	0,5	-0,059	12	16	0,33	0,21	0,7	-0,039
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,059	12	15	0,48	0,29	0,89	-0,039
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,14	0,5	-0,055	12	17	0,22	0,13	0,58	-0,036
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,33	0,85	-0,057	12	16	0,33	0,21	0,97	-0,038
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,058	12	15	0,48	0,29	0,89	-0,038
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,14	0,99	-0,054	12	17	0,22	0,46	0,51	-0,038
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,14	0,99	-0,057	12	15	0,48	0,78	0,27	-0,039
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	7	0,01	0,052	0,49	-0,059	12	15	0,48	0,78	0,27	-0,04
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,33	0,85	-0,054	12	17	0,22	0,13	0,58	-0,035
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,52	-0,056	12	17	0,22	0,13	0,58	-0,037
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,52	-0,057	12	16	0,33	0,7	0,97	-0,037
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,14	0,62	-0,052	12	19	0,08	0,04	0,18	-0,034
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,14	0,62	-0,054	12	19	0,08	0,04	0,18	-0,036
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,14	0,62	-0,054	12	19	0,08	0,04	0,18	-0,036
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,01	0,052	0,49	-0,059	12	16	0,33	0,62	0,28	-0,039
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,33	0,85	-0,061	12	15	0,48	0,78	0,27	-0,04
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,062	12	15	0,48	0,78	0,27	-0,04
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,14	0,5	-0,058	12	17	0,22	0,13	0,58	-0,037
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,33	0,85	-0,061	12	16	0,33	0,21	0,7	-0,038
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,061	12	15	0,48	0,29	0,73	-0,039
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,14	0,5	-0,056	12	17	0,22	0,13	0,58	-0,036
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,33	0,85	-0,058	12	16	0,33	0,21	0,97	-0,037
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,33	0,85	-0,059	12	16	0,33	0,21	0,97	-0,037
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,14	0,99	-0,056	12	17	0,22	0,46	0,51	-0,037
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,33	0,85	-0,059	12	16	0,33	0,62	0,49	-0,039
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,33	0,85	-0,061	12	15	0,48	0,78	0,27	-0,04
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,33	0,85	-0,054	12	17	0,22	0,13	0,58	-0,035
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,33	0,85	-0,057	12	17	0,22	0,13	0,58	-0,037
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,33	0,85	-0,058	12	17	0,22	0,13	0,58	-0,037
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,14	0,62	-0,052	12	19	0,08	0,04	0,18	-0,034
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,14	0,62	-0,055	12	19	0,08	0,04	0,18	-0,035
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,14	0,62	-0,055	12	19	0,08	0,04	0,18	-0,035

Table 16. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2008 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,27	-0,044	12	15	0,48	0,76	0,88	-0,031
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,19	-0,046	12	15	0,48	0,76	0,88	-0,031
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,19	-0,048	12	14	0,67	0,89	0,81	-0,032
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,043	12	15	0,48	0,3	0,73	-0,03
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,19	-0,046	12	15	0,48	0,3	0,73	-0,03
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,19	-0,047	12	15	0,48	0,3	0,73	-0,031
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,043	12	15	0,48	0,3	0,73	-0,03
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,045	12	16	0,33	0,21	0,36	-0,03
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,19	-0,047	12	15	0,48	0,3	0,73	-0,031
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,48	-0,043	12	18	0,13	0,31	0,66	-0,03
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,3	-0,044	12	18	0,13	0,31	0,66	-0,03
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,1	-0,046	12	18	0,13	0,31	0,66	-0,031
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,049	-0,042	12	18	0,13	0,08	0,38	-0,029
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,049	-0,043	12	18	0,13	0,08	0,38	-0,029
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,1	-0,045	12	16	0,33	0,21	0,36	-0,03
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,28	-0,042	12	19	0,08	0,04	0,42	-0,029
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,043	12	18	0,13	0,08	0,38	-0,029
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,1	-0,045	12	16	0,33	0,21	0,36	-0,03
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,19	-0,045	12	14	0,67	0,89	0,81	-0,032
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,19	-0,045	12	14	0,67	0,89	0,81	-0,032
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,19	-0,045	12	14	0,67	0,89	0,81	-0,032
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,045	12	15	0,48	0,3	0,73	-0,032
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,045	12	15	0,48	0,3	0,73	-0,031
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,045	12	14	0,67	0,4	0,76	-0,031
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,044	12	15	0,48	0,3	0,73	-0,031
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,045	12	15	0,48	0,3	0,73	-0,031
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,045	12	15	0,48	0,3	0,73	-0,032
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,15	-0,042	12	18	0,13	0,31	0,66	-0,03
	ARMA(0,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0,48	-0,042	12	18	0,13	0,31	0,66	-0,03
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	7	0,02	0,052	0,48	-0,042	12	18	0,13	0,31	0,66	-0,031
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,049	-0,042	12	18	0,13	0,08	0,38	-0,03
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,049	-0,042	12	18	0,13	0,08	0,38	-0,03
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,042	12	18	0,13	0,08	0,38	-0,03
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,28	-0,041	12	19	0,08	0,04	0,42	-0,03
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,042	12	18	0,13	0,08	0,38	-0,03
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,28	-0,042	12	17	0,21	0,13	0,49	-0,03
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,19	-0,047	12	14	0,67	0,89	0,81	-0,031
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,19	-0,047	12	14	0,67	0,89	0,81	-0,031
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,19	-0,047	12	14	0,67	0,89	0,81	-0,031
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,19	-0,046	12	15	0,48	0,3	0,73	-0,031
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,19	-0,046	12	15	0,48	0,3	0,73	-0,031
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,19	-0,047	12	15	0,48	0,3	0,73	-0,031
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,19	-0,045	12	15	0,48	0,3	0,73	-0,03
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,19	-0,046	12	16	0,33	0,21	0,36	-0,031
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,19	-0,047	12	16	0,33	0,21	0,9	-0,031
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,049	-0,044	12	18	0,13	0,31	0,66	-0,03
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,049	-0,044	12	18	0,13	0,31	0,66	-0,03
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,046	12	18	0,13	0,31	0,66	-0,03
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,049	-0,043	12	18	0,13	0,08	0,38	-0,03
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,049	-0,044	12	18	0,13	0,08	0,38	-0,03
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,044	12	18	0,13	0,08	0,38	-0,03
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,28	-0,043	12	19	0,08	0,04	0,42	-0,029
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,48	-0,043	12	18	0,13	0,08	0,38	-0,029
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,48	-0,044	12	18	0,13	0,08	0,5	-0,029

Table 17. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2009 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,3	-0,049	12	18	0,13	0,28	0,97	-0,034
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,051	12	19	0,08	0,19	0,99	-0,034
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,053	12	17	0,21	0,46	0,67	-0,035
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,049	12	18	0,13	0,31	0,92	-0,034
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,051	12	19	0,08	0,2	0,94	-0,034
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,053	12	17	0,21	0,46	0,93	-0,036
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,048	12	20	0,04	0,11	0,95	-0,034
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,05	12	20	0,04	0,11	0,95	-0,033
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,052	12	20	0,04	0,11	0,95	-0,034
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,52	-0,047	12	20	0,04	0,11	0,95	-0,033
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,049	12	20	0,04	0,11	0,95	-0,033
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,1	-0,051	12	19	0,08	0,2	0,86	-0,034
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,28	-0,047	12	20	0,04	0,11	0,95	-0,033
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,048	12	20	0,04	0,11	0,95	-0,032
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,48	-0,05	12	20	0,04	0,11	0,95	-0,033
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,28	-0,046	12	19	0,08	0,2	0,86	-0,032
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,048	12	19	0,08	0,2	0,86	-0,032
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,48	-0,05	12	19	0,08	0,2	0,86	-0,033
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,051	12	18	0,13	0,28	0,97	-0,035
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,052	12	17	0,21	0,46	0,67	-0,035
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,052	12	17	0,21	0,46	0,67	-0,036
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,051	12	17	0,21	0,46	0,92	-0,035
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,051	12	17	0,21	0,46	0,92	-0,035
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,051	12	17	0,21	0,46	0,92	-0,035
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,051	12	19	0,08	0,2	0,94	-0,035
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,05	12	18	0,13	0,08	0,63	-0,034
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,05	12	18	0,13	0,08	0,44	-0,034
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,28	-0,047	12	19	0,08	0,2	0,86	-0,033
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,047	12	19	0,08	0,2	0,86	-0,033
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,28	-0,047	12	19	0,08	0,2	0,86	-0,033
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,28	-0,047	12	20	0,04	0,11	0,95	-0,033
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,047	12	20	0,04	0,11	0,95	-0,032
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,28	-0,047	12	20	0,04	0,11	0,95	-0,032
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,28	-0,047	12	19	0,08	0,2	0,86	-0,032
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,047	12	19	0,08	0,2	0,86	-0,032
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,28	-0,047	12	19	0,08	0,2	0,86	-0,032
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,053	12	18	0,13	0,28	0,97	-0,035
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,053	12	17	0,21	0,46	0,67	-0,035
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,053	12	17	0,21	0,46	0,67	-0,035
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,053	12	18	0,13	0,31	0,92	-0,034
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,053	12	18	0,13	0,31	0,92	-0,034
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,053	12	18	0,13	0,31	0,92	-0,034
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,052	12	19	0,08	0,2	0,94	-0,034
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,052	12	20	0,04	0,11	0,95	-0,034
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,052	12	20	0,04	0,11	0,95	-0,034
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,1	-0,05	12	20	0,04	0,11	0,95	-0,033
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,48	-0,05	12	19	0,08	0,2	0,86	-0,033
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,1	-0,05	12	19	0,08	0,2	0,86	-0,033
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,48	-0,049	12	20	0,04	0,11	0,95	-0,032
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,48	-0,049	12	20	0,04	0,11	0,95	-0,032
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,48	-0,049	12	20	0,04	0,11	0,95	-0,032
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,48	-0,049	12	19	0,08	0,2	0,86	-0,032
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,48	-0,049	12	19	0,08	0,2	0,86	-0,032
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,48	-0,049	12	19	0,08	0,2	0,86	-0,032

Table 18. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2009 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,029	12	18	0,13	0,12	0,69	-0,02
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,031	12	17	0,21	0,34	0,4	-0,02
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,049	-0,035	12	13	0,89	0,48	0,77	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,028	12	15	0,48	0,3	0,04	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,03	12	13	0,89	0,48	0,12	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,049	-0,033	12	13	0,89	0,48	0,12	-0,021
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,027	12	16	0,33	0,21	0,1	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,03	12	16	0,33	0,21	0,1	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,032	12	15	0,48	0,3	0,14	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,029	12	16	0,33	0,21	0,12	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0	-0,03	12	16	0,33	0,21	0,12	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0	-0,034	12	13	0,89	0,48	0,12	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,027	12	17	0,21	0,13	0,04	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0	-0,029	12	16	0,33	0,21	0,06	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0	-0,032	12	14	0,67	0,4	0,14	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,027	12	17	0,21	0,13	0,06	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0	-0,029	12	17	0,21	0,13	0,06	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,04	-0,031	12	16	0,33	0,21	0,09	-0,02
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,032	12	14	0,67	0,4	0,33	-0,021
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,032	12	14	0,67	0,4	0,33	-0,022
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,032	12	14	0,67	0,4	0,33	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,031	12	13	0,89	0,48	0,12	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,031	12	13	0,89	0,48	0,12	-0,021
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0	-0,031	12	13	0,89	0,48	0,12	-0,021
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,03	12	15	0,48	0,3	0,14	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,03	12	15	0,48	0,3	0,14	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,031	12	15	0,48	0,3	0,14	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,03	12	15	0,48	0,3	0,16	-0,021
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0	-0,031	12	13	0,89	0,48	0,12	-0,021
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,031	12	14	0,67	0,4	0,33	-0,021
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,029	12	15	0,48	0,3	0,14	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,02	-0,03	12	15	0,48	0,3	0,14	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,03	12	14	0,67	0,4	0,14	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0	-0,029	12	16	0,33	0,21	0,09	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0	-0,031	12	16	0,33	0,21	0,09	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0	-0,031	12	16	0,33	0,21	0,09	-0,019
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,033	12	16	0,33	0,21	0,02	-0,021
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,034	12	14	0,67	0,4	0,33	-0,022
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,034	12	14	0,67	0,4	0,33	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,031	12	13	0,89	0,48	0,12	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,032	12	13	0,89	0,48	0,12	-0,02
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,049	-0,032	12	13	0,89	0,48	0,12	-0,02
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,031	12	16	0,33	0,21	0,1	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,031	12	15	0,48	0,3	0,14	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,031	12	15	0,48	0,3	0,14	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,032	12	15	0,48	0,3	0,16	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0	-0,033	12	15	0,48	0,3	0,16	-0,021
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,033	12	15	0,48	0,3	0,16	-0,021
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,03	12	16	0,33	0,21	0,06	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0	-0,031	12	15	0,48	0,3	0,14	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,031	12	14	0,67	0,4	0,14	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0	-0,03	12	17	0,21	0,13	0,06	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0	-0,03	12	16	0,33	0,21	0,08	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0	-0,031	12	16	0,33	0,21	0,08	-0,019

Table 19. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2009 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0	-0,03	12	16	0,33	0,62	0,55	-0,021
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0	-0,032	12	16	0,33	0,62	0,55	-0,021
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,049	-0,036	12	14	0,67	0,4	0,33	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0	-0,028	12	15	0,48	0,3	0,11	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,031	12	16	0,33	0,21	0,28	-0,02
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,049	-0,033	12	13	0,89	0,48	0,11	-0,021
	ARMA(1,1)-GARCH(1,1) - norm	2	8	0,005	0,02	0,02	-0,028	12	16	0,33	0,21	0,1	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,02	-0,03	12	16	0,33	0,21	0,1	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,032	12	15	0,48	0,3	0,14	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0	-0,029	12	15	0,48	0,3	0,26	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0	-0,031	12	15	0,48	0,3	0,26	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,02	-0,035	12	13	0,89	0,48	0,12	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	8	0	0,02	0,02	-0,028	12	16	0,33	0,21	0,28	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,02	-0,03	12	17	0,22	0,13	0,24	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0	-0,032	12	15	0,48	0,3	0,36	-0,021
	ARMA(1,1)-GJR(1,1) - norm	2	9	0	0	0,04	-0,028	12	17	0,22	0,13	0,24	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	7	0,02	0,052	0,31	-0,03	12	17	0,22	0,13	0,24	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,14	-0,032	12	15	0,48	0,3	0,14	-0,02
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0	-0,032	12	13	0,89	0,48	0,12	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0	-0,032	12	13	0,89	0,48	0,12	-0,023
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0	-0,032	12	13	0,89	0,48	0,12	-0,023
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,03	12	13	0,89	0,48	0,12	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,031	12	13	0,89	0,48	0,12	-0,021
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,031	12	13	0,89	0,48	0,12	-0,021
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,03	12	15	0,48	0,3	0,14	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,031	12	15	0,48	0,3	0,14	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0	-0,031	12	14	0,67	0,4	0,14	-0,021
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0	-0,03	12	13	0,89	0,48	0,12	-0,021
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0	-0,031	12	13	0,89	0,48	0,12	-0,022
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0	-0,031	12	13	0,89	0,48	0,12	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,03	12	15	0,48	0,3	0,36	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0	-0,03	12	15	0,48	0,3	0,36	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,03	12	15	0,48	0,3	0,36	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,17	-0,03	12	15	0,48	0,3	0,14	-0,02
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,42	-0,031	12	15	0,48	0,3	0,14	-0,02
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,42	-0,031	12	15	0,48	0,3	0,14	-0,02
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,034	12	15	0,48	0,3	0,26	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,049	-0,035	12	14	0,67	0,4	0,33	-0,022
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,049	-0,035	12	14	0,67	0,4	0,33	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,049	-0,032	12	13	0,89	0,48	0,12	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,049	-0,033	12	13	0,89	0,48	0,12	-0,021
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,049	-0,033	12	13	0,89	0,48	0,12	-0,021
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,032	12	16	0,33	0,21	0,1	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0	-0,032	12	15	0,48	0,3	0,14	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,032	12	15	0,48	0,3	0,14	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,033	12	14	0,67	0,4	0,33	-0,021
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0	-0,033	12	14	0,67	0,4	0,33	-0,021
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,034	12	14	0,67	0,4	0,33	-0,021
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,031	12	16	0,33	0,21	0,28	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0	-0,031	12	15	0,48	0,3	0,36	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,032	12	15	0,48	0,3	0,36	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,82	-0,031	12	17	0,21	0,13	0,24	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,41	-0,031	12	16	0,33	0,21	0,33	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,41	-0,031	12	16	0,33	0,21	0,33	-0,02

Table 20. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2009 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,87	-0,034	12	11	0,66	0,71	0,58	-0,024
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,7	-0,036	12	11	0,66	0,71	0,58	-0,023
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,99	-0,034	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,7	-0,036	12	11	0,66	0,71	0,58	-0,023
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,87	-0,034	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,7	-0,036	12	11	0,66	0,71	0,58	-0,023
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,024
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,33	-0,032	12	12	0,88	0,86	0,36	-0,023
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,034	12	12	0,88	0,86	0,36	-0,022
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,22	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,032	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,034	12	12	0,88	0,86	0,36	-0,022
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,26	-0,032	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,034	12	12	0,88	0,86	0,36	-0,022
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,024
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,024
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	0	-	-	-	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023

Table 21. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2010 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,049	-0,035	12	12	0,88	0,86	0,36	-0,024
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,19	-0,036	12	12	0,88	0,86	0,36	-0,024
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,19	-0,035	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,19	-0,036	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,19	-0,035	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,19	-0,036	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,13	-0,034	12	12	0,88	0,86	0,36	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,28	-0,038	12	12	0,88	0,86	0,36	-0,023
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,037	12	12	0,88	0,86	0,36	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,36	-0,034	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,36	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,037	12	12	0,88	0,86	0,36	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,36	-0,034	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,56	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,037	12	12	0,88	0,86	0,36	-0,025
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,04	12	11	0,66	0,71	0,58	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,78	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,78	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,78	-0,036	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,78	-0,036	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,78	-0,036	12	12	0,88	0,86	0,36	-0,024
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,04	12	11	0,66	0,71	0,58	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,78	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,78	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,78	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,78	-0,036	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,78	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,78	-0,037	12	12	0,88	0,86	0,36	-0,024

Table 22. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2010 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,021	12	18	0,13	0,27	0,76	-0,015
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,022	12	18	0,13	0,27	0,76	-0,015
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,025	12	13	0,89	0,48	0,26	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,021	12	16	0,33	0,62	0,32	-0,015
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,022	12	17	0,22	0,34	0,56	-0,014
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,4	0,29	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,021	12	15	0,48	0,78	0,32	-0,015
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,022	12	15	0,48	0,78	0,32	-0,015
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	12	0,88	0,54	0,18	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,021	12	15	0,48	0,44	0,9	-0,015
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,022	12	17	0,22	0,34	0,89	-0,015
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,025	12	13	0,89	0,48	0,26	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,021	12	15	0,48	0,78	0,08	-0,015
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,022	12	16	0,33	0,62	0,1	-0,015
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	12	0,88	0,54	0,18	-0,016
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,022	12	15	0,48	0,78	0,08	-0,015
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,022	12	16	0,33	0,62	0,04	-0,015
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	12	0,88	0,54	0,04	-0,016
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,56	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	13	0,89	0,48	0,26	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,3	0,42	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,5	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,78	0,57	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,4	0,3	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,26	-0,016
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	12	0,88	0,54	0,18	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	11	0,66	0,54	0,1	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,56	-0,016
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,56	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	13	0,89	0,48	0,26	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	13	0,89	0,92	0,19	-0,015
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	13	0,89	0,92	0,47	-0,015
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	13	0,89	0,92	0,47	-0,015
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	13	0,89	0,92	0,19	-0,015
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	13	0,89	0,92	0,19	-0,016
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	12	0,88	0,54	0,04	-0,016
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,025	12	13	0,89	0,48	0,26	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,025	12	13	0,89	0,48	0,26	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,025	12	13	0,89	0,48	0,26	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,78	0,57	-0,015
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,025	12	15	0,48	0,78	0,57	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,025	12	14	0,67	0,4	0,29	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	13	0,89	0,48	0,08	-0,015
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	12	0,88	0,54	0,18	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,025	12	13	0,89	0,48	0,26	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,56	-0,016
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,56	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,025	12	13	0,89	0,48	0,26	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	13	0,89	0,92	0,19	-0,015
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,26	-0,015
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	13	0,89	0,92	0,47	-0,015
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	12	0,88	0,54	0,04	-0,015
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	12	0,88	0,54	0,04	-0,015
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	13	0,89	0,48	0,08	-0,015

Table 23. VaR estimation results o of the portfolio when not corrected for outliers.

Portfolio created in 2010 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,055	-0,022	12	17	0,22	0,13	0,04	-0,015
	ARMA(0,0)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,055	-0,023	12	18	0,13	0,31	0,11	-0,015
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,94	-0,025	12	15	0,48	0,3	0,09	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,022	12	17	0,22	0,46	0,07	-0,015
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,023	12	18	0,13	0,31	0,11	-0,015
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,99	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,022	12	15	0,48	0,3	0,02	-0,015
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,023	12	16	0,33	0,21	0,04	-0,015
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,99	-0,025	12	14	0,67	0,4	0,01	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,055	-0,022	12	16	0,33	0,21	0,04	-0,015
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,5	-0,023	12	17	0,22	0,46	0,12	-0,015
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,94	-0,025	12	16	0,33	0,21	0,04	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,5	-0,022	12	15	0,48	0,3	0,02	-0,015
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,5	-0,023	12	16	0,33	0,62	0,07	-0,015
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,99	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,5	-0,022	12	15	0,48	0,3	0,02	-0,015
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,83	-0,023	12	15	0,48	0,3	0,02	-0,015
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,99	-0,025	12	14	0,67	0,4	0,01	-0,016
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,025	12	16	0,33	0,21	0,1	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,025	12	15	0,48	0,3	0,09	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,025	12	15	0,48	0,3	0,09	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,99	-0,024	12	16	0,33	0,21	0,02	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,99	-0,025	12	16	0,33	0,21	0,02	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,99	-0,025	12	16	0,33	0,21	0,02	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,99	-0,024	12	14	0,67	0,4	0,01	-0,016
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,99	-0,024	12	14	0,67	0,4	0,01	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,99	-0,024	12	14	0,67	0,4	0,01	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,5	-0,024	12	16	0,33	0,21	0,04	-0,016
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,025	12	15	0,48	0,3	0,09	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,83	-0,024	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,99	-0,024	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,83	-0,024	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,99	-0,024	12	14	0,67	0,4	0,02	-0,016
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,99	-0,024	12	14	0,67	0,4	0,02	-0,016
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,99	-0,024	12	14	0,67	0,4	0,02	-0,016
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,94	-0,025	12	15	0,48	0,3	0,09	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,94	-0,026	12	15	0,48	0,3	0,09	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,5	-0,026	12	15	0,48	0,3	0,09	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,99	-0,025	12	16	0,33	0,21	0,02	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,99	-0,025	12	16	0,33	0,21	0,02	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,99	-0,025	12	16	0,33	0,21	0,02	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,99	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,99	-0,025	12	14	0,67	0,4	0,01	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,99	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,94	-0,025	12	16	0,33	0,21	0,04	-0,016
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,94	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,94	-0,025	12	16	0,33	0,21	0,04	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,99	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,99	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,99	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,99	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,99	-0,025	12	14	0,67	0,4	0,01	-0,016
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,99	-0,025	12	15	0,48	0,3	0,02	-0,016

Table 24. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2010 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,45	-0,036	12	14	0,67	0,4	0,95	-0,025
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,45	-0,037	12	14	0,67	0,4	0,95	-0,025
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,039	12	13	0,89	0,48	0,51	-0,025
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,45	-0,036	12	14	0,67	0,4	0,95	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,45	-0,037	12	14	0,67	0,4	0,95	-0,025
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,039	12	13	0,89	0,48	0,51	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,45	-0,036	12	13	0,89	0,48	0,51	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,45	-0,037	12	13	0,89	0,48	0,51	-0,025
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,65	-0,039	12	12	0,88	0,54	0,41	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,23	-0,035	12	16	0,33	0,21	0,66	-0,025
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,23	-0,036	12	16	0,33	0,21	0,66	-0,024
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,038	12	13	0,89	0,48	0,6	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,23	-0,035	12	16	0,33	0,21	0,66	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,23	-0,036	12	16	0,33	0,21	0,66	-0,024
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,038	12	13	0,89	0,48	0,6	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,23	-0,035	12	15	0,48	0,3	0,97	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,23	-0,036	12	16	0,33	0,21	0,66	-0,024
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,038	12	12	0,88	0,54	0,17	-0,025
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,45	-0,037	12	13	0,89	0,48	0,51	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,65	-0,038	12	12	0,88	0,54	0,41	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,45	-0,038	12	12	0,88	0,54	0,41	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,45	-0,037	12	13	0,89	0,48	0,51	-0,026
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,65	-0,038	12	12	0,88	0,54	0,41	-0,026
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,65	-0,038	12	12	0,88	0,54	0,41	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,45	-0,038	12	12	0,88	0,54	0,54	-0,026
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,45	-0,038	12	11	0,66	0,54	0,45	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,45	-0,038	12	11	0,66	0,54	0,45	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,21	-0,037	12	13	0,89	0,48	0,22	-0,025
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,21	-0,037	12	13	0,89	0,48	0,22	-0,025
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,21	-0,037	12	12	0,88	0,54	0,17	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,21	-0,037	12	13	0,89	0,48	0,22	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,21	-0,037	12	13	0,89	0,48	0,22	-0,025
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,21	-0,037	12	12	0,88	0,54	0,17	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,21	-0,037	12	12	0,88	0,54	0,17	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,21	-0,037	12	12	0,88	0,54	0,17	-0,025
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,21	-0,037	12	12	0,88	0,54	0,17	-0,025
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,45	-0,039	12	12	0,88	0,54	0,41	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,45	-0,039	12	12	0,88	0,54	0,41	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,039	12	12	0,88	0,54	0,41	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,45	-0,039	12	12	0,88	0,54	0,41	-0,026
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,45	-0,039	12	12	0,88	0,54	0,41	-0,026
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,039	12	12	0,88	0,54	0,41	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,45	-0,039	12	11	0,66	0,54	0,45	-0,026
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,45	-0,039	12	12	0,88	0,54	0,41	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,039	12	11	0,66	0,54	0,45	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,45	-0,038	12	14	0,67	0,4	0,73	-0,025
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,45	-0,038	12	13	0,89	0,48	0,6	-0,025
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,038	12	13	0,89	0,48	0,6	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,45	-0,038	12	14	0,67	0,4	0,73	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,45	-0,038	12	13	0,89	0,48	0,6	-0,025
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,038	12	13	0,89	0,48	0,6	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,45	-0,038	12	14	0,67	0,4	0,73	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,45	-0,038	12	12	0,88	0,54	0,17	-0,025
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,038	12	12	0,88	0,54	0,17	-0,025

Table 25. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2011 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,14	-0,04	12	18	0,13	0,31	0,77	-0,028
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,39	-0,041	12	18	0,13	0,31	0,77	-0,028
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,56	-0,045	12	15	0,48	0,78	0,82	-0,029
	ARMA(1,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,14	-0,04	12	17	0,22	0,46	0,65	-0,028
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,39	-0,042	12	18	0,13	0,31	0,77	-0,028
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,56	-0,045	12	15	0,48	0,78	0,82	-0,029
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,02	0,052	0,14	-0,04	12	17	0,22	0,46	0,65	-0,028
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,39	-0,042	12	17	0,22	0,46	0,65	-0,029
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,29	-0,045	12	15	0,48	0,78	0,82	-0,03
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,71	-0,04	12	19	0,08	0,2	0,93	-0,028
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,33	-0,041	12	20	0,04	0,11	0,78	-0,028
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,045	12	14	0,67	0,89	0,52	-0,03
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,33	-0,04	12	18	0,13	0,31	0,92	-0,028
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,17	-0,042	12	18	0,13	0,31	0,92	-0,028
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,045	12	14	0,67	0,89	0,52	-0,03
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,17	-0,04	12	19	0,08	0,2	0,93	-0,028
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,17	-0,042	12	18	0,13	0,31	0,92	-0,028
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,045	12	14	0,67	0,89	0,52	-0,03
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,17	-0,045	12	15	0,48	0,78	0,82	-0,03
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,17	-0,045	12	15	0,48	0,78	0,82	-0,03
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,045	12	15	0,48	0,78	0,82	-0,03
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,17	-0,045	12	15	0,48	0,78	0,82	-0,03
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,17	-0,045	12	15	0,48	0,78	0,82	-0,03
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,045	12	14	0,67	0,89	0,64	-0,03
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,17	-0,045	12	15	0,48	0,78	0,82	-0,03
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,17	-0,045	12	15	0,48	0,78	0,82	-0,03
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,56	-0,045	12	16	0,33	0,62	0,62	-0,03
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,17	-0,045	12	14	0,67	0,89	0,52	-0,029
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,17	-0,045	12	14	0,67	0,89	0,52	-0,03
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,046	12	14	0,67	0,89	0,52	-0,03
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,17	-0,045	12	15	0,48	0,78	0,62	-0,029
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,17	-0,045	12	14	0,67	0,89	0,52	-0,03
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,046	12	14	0,67	0,89	0,52	-0,03
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,17	-0,045	12	14	0,67	0,89	0,52	-0,029
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,17	-0,046	12	14	0,67	0,89	0,52	-0,03
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,046	12	14	0,67	0,89	0,52	-0,03
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,56	-0,045	12	15	0,48	0,78	0,82	-0,029
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,29	-0,046	12	15	0,48	0,78	0,82	-0,03
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,29	-0,046	12	15	0,48	0,78	0,82	-0,03
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,56	-0,045	12	16	0,33	0,62	0,62	-0,029
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,29	-0,046	12	15	0,48	0,78	0,82	-0,03
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,29	-0,046	12	15	0,48	0,78	0,82	-0,03
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,56	-0,045	12	16	0,33	0,62	0,62	-0,029
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,29	-0,046	12	16	0,33	0,62	0,62	-0,03
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,29	-0,046	12	15	0,48	0,78	0,82	-0,03
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,17	-0,045	12	17	0,21	0,46	0,89	-0,029
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,17	-0,045	12	16	0,33	0,62	0,85	-0,029
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,045	12	15	0,48	0,78	0,62	-0,029
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,17	-0,045	12	17	0,21	0,46	0,86	-0,029
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,17	-0,045	12	15	0,48	0,78	0,62	-0,029
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,045	12	15	0,48	0,78	0,62	-0,029
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,17	-0,045	12	17	0,21	0,46	0,77	-0,029
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,17	-0,045	12	14	0,67	0,89	0,52	-0,029
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,046	12	14	0,67	0,89	0,52	-0,03

Table 26. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2011 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,12	-0,029	12	17	0,22	0,34	0,61	-0,02
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,15	-0,031	12	18	0,13	0,27	0,88	-0,02
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,035	12	16	0,33	0,41	0,73	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	8	0,005	0,02	0,27	-0,03	12	18	0,13	0,27	0,98	-0,021
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,031	12	18	0,13	0,27	0,98	-0,02
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,034	12	16	0,33	0,41	0,73	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,27	-0,029	12	19	0,08	0,19	0,39	-0,021
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,031	12	19	0,08	0,19	0,39	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,034	12	16	0,33	0,41	0,93	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	8	0,005	0,02	0,27	-0,03	12	19	0,08	0,19	0,69	-0,021
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,15	-0,031	12	19	0,08	0,19	0,69	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,035	12	15	0,48	0,44	0,56	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,48	-0,03	12	17	0,22	0,46	0,28	-0,021
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,76	-0,031	12	18	0,13	0,27	0,52	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,034	12	15	0,48	0,78	0,73	-0,022
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,05	0,93	-0,029	12	16	0,33	0,62	0,24	-0,021
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,78	-0,031	12	18	0,13	0,31	0,17	-0,02
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,034	12	16	0,33	0,62	0,24	-0,022
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,27	-0,035	12	16	0,33	0,41	0,73	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,035	12	16	0,33	0,41	0,73	-0,022
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,035	12	16	0,33	0,41	0,73	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,27	-0,034	12	16	0,33	0,41	0,73	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,035	12	16	0,33	0,41	0,73	-0,022
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,035	12	16	0,33	0,41	0,73	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,27	-0,034	12	17	0,22	0,34	0,58	-0,022
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,034	12	15	0,48	0,78	0,73	-0,022
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,034	12	16	0,33	0,41	0,93	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,27	-0,034	12	16	0,33	0,41	0,73	-0,022
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,27	-0,034	12	15	0,48	0,44	0,56	-0,022
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,035	12	16	0,33	0,41	0,73	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,27	-0,034	12	17	0,22	0,46	0,28	-0,021
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,76	-0,034	12	16	0,33	0,62	0,55	-0,021
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,034	12	16	0,33	0,62	0,55	-0,022
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,76	-0,034	12	16	0,33	0,62	0,24	-0,021
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,76	-0,034	12	16	0,33	0,62	0,24	-0,022
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,034	12	17	0,22	0,46	0,22	-0,022
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,76	-0,034	12	17	0,22	0,34	0,61	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,76	-0,035	12	16	0,33	0,41	0,73	-0,022
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,035	12	16	0,33	0,41	0,73	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,76	-0,034	12	16	0,33	0,41	0,73	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,76	-0,035	12	16	0,33	0,41	0,73	-0,022
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,035	12	16	0,33	0,41	0,73	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,76	-0,034	12	16	0,33	0,41	0,93	-0,021
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,76	-0,035	12	15	0,48	0,78	0,73	-0,022
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,034	12	16	0,33	0,41	0,93	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,76	-0,034	12	17	0,22	0,34	0,95	-0,021
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,76	-0,034	12	16	0,33	0,41	0,73	-0,022
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,035	12	16	0,33	0,41	0,73	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,76	-0,034	12	17	0,22	0,46	0,28	-0,021
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,76	-0,035	12	15	0,48	0,78	0,73	-0,022
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,035	12	17	0,22	0,34	0,86	-0,022
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,76	-0,034	12	16	0,33	0,62	0,24	-0,021
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,76	-0,034	12	16	0,33	0,62	0,24	-0,022
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,034	12	16	0,33	0,62	0,24	-0,022

Table 27. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2011 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	8	0,005	0,02	0,27	-0,029	12	19	0,08	0,19	0,93	-0,02
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,19	-0,031	12	21	0,02	0,08	0,87	-0,02
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,035	12	16	0,33	0,62	0,95	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	8	0,005	0,01	0,14	-0,029	12	19	0,08	0,19	0,57	-0,021
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,19	-0,031	12	19	0,08	0,19	0,57	-0,02
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,035	12	18	0,13	0,31	0,33	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,02	0,052	0,39	-0,029	12	18	0,13	0,31	0,33	-0,021
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,031	12	19	0,08	0,2	0,25	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,034	12	18	0,13	0,31	0,33	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	8	0,005	0,02	0,27	-0,03	12	18	0,13	0,31	0,33	-0,021
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,19	-0,031	12	19	0,08	0,2	0,57	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,035	12	17	0,22	0,46	0,62	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,39	-0,03	12	18	0,13	0,31	0,33	-0,021
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,1	-0,031	12	19	0,08	0,2	0,25	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,035	12	18	0,13	0,31	0,33	-0,022
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0,93	-0,029	12	18	0,13	0,31	0,27	-0,021
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,68	-0,031	12	19	0,08	0,2	0,21	-0,02
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,035	12	17	0,22	0,46	0,26	-0,022
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,27	-0,034	12	18	0,13	0,27	0,91	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,76	-0,035	12	16	0,33	0,62	0,95	-0,022
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,035	12	17	0,22	0,34	0,75	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,04	-0,034	12	18	0,13	0,31	0,33	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,17	-0,035	12	17	0,22	0,46	0,62	-0,022
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,04	-0,035	12	18	0,13	0,31	0,33	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,04	-0,033	12	18	0,13	0,31	0,33	-0,022
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,17	-0,034	12	17	0,22	0,46	0,38	-0,022
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,04	-0,034	12	18	0,13	0,31	0,33	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,76	-0,034	12	17	0,22	0,46	0,62	-0,021
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,76	-0,034	12	18	0,13	0,31	0,33	-0,022
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,035	12	18	0,13	0,27	0,91	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,1	-0,034	12	18	0,13	0,31	0,33	-0,022
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,17	-0,035	12	18	0,13	0,31	0,33	-0,022
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,034	12	18	0,13	0,31	0,33	-0,022
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,17	-0,034	12	17	0,22	0,46	0,26	-0,022
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,17	-0,034	12	17	0,22	0,46	0,26	-0,022
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,034	12	16	0,33	0,62	0,35	-0,022
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,17	-0,035	12	17	0,22	0,46	0,62	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,17	-0,036	12	16	0,33	0,62	0,95	-0,022
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,036	12	18	0,13	0,27	0,91	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,17	-0,035	12	18	0,13	0,31	0,33	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,17	-0,035	12	17	0,22	0,46	0,62	-0,022
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,035	12	18	0,13	0,31	0,33	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,17	-0,035	12	18	0,13	0,31	0,33	-0,022
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,17	-0,035	12	18	0,13	0,31	0,33	-0,022
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,035	12	18	0,13	0,31	0,33	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,17	-0,035	12	18	0,13	0,31	0,33	-0,022
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,17	-0,035	12	18	0,13	0,31	0,33	-0,022
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,035	12	17	0,22	0,46	0,62	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,17	-0,035	12	18	0,13	0,31	0,33	-0,022
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,17	-0,035	12	17	0,22	0,46	0,38	-0,022
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,035	12	18	0,13	0,31	0,33	-0,022
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,17	-0,034	12	17	0,22	0,46	0,26	-0,021
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,17	-0,035	12	17	0,22	0,46	0,26	-0,022
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,035	12	17	0,22	0,46	0,26	-0,022

Table 28. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2011 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,026	12	14	0,67	0,4	0,38	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,027	12	15	0,48	0,3	0,32	-0,018
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,029	12	12	0,88	0,54	0,28	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,026	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,027	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,029	12	12	0,88	0,54	0,46	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,026	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,027	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,029	12	12	0,88	0,54	0,46	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,95	-0,025	12	13	0,89	0,48	0,16	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,95	-0,026	12	14	0,67	0,4	0,3	-0,017
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,028	12	11	0,66	0,55	0,18	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,83	-0,025	12	13	0,89	0,48	0,34	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,95	-0,026	12	13	0,89	0,48	0,34	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,028	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,83	-0,025	12	13	0,89	0,48	0,34	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,95	-0,026	12	13	0,89	0,48	0,34	-0,017
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,028	12	13	0,89	0,48	0,34	-0,018
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,028	12	9	0,29	0,4	0,28	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,028	12	9	0,29	0,4	0,28	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,028	12	9	0,29	0,4	0,28	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,028	12	9	0,29	0,4	0,28	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,028	12	10	0,45	0,5	0,6	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,028	12	9	0,29	0,4	0,28	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,028	12	9	0,29	0,4	0,28	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,028	12	10	0,45	0,5	0,6	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,028	12	9	0,29	0,4	0,28	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,95	-0,027	12	11	0,66	0,55	0,18	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,95	-0,027	12	11	0,66	0,55	0,18	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,027	12	11	0,66	0,55	0,18	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,95	-0,026	12	12	0,88	0,54	0,38	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,95	-0,026	12	12	0,88	0,54	0,38	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,026	12	12	0,88	0,54	0,38	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,95	-0,026	12	12	0,88	0,54	0,38	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,95	-0,026	12	12	0,88	0,54	0,38	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,026	12	12	0,88	0,54	0,38	-0,018
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,029	12	10	0,45	0,5	0,22	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,029	12	10	0,45	0,5	0,22	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,029	12	10	0,45	0,5	0,22	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,029	12	11	0,66	0,55	0,48	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,029	12	11	0,66	0,55	0,48	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,029	12	11	0,66	0,55	0,48	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,029	12	11	0,66	0,55	0,48	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,029	12	11	0,66	0,55	0,48	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,029	12	11	0,66	0,55	0,48	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,95	-0,028	12	11	0,66	0,55	0,18	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,95	-0,028	12	11	0,66	0,55	0,18	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,028	12	11	0,66	0,55	0,18	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,028	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,027	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,027	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,028	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,027	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,027	12	13	0,89	0,48	0,34	-0,018

Table 29. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2012 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,12	-0,031	12	12	0,88	0,54	0,27	-0,021
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,032	12	12	0,88	0,54	0,27	-0,021
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,035	12	12	0,88	0,54	0,27	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,53	-0,031	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,032	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,035	12	12	0,88	0,54	0,27	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,12	-0,031	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,032	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,035	12	12	0,88	0,54	0,27	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,029	12	13	0,89	0,48	0,1	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,03	12	13	0,89	0,48	0,1	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,033	12	11	0,66	0,55	0,12	-0,021
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,029	12	13	0,89	0,48	0,1	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,03	12	14	0,67	0,4	0,17	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,029	12	13	0,89	0,48	0,1	-0,02
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,03	12	14	0,67	0,4	0,17	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,021
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,12	-0,034	12	12	0,88	0,54	0,27	-0,023
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,023
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,034	12	12	0,88	0,54	0,27	-0,023
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,12	-0,033	12	11	0,66	0,55	0,33	-0,023
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,023
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,023
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,12	-0,033	12	11	0,66	0,55	0,33	-0,023
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,023
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,023
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,031	12	11	0,66	0,55	0,12	-0,021
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,031	12	11	0,66	0,55	0,12	-0,021
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,031	12	11	0,66	0,55	0,12	-0,021
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,031	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,031	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,031	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,031	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,031	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,031	12	12	0,88	0,54	0,27	-0,021
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,035	12	12	0,88	0,54	0,27	-0,023
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,035	12	12	0,88	0,54	0,27	-0,023
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,035	12	12	0,88	0,54	0,27	-0,023
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,035	12	12	0,88	0,54	0,27	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,035	12	12	0,88	0,54	0,27	-0,022
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,035	12	12	0,88	0,54	0,27	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,034	12	12	0,88	0,54	0,27	-0,022
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,034	12	12	0,88	0,54	0,27	-0,022
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,035	12	12	0,88	0,54	0,27	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,021
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,021

Table 30. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2012 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,019	12	13	0,89	0,92	0,77	-0,013
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,12	-0,019	12	13	0,89	0,92	0,77	-0,012
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,022	12	12	0,88	0,86	0,35	-0,014
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,018	12	12	0,88	0,54	0,84	-0,013
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,21	-0,019	12	13	0,89	0,48	0,61	-0,012
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,013
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,018	12	12	0,88	0,54	0,84	-0,013
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,12	-0,019	12	12	0,88	0,54	0,84	-0,012
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,021	12	11	0,66	0,55	0,64	-0,013
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,12	-0,018	12	12	0,89	0,54	0,84	-0,013
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,12	-0,019	12	13	0,89	0,92	0,77	-0,012
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,014
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,12	-0,018	12	13	0,89	0,48	0,61	-0,013
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,21	-0,019	12	13	0,89	0,48	0,61	-0,012
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,021	12	11	0,66	0,55	0,64	-0,013
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,03	-0,018	12	12	0,88	0,54	0,83	-0,013
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,09	-0,019	12	14	0,67	0,4	0,44	-0,012
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,021	12	11	0,66	0,55	0,64	-0,013
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,022	12	10	0,45	0,5	0,52	-0,014
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,022	12	10	0,45	0,5	0,52	-0,014
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,022	12	10	0,45	0,5	0,52	-0,014
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,92	-0,022	12	11	0,66	0,55	0,64	-0,014
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,92	-0,022	12	10	0,45	0,5	0,52	-0,014
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,92	-0,022	12	10	0,45	0,5	0,52	-0,014
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,014
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,014
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,014
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,022	12	12	0,89	0,54	0,84	-0,014
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,92	-0,022	12	12	0,89	0,54	0,84	-0,014
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,92	-0,022	12	10	0,45	0,5	0,52	-0,014
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,92	-0,021	12	12	0,89	0,54	0,83	-0,013
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,21	-0,021	12	12	0,89	0,54	0,83	-0,013
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,92	-0,021	12	11	0,66	0,55	0,64	-0,013
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,01	-0,021	12	11	0,66	0,55	0,84	-0,013
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,01	-0,021	12	11	0,66	0,55	0,84	-0,013
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,021	12	11	0,66	0,55	0,64	-0,013
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,023	12	10	0,45	0,5	0,35	-0,014
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,014
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,023	12	11	0,66	0,55	0,64	-0,014
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,014
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,014
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,014
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,014
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,014
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,014
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,014
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,014
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,014
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,013
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,01	-0,022	12	12	0,89	0,54	0,83	-0,013
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,55	0,64	-0,013
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,01	-0,022	12	10	0,45	0,5	0,98	-0,013
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,01	-0,021	12	10	0,45	0,5	0,98	-0,013
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,021	12	11	0,66	0,55	0,64	-0,013

Table 31. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2012 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,84	-0,021	12	13	0,89	0,92	0,77	-0,014
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,12	-0,022	12	15	0,48	0,78	0,82	-0,014
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,025	12	11	0,66	0,55	0,98	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,021	12	14	0,67	0,89	0,99	-0,014
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,12	-0,022	12	15	0,48	0,78	0,94	-0,014
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,025	12	12	0,88	0,54	0,81	-0,015
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,021	12	14	0,67	0,4	0,99	-0,014
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,12	-0,022	12	15	0,48	0,78	0,94	-0,014
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,024	12	13	0,89	0,48	0,62	-0,015
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,84	-0,021	12	13	0,89	0,48	0,62	-0,014
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,84	-0,022	12	14	0,67	0,89	0,99	-0,014
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,025	12	11	0,66	0,55	0,98	-0,015
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,12	-0,021	12	14	0,67	0,89	0,99	-0,014
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,12	-0,022	12	14	0,67	0,89	0,99	-0,014
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,024	12	13	0,89	0,92	0,79	-0,015
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,84	-0,021	12	14	0,67	0,89	0,52	-0,014
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,12	-0,022	12	16	0,33	0,62	0,32	-0,014
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,024	12	13	0,89	0,92	0,71	-0,015
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,024	12	11	0,66	0,55	0,98	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,12	-0,024	12	11	0,66	0,55	0,98	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,024	12	11	0,66	0,55	0,98	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,21	-0,024	12	12	0,88	0,54	0,81	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,21	-0,024	12	13	0,89	0,92	0,79	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,025	12	12	0,88	0,54	0,81	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,024	12	13	0,89	0,48	0,62	-0,015
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,12	-0,024	12	14	0,67	0,89	0,99	-0,015
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,024	12	12	0,88	0,54	0,81	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,12	-0,024	12	12	0,88	0,54	0,81	-0,015
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,12	-0,024	12	12	0,88	0,54	0,81	-0,015
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,024	12	11	0,66	0,55	0,98	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,21	-0,024	12	13	0,89	0,92	0,79	-0,015
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,21	-0,024	12	13	0,89	0,92	0,79	-0,015
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,21	-0,024	12	13	0,89	0,92	0,79	-0,015
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,12	-0,024	12	13	0,89	0,92	0,71	-0,015
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,12	-0,024	12	13	0,89	0,92	0,71	-0,015
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,024	12	14	0,67	0,89	0,99	-0,015
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,12	-0,025	12	11	0,66	0,55	0,98	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,025	12	11	0,66	0,55	0,98	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,025	12	11	0,66	0,55	0,98	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,025	12	12	0,88	0,54	0,81	-0,015
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,21	-0,025	12	13	0,89	0,92	0,79	-0,015
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,025	12	12	0,88	0,54	0,81	-0,015
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,12	-0,025	12	13	0,89	0,48	0,62	-0,015
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,025	12	14	0,67	0,89	0,99	-0,015
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,025	12	13	0,89	0,48	0,62	-0,015
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,12	-0,025	12	11	0,66	0,55	0,98	-0,015
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,12	-0,025	12	12	0,88	0,54	0,81	-0,015
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,025	12	11	0,66	0,55	0,98	-0,015
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,01	-0,024	12	13	0,89	0,92	0,79	-0,015
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,12	-0,024	12	13	0,89	0,92	0,79	-0,015
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,024	12	13	0,89	0,92	0,79	-0,015
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,12	-0,024	12	13	0,89	0,92	0,71	-0,015
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,12	-0,024	12	13	0,89	0,92	0,71	-0,015
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,024	12	13	0,89	0,92	0,71	-0,015

Table 32. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2012 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,2	-0,029	12	14	0,67	0,89	0,77	-0,02
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,91	-0,03	12	14	0,67	0,89	0,77	-0,02
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,032	12	12	0,88	0,86	0,75	-0,021
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,16	-0,029	12	14	0,67	0,89	0,77	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,91	-0,03	12	14	0,67	0,89	0,77	-0,02
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,032	12	12	0,88	0,86	0,75	-0,021
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,16	-0,029	12	14	0,67	0,89	0,77	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,91	-0,03	12	14	0,67	0,89	0,77	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,032	12	11	0,66	0,72	0,64	-0,021
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,73	-0,028	12	15	0,48	0,78	0,68	-0,019
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,91	-0,029	12	15	0,48	0,78	0,68	-0,019
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,73	-0,028	12	14	0,67	0,89	0,64	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,4	-0,029	12	15	0,48	0,78	0,68	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,73	-0,028	12	14	0,67	0,89	0,64	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,4	-0,029	12	15	0,48	0,78	0,68	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,031	12	13	0,89	0,92	0,62	-0,02
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,91	-0,033	12	11	0,66	0,72	0,64	-0,021
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,033	12	11	0,66	0,72	0,64	-0,021
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,033	12	10	0,45	0,53	0,93	-0,021
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,032	12	11	0,66	0,72	0,64	-0,021
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,033	12	10	0,45	0,53	0,93	-0,021
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,033	12	10	0,45	0,53	0,93	-0,021
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,032	12	11	0,66	0,72	0,64	-0,021
	ARMA(1,1)-GARCH(1,1) - student-t	2	0	-	-	1	-0,033	12	11	0,66	0,72	0,64	-0,021
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,033	12	10	0,45	0,53	0,93	-0,021
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	14	0,67	0,89	0,68	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	13	0,89	0,92	0,62	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	13	0,89	0,92	0,62	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	0	-	-	1	-0,031	12	13	0,89	0,92	0,62	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	0	-	-	1	-0,031	12	13	0,89	0,92	0,62	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	13	0,89	0,92	0,62	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	0	-	-	1	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,1)-GJR(1,1) - student-t	2	0	-	-	1	-0,031	12	13	0,89	0,92	0,62	-0,02
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	0	-	-	1	-0,031	12	13	0,89	0,92	0,62	-0,02
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,033	12	12	0,88	0,86	0,75	-0,021
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,033	12	11	0,66	0,72	0,64	-0,021
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,033	12	10	0,45	0,53	0,93	-0,021
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,033	12	11	0,66	0,72	0,64	-0,021
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,033	12	11	0,66	0,72	0,64	-0,021
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,033	12	10	0,45	0,53	0,93	-0,021
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,033	12	11	0,66	0,72	0,64	-0,021
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,033	12	11	0,66	0,72	0,64	-0,021
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,033	12	10	0,45	0,53	0,93	-0,021
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	15	0,48	0,78	0,68	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,032	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	0	-	-	1	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	0	-	-	1	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	0	-	-	1	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,1)-GJR(1,1) - student-t	2	0	-	-	1	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	0	-	-	1	-0,032	12	14	0,67	0,89	0,64	-0,02

Table 33. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2013 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,77	-0,036	12	14	0,67	0,4	0,52	-0,025
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,77	-0,038	12	14	0,67	0,4	0,52	-0,025
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,38	-0,041	12	10	0,45	0,5	0,34	-0,027
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,77	-0,035	12	14	0,67	0,4	0,52	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,77	-0,038	12	15	0,48	0,78	0,9	-0,024
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,38	-0,041	12	10	0,45	0,5	0,34	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,77	-0,036	12	14	0,67	0,4	0,52	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,77	-0,038	12	15	0,48	0,78	0,9	-0,024
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,38	-0,042	12	10	0,45	0,5	0,62	-0,027
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,74	-0,034	12	15	0,48	0,3	0,23	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,77	-0,036	12	17	0,22	0,46	0,3	-0,023
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,38	-0,04	12	12	0,88	0,54	0,34	-0,026
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,74	-0,034	12	14	0,67	0,4	0,16	-0,024
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,77	-0,035	12	16	0,33	0,21	0,12	-0,023
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,38	-0,039	12	13	0,89	0,48	0,32	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,74	-0,034	12	15	0,48	0,3	0,23	-0,024
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,88	-0,036	12	17	0,22	0,46	0,12	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,38	-0,039	12	12	0,88	0,54	0,34	-0,025
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,91	-0,041	12	9	0,29	0,4	0,76	-0,027
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,91	-0,042	12	9	0,29	0,4	0,76	-0,027
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,042	12	9	0,29	0,4	0,76	-0,027
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,16	-0,041	12	10	0,45	0,5	0,62	-0,027
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,91	-0,042	12	9	0,29	0,4	0,76	-0,027
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,042	12	9	0,29	0,4	0,76	-0,027
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,16	-0,041	12	10	0,45	0,5	0,62	-0,027
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,91	-0,042	12	9	0,29	0,4	0,76	-0,027
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,042	12	9	0,29	0,4	0,76	-0,028
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,77	-0,038	12	12	0,88	0,54	0,34	-0,025
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,38	-0,038	12	12	0,88	0,54	0,34	-0,025
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,38	-0,038	12	12	0,88	0,54	0,34	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,77	-0,038	12	13	0,89	0,48	0,32	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,77	-0,038	12	13	0,89	0,48	0,32	-0,025
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,77	-0,038	12	13	0,89	0,48	0,32	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,77	-0,038	12	13	0,89	0,48	0,32	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,77	-0,038	12	13	0,89	0,48	0,32	-0,025
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,38	-0,038	12	12	0,88	0,54	0,34	-0,025
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,91	-0,042	12	10	0,45	0,5	0,34	-0,027
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,91	-0,042	12	9	0,29	0,4	0,76	-0,027
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,042	12	9	0,29	0,4	0,76	-0,027
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,77	-0,041	12	10	0,45	0,5	0,34	-0,027
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,38	-0,042	12	9	0,29	0,4	0,76	-0,027
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,042	12	9	0,29	0,4	0,76	-0,027
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,77	-0,041	12	10	0,45	0,5	0,34	-0,027
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,38	-0,042	12	10	0,45	0,5	0,34	-0,027
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,042	12	9	0,29	0,4	0,76	-0,027
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,38	-0,039	12	12	0,88	0,54	0,34	-0,025
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,38	-0,039	12	12	0,88	0,54	0,34	-0,025
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,38	-0,039	12	12	0,88	0,54	0,34	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,77	-0,038	12	13	0,89	0,48	0,32	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,38	-0,039	12	13	0,89	0,48	0,32	-0,025
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,38	-0,039	12	13	0,89	0,48	0,32	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,77	-0,038	12	13	0,89	0,48	0,32	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,38	-0,039	12	13	0,89	0,48	0,32	-0,025
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,38	-0,039	12	12	0,88	0,54	0,34	-0,025

Table 34. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2013 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,73	-0,022	12	16	0,33	0,62	0,86	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,06	-0,023	12	17	0,22	0,46	0,51	-0,015
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,4	0,34	-0,017
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,69	-0,022	12	14	0,67	0,89	0,88	-0,015
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,06	-0,023	12	16	0,33	0,62	0,37	-0,015
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,06	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,89	-0,022	12	14	0,67	0,89	0,88	-0,015
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,06	-0,023	12	16	0,33	0,62	0,37	-0,015
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,73	-0,022	12	15	0,48	0,78	0,7	-0,016
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,73	-0,023	12	16	0,33	0,62	0,37	-0,015
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,026	12	12	0,88	0,54	0,81	-0,017
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,69	-0,022	12	14	0,67	0,89	0,88	-0,015
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,06	-0,023	12	16	0,33	0,62	0,37	-0,015
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,026	12	13	0,89	0,92	0,76	-0,016
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,89	-0,022	12	14	0,67	0,89	0,88	-0,015
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,39	-0,023	12	16	0,33	0,62	0,91	-0,015
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,025	12	13	0,89	0,92	0,76	-0,016
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,06	-0,026	12	13	0,89	0,48	0,71	-0,017
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,06	-0,026	12	13	0,89	0,48	0,71	-0,017
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,06	-0,026	12	13	0,89	0,48	0,71	-0,017
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,06	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,06	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,06	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,06	-0,026	12	12	0,88	0,54	0,81	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,21	-0,026	12	12	0,88	0,54	0,81	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,06	-0,026	12	12	0,88	0,54	0,81	-0,017
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,21	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,21	-0,025	12	13	0,89	0,92	0,76	-0,016
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,025	12	13	0,89	0,92	0,76	-0,016
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,21	-0,027	12	13	0,89	0,48	0,71	-0,017
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,21	-0,027	12	14	0,67	0,4	0,34	-0,017
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,027	12	13	0,89	0,48	0,71	-0,017
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,21	-0,026	12	12	0,88	0,54	0,81	-0,016
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,21	-0,027	12	13	0,89	0,48	0,45	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,027	12	13	0,89	0,48	0,45	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,21	-0,026	12	13	0,89	0,92	0,76	-0,016
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,026	12	13	0,89	0,92	0,76	-0,016

Table 35. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2013 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,73	-0,024	12	15	0,48	0,78	0,84	-0,017
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,73	-0,025	12	16	0,33	0,62	0,49	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,029	12	12	0,88	0,86	0,71	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,89	-0,023	12	15	0,48	0,78	0,84	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,89	-0,025	12	17	0,22	0,46	0,36	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	13	0,89	0,92	0,82	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,89	-0,023	12	14	0,67	0,89	0,84	-0,016
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,08	-0,025	12	16	0,33	0,62	0,37	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,73	-0,024	12	15	0,48	0,78	0,7	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,08	-0,025	12	16	0,33	0,62	0,68	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,71	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,89	-0,023	12	15	0,48	0,78	0,73	-0,016
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,08	-0,024	12	17	0,22	0,46	0,36	-0,016
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,08	-0,023	12	14	0,67	0,89	0,95	-0,016
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,08	-0,025	12	17	0,22	0,46	0,66	-0,016
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,08	-0,029	12	14	0,67	0,89	0,84	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,08	-0,029	12	14	0,67	0,89	0,84	-0,018
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,029	12	14	0,67	0,89	0,84	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,08	-0,028	12	13	0,89	0,92	0,82	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	13	0,89	0,92	0,82	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,029	12	13	0,89	0,92	0,82	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,08	-0,027	12	14	0,67	0,89	0,84	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,08	-0,029	12	13	0,89	0,92	0,99	-0,017
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,029	12	13	0,89	0,92	0,99	-0,017
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,08	-0,027	12	14	0,67	0,89	0,95	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	13	0,89	0,92	0,82	-0,017
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,08	-0,027	12	13	0,89	0,92	0,48	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,028	12	13	0,89	0,92	0,81	-0,017
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,08	-0,029	12	14	0,67	0,89	0,84	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,08	-0,029	12	12	0,88	0,86	0,71	-0,018
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,029	12	12	0,88	0,86	0,71	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	13	0,89	0,92	0,82	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,71	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,71	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,71	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,08	-0,027	12	14	0,67	0,89	0,79	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	14	0,67	0,89	0,95	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	13	0,89	0,92	0,82	-0,017
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,08	-0,027	12	13	0,89	0,92	0,48	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,028	12	13	0,89	0,92	0,81	-0,017

Table 36. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2013 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,49	-0,026	12	17	0,22	0,46	0,66	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,49	-0,028	12	19	0,08	0,2	0,9	-0,017
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	17	0,22	0,46	0,66	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,49	-0,026	12	18	0,13	0,31	0,5	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,62	-0,028	12	18	0,13	0,31	0,88	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	17	0,22	0,46	0,66	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,17	-0,026	12	17	0,22	0,46	0,48	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,62	-0,028	12	18	0,13	0,31	0,88	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	17	0,22	0,46	0,66	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,49	-0,026	12	15	0,48	0,78	0,32	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,74	-0,028	12	19	0,08	0,19	0,76	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	15	0,48	0,78	0,32	-0,019
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,49	-0,027	12	15	0,48	0,78	0,32	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,2	-0,028	12	18	0,13	0,31	0,3	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	16	0,33	0,62	0,37	-0,019
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,49	-0,026	12	15	0,48	0,78	0,32	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,2	-0,028	12	17	0,22	0,46	0,25	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	15	0,48	0,78	0,32	-0,019
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	14	0,67	0,89	0,44	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,62	-0,029	12	15	0,48	0,78	0,5	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,62	-0,028	12	15	0,48	0,78	0,5	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	14	0,67	0,89	0,44	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,028	12	16	0,33	0,62	0,59	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,028	12	15	0,48	0,78	0,5	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	14	0,67	0,89	0,44	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,028	12	15	0,48	0,78	0,5	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,62	-0,028	12	16	0,33	0,62	0,59	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,03	12	15	0,48	0,78	0,32	-0,019
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,8	-0,029	12	15	0,48	0,78	0,41	-0,019
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,8	-0,029	12	16	0,33	0,62	0,37	-0,019
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	15	0,48	0,78	0,32	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,8	-0,029	12	16	0,33	0,62	0,37	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,8	-0,029	12	16	0,33	0,62	0,37	-0,019
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	15	0,48	0,78	0,32	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,8	-0,029	12	16	0,33	0,62	0,37	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,8	-0,029	12	15	0,48	0,78	0,32	-0,019
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,03	12	15	0,48	0,78	0,54	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	16	0,33	0,62	0,63	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	16	0,33	0,62	0,63	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,03	12	14	0,67	0,89	0,44	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	15	0,48	0,78	0,54	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	16	0,33	0,62	0,63	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,03	12	15	0,48	0,78	0,54	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	15	0,48	0,78	0,54	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	15	0,48	0,78	0,54	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,03	12	15	0,48	0,78	0,32	-0,019
	ARMA(0,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	16	0,33	0,62	0,37	-0,019
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	15	0,48	0,78	0,32	-0,019
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	15	0,48	0,78	0,32	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	16	0,33	0,62	0,37	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	15	0,48	0,78	0,32	-0,019
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	15	0,48	0,78	0,32	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	15	0,48	0,78	0,32	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	15	0,48	0,78	0,32	-0,019

Table 37. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2014 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,01	-0,032	12	12	0,88	0,54	0,054	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,39	-0,035	12	18	0,13	0,31	0,73	-0,021
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,038	12	12	0,88	0,54	0,13	-0,023
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,34	-0,032	12	12	0,88	0,54	0,08	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,39	-0,035	12	18	0,13	0,08	0,34	-0,021
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,038	12	12	0,88	0,54	0,13	-0,023
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,01	-0,032	12	12	0,88	0,54	0,08	-0,022
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,39	-0,034	12	17	0,22	0,13	0,48	-0,021
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,038	12	12	0,88	0,54	0,13	-0,023
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,052	0	-0,033	12	13	0,89	0,92	0,45	-0,023
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,01	-0,034	12	17	0,22	0,34	0,81	-0,021
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,038	12	14	0,67	0,89	0,59	-0,023
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,09	-0,033	12	14	0,67	0,89	0,44	-0,023
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,11	-0,034	12	17	0,22	0,46	0,78	-0,021
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,038	12	14	0,67	0,89	0,59	-0,023
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0	-0,033	12	14	0,67	0,89	0,44	-0,023
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,11	-0,034	12	17	0,22	0,46	0,78	-0,021
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,038	12	14	0,67	0,89	0,59	-0,023
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,39	-0,036	12	11	0,66	0,54	0,06	-0,023
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,037	12	10	0,45	0,5	0,07	-0,023
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,037	12	10	0,45	0,5	0,07	-0,023
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,74	-0,036	12	10	0,45	0,5	0,04	-0,023
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,037	12	13	0,89	0,48	0,23	-0,023
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,037	12	12	0,88	0,54	0,13	-0,023
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,74	-0,036	12	11	0,66	0,54	0,06	-0,023
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,037	12	11	0,66	0,54	0,11	-0,023
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,038	12	11	0,66	0,54	0,11	-0,023
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,39	-0,035	12	12	0,88	0,86	0,3	-0,023
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,11	-0,035	12	14	0,67	0,89	0,59	-0,023
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,11	-0,035	12	14	0,67	0,89	0,59	-0,023
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,39	-0,035	12	14	0,67	0,89	0,44	-0,023
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,11	-0,035	12	14	0,67	0,89	0,59	-0,023
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,11	-0,035	12	14	0,67	0,89	0,59	-0,023
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,39	-0,035	12	14	0,67	0,89	0,44	-0,023
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,11	-0,035	12	14	0,67	0,89	0,59	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,11	-0,035	12	14	0,67	0,89	0,59	-0,023
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,39	-0,036	12	11	0,66	0,54	0,06	-0,023
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,39	-0,036	12	10	0,45	0,5	0,07	-0,023
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,39	-0,036	12	10	0,45	0,5	0,07	-0,023
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,39	-0,036	12	11	0,66	0,54	0,06	-0,023
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,036	12	12	0,88	0,54	0,13	-0,023
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,036	12	12	0,88	0,54	0,13	-0,023
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,74	-0,036	12	12	0,88	0,54	0,08	-0,023
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,036	12	11	0,66	0,54	0,11	-0,023
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,036	12	11	0,66	0,54	0,11	-0,023
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,39	-0,035	12	13	0,89	0,92	0,45	-0,023
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,11	-0,035	12	14	0,67	0,89	0,59	-0,023
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,11	-0,035	12	14	0,67	0,89	0,59	-0,023
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,39	-0,035	12	14	0,67	0,89	0,44	-0,023
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,11	-0,035	12	14	0,67	0,89	0,59	-0,023
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,11	-0,035	12	14	0,67	0,89	0,59	-0,023
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,72	-0,035	12	14	0,67	0,89	0,44	-0,023
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,11	-0,035	12	14	0,67	0,89	0,59	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,11	-0,035	12	14	0,67	0,89	0,59	-0,023

Table 38. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2014 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	8	0,01	0	0,34	-0,023	12	20	0,04	0,07	0,71	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	8	0,01	0	0,34	-0,025	12	21	0,02	0,02	0,52	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,31	-0,028	12	19	0,08	0,1	0,48	-0,017
	ARMA(1,0)-GARCH(1,1) - norm	2	7	0,02	0,03	0,85	-0,023	12	19	0,08	0,19	0,94	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	7	0,02	0,03	0,85	-0,025	12	20	0,04	0,07	0,71	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,87	-0,028	12	17	0,22	0,34	0,73	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,02	0,03	0,85	-0,023	12	18	0,13	0,12	0,5	-0,016
	ARMA(1,1)-GARCH(1,1) - student-t	2	7	0,02	0,03	0,85	-0,025	12	20	0,04	0,07	0,71	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,87	-0,028	12	17	0,22	0,34	0,73	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,03	0,85	-0,024	12	19	0,08	0,1	0,73	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	7	0,02	0,03	0,85	-0,025	12	20	0,04	0,07	0,71	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,87	-0,028	12	18	0,13	0,12	0,5	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,01	0,01	0,82	-0,024	12	18	0,13	0,12	0,93	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,32	-0,025	12	19	0,08	0,1	0,73	-0,016
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,62	-0,028	12	17	0,22	0,13	0,69	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	8	0,01	0,01	0,82	-0,024	12	17	0,22	0,13	0,69	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	7	0,02	0,052	0,16	-0,026	12	19	0,08	0,1	0,73	-0,016
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,29	-0,029	12	17	0,22	0,13	0,69	-0,018
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,62	-0,029	12	17	0,22	0,13	0,62	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,029	12	17	0,22	0,13	0,62	-0,017
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,029	12	17	0,22	0,34	0,73	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,62	-0,029	12	17	0,22	0,34	0,73	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,029	12	17	0,22	0,34	0,73	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,029	12	17	0,22	0,34	0,73	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,62	-0,029	12	16	0,33	0,41	0,9	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,029	12	16	0,33	0,41	0,9	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,029	12	17	0,22	0,34	0,73	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,37	-0,029	12	16	0,33	0,14	0,84	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,37	-0,029	12	16	0,33	0,14	0,84	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,33	-0,029	12	17	0,22	0,13	0,62	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,62	-0,029	12	16	0,33	0,41	0,98	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,37	-0,029	12	17	0,22	0,13	0,69	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,37	-0,029	12	17	0,22	0,13	0,69	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,62	-0,029	12	16	0,33	0,14	0,61	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,29	-0,029	12	15	0,48	0,12	0,78	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,29	-0,029	12	17	0,22	0,13	0,69	-0,018
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,31	-0,028	12	15	0,48	0,44	0,89	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,87	-0,028	12	16	0,33	0,41	0,9	-0,018
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,028	12	17	0,22	0,34	0,73	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,63	-0,028	12	17	0,22	0,34	0,73	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,028	12	16	0,33	0,41	0,98	-0,018
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,028	12	17	0,22	0,34	0,73	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,62	-0,028	12	17	0,22	0,34	0,73	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,33	-0,028	12	17	0,22	0,34	0,73	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,028	12	17	0,22	0,34	0,73	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,37	-0,028	12	16	0,33	0,14	0,84	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,33	-0,029	12	17	0,22	0,13	0,91	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,029	12	18	0,13	0,12	0,5	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,63	-0,028	12	16	0,33	0,41	0,98	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,37	-0,028	12	16	0,33	0,41	0,98	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,62	-0,028	12	17	0,22	0,13	0,69	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,37	-0,028	12	16	0,33	0,13	0,61	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,29	-0,028	12	16	0,33	0,14	0,61	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,29	-0,028	12	17	0,22	0,13	0,69	-0,018

Table 39. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2014 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	9	0	0	0,33	-0,024	12	20	0,04	0,07	0,63	-0,017
	ARMA(0,0)-GARCH(1,1) - student-t	2	7	0,02	0,03	0,85	-0,026	12	21	0,02	0,051	0,51	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,029	12	18	0,13	0,12	0,5	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	8	0,01	0	0,34	-0,024	12	18	0,13	0,27	0,83	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	7	0,02	0,03	0,85	-0,026	12	20	0,04	0,13	0,71	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,029	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	8	0,01	0,01	0,82	-0,025	12	18	0,13	0,27	0,83	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	7	0,02	0,03	0,85	-0,026	12	19	0,08	0,1	0,6	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,029	12	18	0,13	0,27	0,83	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	9	0	0	0,58	-0,025	12	19	0,08	0,1	0,6	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	7	0,02	0,03	0,85	-0,026	12	20	0,04	0,07	0,85	-0,017
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,03	12	18	0,13	0,12	0,5	-0,019
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,01	0,01	0,82	-0,025	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,66	-0,026	12	19	0,08	0,1	0,6	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,03	12	18	0,13	0,27	0,83	-0,019
	ARMA(1,1)-GJR(1,1) - norm	2	8	0,01	0,01	0,82	-0,025	12	19	0,08	0,1	0,6	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	7	0,02	0,03	0,15	-0,027	12	19	0,08	0,1	0,6	-0,017
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,37	-0,03	12	18	0,13	0,27	0,83	-0,019
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0	-0,03	12	17	0,22	0,13	0,62	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,04	-0,03	12	17	0,22	0,13	0,62	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,03	12	16	0,33	0,41	0,9	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,03	12	18	0,13	0,27	0,83	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,048	-0,03	12	18	0,13	0,27	0,83	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,048	-0,03	12	18	0,13	0,27	0,83	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,03	12	17	0,22	0,34	0,98	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,01	-0,03	12	17	0,22	0,34	0,98	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,048	-0,03	12	17	0,22	0,34	0,98	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,08	-0,03	12	17	0,22	0,13	0,62	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,36	-0,03	12	17	0,22	0,13	0,62	-0,019
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,03	12	17	0,22	0,13	0,62	-0,019
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,01	-0,03	12	17	0,22	0,34	0,93	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,01	-0,03	12	17	0,22	0,34	0,93	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,03	12	18	0,13	0,27	0,83	-0,019
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,03	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,25	-0,03	12	17	0,22	0,13	0,62	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,36	-0,03	12	19	0,08	0,1	0,6	-0,019
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,04	-0,03	12	16	0,33	0,14	0,59	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,04	-0,03	12	17	0,22	0,13	0,62	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,03	12	17	0,22	0,13	0,47	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,029	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,31	-0,03	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,03	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,36	-0,029	12	17	0,22	0,34	0,98	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,31	-0,029	12	17	0,22	0,34	0,98	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,03	12	18	0,13	0,27	0,83	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,31	-0,03	12	17	0,22	0,13	0,62	-0,019
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,31	-0,03	12	17	0,22	0,13	0,62	-0,019
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,03	12	18	0,13	0,12	0,5	-0,019
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,36	-0,029	12	17	0,22	0,34	0,93	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,36	-0,03	12	17	0,22	0,34	0,93	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,03	12	18	0,13	0,27	0,83	-0,019
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,25	-0,03	12	18	0,13	0,27	0,83	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,25	-0,03	12	16	0,33	0,41	0,9	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,36	-0,03	12	19	0,08	0,1	0,6	-0,019

Table 40. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2014 using the MAX(5) identified lottery stocks and composed of equally -weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	10	0	0	0,7	-0,035	12	22	0,01	0,02	0,61	-0,024
	ARMA(0,0)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,87	-0,038	12	22	0,01	0,02	0,61	-0,024
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,97	-0,042	12	20	0,04	0,07	0,67	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	10	0	0	0,7	-0,035	12	22	0,01	0,02	0,61	-0,024
	ARMA(1,0)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,87	-0,038	12	22	0,01	0,02	0,61	-0,024
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,97	-0,042	12	20	0,04	0,07	0,67	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	10	0	0	0,7	-0,035	12	22	0,01	0,02	0,61	-0,024
	ARMA(1,1)-GARCH(1,1) - student-t	2	8	0,01	0,02	0,92	-0,038	12	22	0,01	0,02	0,61	-0,024
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,97	-0,043	12	18	0,13	0,12	0,72	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	8	0,01	0,02	0,98	-0,036	12	21	0,02	0,051	0,4	-0,025
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,97	-0,039	12	21	0,02	0,051	0,4	-0,025
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,044	12	18	0,13	0,12	0,5	-0,028
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,01	0,02	0,98	-0,036	12	20	0,04	0,07	0,91	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,97	-0,039	12	22	0,01	0,03	0,29	-0,025
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,044	12	18	0,13	0,12	0,5	-0,028
	ARMA(1,1)-GJR(1,1) - norm	2	9	0	0	0,74	-0,036	12	20	0,04	0,07	0,91	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,97	-0,039	12	22	0,01	0,03	0,29	-0,025
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,59	-0,044	12	17	0,21	0,34	0,73	-0,028
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,87	-0,041	12	18	0,13	0,12	0,65	-0,027
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,68	-0,042	12	17	0,21	0,13	0,42	-0,028
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,97	-0,042	12	17	0,21	0,13	0,42	-0,028
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,68	-0,041	12	18	0,13	0,12	0,65	-0,027
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,97	-0,042	12	17	0,21	0,13	0,42	-0,027
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,97	-0,042	12	17	0,21	0,13	0,42	-0,028
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,02	0,052	0,87	-0,041	12	18	0,13	0,12	0,65	-0,027
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,68	-0,042	12	17	0,21	0,13	0,42	-0,028
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,68	-0,042	12	16	0,33	0,14	0,18	-0,028
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,99	-0,041	12	18	0,13	0,12	0,78	-0,028
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,44	-0,042	12	15	0,48	0,44	0,75	-0,029
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,44	-0,042	12	15	0,48	0,44	0,75	-0,029
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,68	-0,041	12	19	0,08	0,1	0,76	-0,028
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,44	-0,042	12	15	0,48	0,44	0,75	-0,028
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,44	-0,042	12	15	0,48	0,44	0,75	-0,029
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,68	-0,041	12	19	0,08	0,1	0,76	-0,028
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,44	-0,042	12	16	0,33	0,41	0,77	-0,028
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,44	-0,042	12	16	0,33	0,41	0,69	-0,029
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,13	-0,042	12	19	0,08	0,1	0,76	-0,027
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,13	-0,043	12	18	0,13	0,12	0,65	-0,027
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,13	-0,043	12	18	0,13	0,12	0,65	-0,027
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,13	-0,042	12	19	0,08	0,1	0,76	-0,027
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,13	-0,043	12	18	0,13	0,12	0,65	-0,027
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,13	-0,043	12	18	0,13	0,12	0,65	-0,027
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,97	-0,042	12	18	0,13	0,12	0,65	-0,027
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,97	-0,043	12	18	0,13	0,12	0,65	-0,027
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,97	-0,044	12	17	0,21	0,13	0,3	-0,027
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,02	-0,042	12	20	0,04	0,07	0,91	-0,027
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,044	12	17	0,21	0,34	0,73	-0,028
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,044	12	17	0,21	0,34	0,73	-0,028
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,02	-0,042	12	20	0,04	0,07	0,91	-0,027
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,044	12	17	0,21	0,34	0,73	-0,028
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,044	12	17	0,21	0,34	0,73	-0,028
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,55	-0,042	12	20	0,04	0,07	0,91	-0,027
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,044	12	18	0,13	0,27	0,99	-0,028
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,59	-0,044	12	17	0,21	0,34	0,73	-0,028

Table 41. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2015 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	10	0	0	0,36	-0,051	12	21	0,02	0,051	0,61	-0,035
	ARMA(0,0)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,19	-0,056	12	22	0,01	0,03	0,84	-0,035
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,061	12	18	0,13	0,12	0,91	-0,038
	ARMA(1,0)-GARCH(1,1) - norm	2	8	0,01	0,02	0,38	-0,05	12	20	0,04	0,07	0,72	-0,035
	ARMA(1,0)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,19	-0,056	12	22	0,01	0,03	0,84	-0,035
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,06	12	17	0,21	0,13	0,7	-0,038
	ARMA(1,1)-GARCH(1,1) - norm	2	8	0,01	0,02	0,.38	-0,05	12	20	0,04	0,07	0,72	-0,035
	ARMA(1,1)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,19	-0,056	12	22	0,01	0,03	0,84	-0,035
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,061	12	16	0,33	0,14	0,33	-0,038
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,93	-0,05	12	21	0,02	0,051	0,9	-0,035
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,45	-0,055	12	21	0,02	0,051	0,49	-0,035
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,061	12	20	0,04	0,07	0,99	-0,038
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,91	-0,05	12	21	0,02	0,051	0,49	-0,035
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,54	-0,056	12	21	0,02	0,051	0,49	-0,035
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,86	-0,061	12	20	0,04	0,07	0,99	-0,038
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0,69	-0,05	12	21	0,02	0,051	0,49	-0,035
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,54	-0,056	12	21	0,02	0,051	0,49	-0,035
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,86	-0,061	12	20	0,04	0,07	0,99	-0,038
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,54	-0,058	12	16	0,33	0,14	0,33	-0,037
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,69	-0,06	12	16	0,33	0,14	0,33	-0,038
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,061	12	16	0,33	0,14	0,33	-0,038
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,32	-0,058	12	17	0,21	0,13	0,32	-0,037
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,69	-0,06	12	16	0,33	0,14	0,33	-0,038
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,061	12	16	0,33	0,14	0,33	-0,038
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,32	-0,058	12	16	0,33	0,14	0,33	-0,037
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,69	-0,06	12	16	0,33	0,14	0,33	-0,038
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,061	12	16	0,33	0,14	0,33	-0,038
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,54	-0,057	12	20	0,04	0,07	0,99	-0,037
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,69	-0,059	12	19	0,08	0,1	0,67	-0,039
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,059	12	19	0,08	0,1	0,67	-0,039
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,54	-0,056	12	20	0,04	0,07	0,99	-0,037
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,54	-0,058	12	19	0,08	0,1	0,67	-0,038
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,059	12	19	0,08	0,1	0,67	-0,039
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,54	-0,056	12	20	0,04	0,07	0,99	-0,037
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,54	-0,058	12	19	0,08	0,1	0,67	-0,038
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,059	12	19	0,08	0,1	0,67	-0,039
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,69	-0,06	12	18	0,13	0,12	0,97	-0,037
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,69	-0,062	12	16	0,33	0,14	0,33	-0,038
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,062	12	16	0,33	0,14	0,33	-0,038
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,69	-0,059	12	19	0,08	0,1	0,97	-0,037
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,69	-0,061	12	16	0,33	0,14	0,33	-0,038
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,062	12	16	0,33	0,14	0,33	-0,038
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,69	-0,059	12	18	0,13	0,12	0,97	-0,037
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,69	-0,061	12	16	0,33	0,14	0,33	-0,038
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,062	12	16	0,33	0,14	0,33	-0,038
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,69	-0,058	12	21	0,02	0,051	0,49	-0,036
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,69	-0,06	12	21	0,02	0,051	0,49	-0,038
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,06	12	20	0,04	0,07	0,99	-0,038
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,69	-0,058	12	20	0,04	0,07	0,99	-0,036
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,86	-0,06	12	20	0,04	0,07	0,99	-0,038
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,86	-0,06	12	20	0,04	0,07	0,99	-0,038
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,69	-0,058	12	20	0,04	0,07	0,99	-0,036
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,86	-0,06	12	20	0,04	0,07	0,99	-0,038
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,86	-0,06	12	20	0,04	0,07	0,99	-0,038

Table 42. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2015 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	10	0	0	0,3	-0,033	12	20	0,04	0,07	0,9	-0,023
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,68	-0,036	12	20	0,04	0,07	0,9	-0,023
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,042	12	16	0,33	0,14	0,53	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	8	0,01	0,02	0,85	-0,033	12	20	0,04	0,07	0,44	-0,023
	ARMA(1,0)-GARCH(1,1) - student-t	2	8	0,01	0,02	0,85	-0,036	12	21	0,02	0,051	0,67	-0,023
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,041	12	17	0,22	0,13	0,51	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	8	0,01	0,02	0,85	-0,033	12	19	0,08	0,1	0,87	-0,023
	ARMA(1,1)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,54	-0,036	12	19	0,08	0,1	0,87	-0,023
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,041	12	17	0,22	0,13	0,51	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	10	0	0	0,56	-0,033	12	19	0,08	0,1	0,89	-0,023
	ARMA(0,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0,54	-0,036	12	19	0,08	0,1	0,89	-0,023
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,63	-0,042	12	16	0,33	0,14	0,4	-0,026
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,01	0,02	0,39	-0,033	12	20	0,04	0,07	0,68	-0,023
	ARMA(1,0)-GJR(1,1) - student-t	2	8	0,01	0,02	0,39	-0,036	12	21	0,02	0,051	0,27	-0,023
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,63	-0,041	12	19	0,08	0,1	0,87	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	8	0,01	0,02	0,39	-0,033	12	20	0,04	0,07	0,68	-0,023
	ARMA(1,1)-GJR(1,1) - student-t	2	8	0,01	0,02	0,39	-0,036	12	20	0,04	0,07	0,68	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,63	-0,041	12	18	0,13	0,12	0,99	-0,025
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,55	-0,042	12	17	0,22	0,13	0,96	-0,025
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,55	-0,043	12	16	0,33	0,14	0,53	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,043	12	16	0,33	0,14	0,53	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,55	-0,041	12	18	0,13	0,12	0,93	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,55	-0,042	12	17	0,22	0,13	0,51	-0,026
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,042	12	17	0,22	0,13	0,51	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,55	-0,04	12	17	0,22	0,13	0,81	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,55	-0,041	12	18	0,13	0,12	0,93	-0,025
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,042	12	17	0,22	0,13	0,51	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,63	-0,041	12	19	0,08	0,1	0,89	-0,026
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,63	-0,042	12	19	0,08	0,1	0,89	-0,026
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,042	12	16	0,33	0,14	0,4	-0,026
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,2	-0,04	12	19	0,08	0,1	0,87	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,2	-0,041	12	19	0,08	0,1	0,87	-0,026
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,93	-0,041	12	19	0,08	0,1	0,87	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,26	-0,039	12	19	0,08	0,1	0,83	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,2	-0,04	12	19	0,08	0,1	0,83	-0,026
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,2	-0,041	12	18	0,13	0,12	0,99	-0,026
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,55	-0,041	12	15	0,48	0,12	0,43	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,55	-0,042	12	16	0,33	0,14	0,53	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,042	12	15	0,48	0,12	0,43	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,55	-0,04	12	17	0,22	0,13	0,51	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,63	-0,041	12	17	0,22	0,13	0,51	-0,026
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,042	12	17	0,22	0,13	0,51	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,55	-0,04	12	17	0,22	0,13	0,81	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,63	-0,041	12	18	0,13	0,12	0,93	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,041	12	17	0,22	0,13	0,51	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,63	-0,041	12	18	0,13	0,12	0,97	-0,025
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,63	-0,042	12	19	0,08	0,1	0,89	-0,026
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,63	-0,042	12	16	0,33	0,14	0,4	-0,026
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,2	-0,04	12	19	0,08	0,1	0,87	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,2	-0,041	12	19	0,08	0,1	0,87	-0,026
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,63	-0,041	12	19	0,08	0,1	0,87	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,26	-0,04	12	19	0,08	0,1	0,83	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,2	-0,041	12	19	0,08	0,1	0,83	-0,026
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,63	-0,041	12	18	0,13	0,12	0,99	-0,025

Table 43. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2015 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	10	0	0	0,31	-0,034	12	20	0,04	0,07	0,94	-0,024
	ARMA(0,0)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,46	-0,037	12	21	0,02	0,051	0,93	-0,023
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,043	12	16	0,33	0,14	0,5	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	9	0	0	0,62	-0,034	12	19	0,08	0,1	0,87	-0,024
	ARMA(1,0)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,54	-0,037	12	20	0,04	0,07	0,94	-0,023
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,042	12	18	0,13	0,12	0,45	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	9	0	0	0,62	-0,034	12	21	0,02	0,051	0,72	-0,024
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,68	-0,037	12	21	0,02	0,051	0,72	-0,023
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,041	12	18	0,13	0,12	0,45	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	11	0	0	0,91	-0,034	12	20	0,04	0,07	0,94	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,63	-0,037	12	20	0,04	0,07	0,94	-0,024
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,043	12	18	0,13	0,12	0,6	-0,026
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,01	0,02	0,39	-0,034	12	21	0,02	0,051	0,72	-0,024
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,26	-0,037	12	21	0,02	0,051	0,72	-0,024
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,042	12	18	0,13	0,12	0,45	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	8	0,01	0,02	0,39	-0,034	12	21	0,02	0,051	0,72	-0,024
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,26	-0,037	12	21	0,02	0,051	0,72	-0,024
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,042	12	21	0,02	0,051	0,72	-0,026
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,44	-0,043	12	16	0,33	0,14	0,5	-0,027
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,44	-0,044	12	16	0,33	0,14	0,5	-0,027
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,044	12	16	0,33	0,14	0,5	-0,027
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,44	-0,042	12	18	0,13	0,12	0,45	-0,026
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,44	-0,043	12	18	0,13	0,12	0,45	-0,027
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,043	12	18	0,13	0,12	0,45	-0,027
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,44	-0,042	12	19	0,08	0,1	0,87	-0,026
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,44	-0,043	12	19	0,08	0,1	0,87	-0,027
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,043	12	18	0,13	0,12	0,45	-0,027
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,44	-0,042	12	20	0,04	0,07	0,94	-0,027
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,44	-0,043	12	20	0,04	0,07	0,94	-0,027
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,043	12	18	0,13	0,12	0,6	-0,027
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,44	-0,041	12	20	0,04	0,07	0,92	-0,026
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,67	-0,042	12	20	0,04	0,07	0,92	-0,027
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,042	12	18	0,13	0,12	0,45	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,67	-0,041	12	21	0,02	0,051	0,72	-0,026
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,67	-0,042	12	21	0,02	0,051	0,72	-0,026
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,042	12	21	0,02	0,051	0,72	-0,027
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,44	-0,042	12	16	0,33	0,14	0,5	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,44	-0,044	12	16	0,33	0,14	0,5	-0,027
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,044	12	16	0,33	0,14	0,5	-0,027
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,44	-0,042	12	18	0,13	0,12	0,45	-0,026
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,44	-0,043	12	18	0,13	0,12	0,45	-0,027
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,043	12	17	0,21	0,13	0,48	-0,027
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,44	-0,041	12	19	0,08	0,1	0,87	-0,026
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,44	-0,042	12	19	0,08	0,1	0,87	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,043	12	18	0,13	0,12	0,45	-0,027
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,44	-0,042	12	20	0,04	0,07	0,94	-0,026
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,44	-0,043	12	19	0,08	0,1	0,92	-0,027
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,043	12	18	0,13	0,12	0,6	-0,027
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,67	-0,041	12	20	0,04	0,07	0,92	-0,026
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,67	-0,042	12	20	0,04	0,07	0,92	-0,026
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,67	-0,042	12	18	0,13	0,12	0,45	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,56	-0,041	12	21	0,02	0,051	0,72	-0,026
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,67	-0,042	12	20	0,04	0,13	0,49	-0,026
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,67	-0,042	12	21	0,02	0,051	0,72	-0,026

Table 44. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2015 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,026	12	8	0,16	0,29	0,08	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,027	12	9	0,29	0,4	0,36	-0,017
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	8	0,16	0,29	0,08	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,026	12	9	0,29	0,4	0,36	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,027	12	9	0,29	0,4	0,36	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	8	0,16	0,29	0,08	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,026	12	8	0,16	0,29	0,08	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,027	12	9	0,29	0,4	0,36	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	6	0,04	0,1	0,58	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,15	-0,025	12	7	0,08	0,18	0,01	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,51	-0,026	12	9	0,29	0,4	0,36	-0,017
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	0	-	-	1	-0,029	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,15	-0,026	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,51	-0,026	12	9	0,29	0,4	0,36	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	0	-	-	1	-0,029	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,15	-0,025	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,51	-0,026	12	9	0,29	0,4	0,36	-0,017
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	0	-	-	1	-0,029	12	7	0,08	0,18	0,01	-0,018
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	0	-	-	1	-0,03	12	4	0	0,02	0,51	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0,46	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0,46	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	0	-	-	1	-0,03	12	4	0	0,02	0,51	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	8	0,16	0,29	0,08	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0,46	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	0	-	-	1	-0,03	12	4	0	0,02	0,51	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0,46	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0,46	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,028	12	6	0,04	0,1	0,08	-0,019
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,028	12	6	0,04	0,1	0,08	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,028	12	6	0,04	0,1	0,08	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,028	12	7	0,08	0,18	0,01	-0,018
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	0	-	-	1	-0,03	12	4	0	0,02	0,51	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	6	0,04	0,1	0,58	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	6	0,04	0,1	0,58	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	0	-	-	1	-0,03	12	4	0	0,02	0,51	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	7	0,08	0,18	0,14	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	6	0,04	0,1	0,58	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	0	-	-	1	-0,03	12	4	0	0,02	0,51	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	6	0,04	0,1	0,58	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	6	0,04	0,1	0,58	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	6	0,04	0,1	0,08	-0,019
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,97	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,15	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	6	0,04	0,1	0,08	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,15	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,15	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,028	12	6	0,04	0,1	0,08	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,15	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,97	-0,028	12	7	0,08	0,18	0,01	-0,018

Table 45. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2016 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,024	12	11	0,66	0,55	0,052	-0,017
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,026	12	12	0,88	0,54	0,12	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	8	0,16	0,29	0,03	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,024	12	12	0,88	0,54	0,09	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,02	-0,026	12	14	0,67	0,4	0,12	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,08	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,024	12	11	0,66	0,55	0,052	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,02	-0,026	12	14	0,67	0,4	0,12	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	10	0,45	0,5	0,06	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,15	-0,024	12	11	0,66	0,55	0,052	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,026	12	13	0,89	0,48	0,15	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	8	0,16	0,29	0	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,02	-0,024	12	11	0,66	0,55	0,11	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,026	12	13	0,89	0,48	0,15	-0,016
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,029	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,15	-0,024	12	11	0,66	0,55	0,11	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,026	12	13	0,89	0,48	0,15	-0,016
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,029	12	10	0,45	0,5	0,06	-0,018
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,03	12	6	0,04	0,1	0,02	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	7	0,08	0,18	0	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	6	0,04	0,1	0	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,08	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,08	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	8	0,16	0,29	0,12	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,02	-0,029	12	8	0,16	0,29	0,04	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	8	0,16	0,29	0,04	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	8	0,16	0,29	0,01	-0,019
	ARMA(0,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	8	0,16	0,29	0,01	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0	-0,019
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,028	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,028	12	11	0,66	0,55	0,11	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,029	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	10	0,45	0,5	0,06	-0,018
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,03	12	6	0,04	0,1	0	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	6	0,04	0,1	0	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	6	0,04	0,1	0	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,08	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,08	-0,018
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	8	0,16	0,29	0,12	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,08	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	8	0,16	0,29	0,01	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,01	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	8	0,16	0,29	0	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	11	0,66	0,55	0,11	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,029	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,02	-0,028	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,029	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,029	12	10	0,45	0,5	0,06	-0,018

Table 46. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2016 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,026	12	11	0,66	0,54	0,13	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,028	12	12	0,88	0,54	0,12	-0,018
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	0	-	-	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,026	12	11	0,66	0,54	0,13	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,028	12	11	0,66	0,54	0,13	-0,018
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,07	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,026	12	11	0,66	0,55	0,13	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,028	12	11	0,66	0,55	0,13	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,07	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,15	-0,026	12	10	0,45	0,5	0,054	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,15	-0,028	12	12	0,88	0,54	0,07	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,15	-0,026	12	11	0,66	0,55	0,13	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,028	12	12	0,88	0,54	0,25	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,054	-0,019
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,15	-0,026	12	11	0,66	0,55	0,13	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,028	12	12	0,88	0,54	0,07	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,054	-0,019
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	0	-	-	1	-0,032	12	9	0,29	0,4	0,02	-0,02
	ARMA(0,0)-GARCH(1,1) - student-t	2	0	-	-	2	-0,032	12	9	0,29	0,4	0,02	-0,02
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	0	-	-	3	-0,032	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	8	0,16	0,29	0,14	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,032	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,03	12	9	0,29	0,4	0,28	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	9	0,29	0,4	0,28	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	10	0,45	0,5	0,054	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	8	0,16	0,29	0,14	-0,02
	ARMA(1,1)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	9	0,29	0,4	0,28	-0,02
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	10	0,45	0,5	0,054	-0,02
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	0	-	-	1	-0,032	12	9	0,29	0,4	0,02	-0,02
	ARMA(0,0)-GARCH(1,1) - student-t	2	0	-	-	1	-0,032	12	9	0,29	0,4	0,02	-0,02
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	0	-	-	1	-0,032	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,0)-GARCH(1,1) - norm	2	0	-	-	1	-0,031	12	10	0,45	0,5	0,07	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	11	0,66	0,54	0,13	-0,02
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	0	-	-	1	-0,032	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,07	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	0	-	-	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,054	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	0	-	-	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,054	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,054	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,054	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,054	-0,02
	ARMA(1,1)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,054	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,054	-0,019

Table 47. VaR estimation results of the portfolio when not corrected for outliers.

Portfolio created in 2016 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

Appendix C. Total number of null hypotheses rejections per combination of method and filter when portfolios are not corrected for outliers.

Table 48.Total number of null hypotheses rejections per combination of method and filter for the portfolios created with the MAX(5) identified stocks and composed of equally-weighted returns.

In this table, N 1 corresponds to the number of times the null hypothesis of unconditional coverage was rejected per combination of method and filter. Similarly, N 2 corresponds to the number of times the null hypothesis of conditional coverage was rejected, and N 3 corresponds to the number of times the null hypothesis of independence was rejected per combination of method and filter. A significance level of 5% was used.

		1 % VaR			5 % VaR		
		N 1	N 2	N 3	N 1	N 2	N 3
Parametric	ARMA(0,0)-GARCH(1,1) - norm	5	4	1	3	1	2
	ARMA(0,0)-GARCH(1,1) - student-t	4	1	1	4	1	1
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	1
	ARMA(1,0)-GARCH(1,1) - norm	5	4	1	1	1	1
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	1	3	1	1
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	1	1	1	1
	ARMA(1,1)-GARCH(1,1) - norm	6	4	1	2	1	2
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	1	2	1	2
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	1	1	1	2
	ARMA(0,0)-GJR(1,1) - norm	5	4	1	2	1	2
	ARMA(0,0)-GJR(1,1) - student-t	2	1	1	3	1	1
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	2	1	1	2
	ARMA(1,0)-GJR(1,1) - norm	5	4	1	2	1	2
	ARMA(1,0)-GJR(1,1) - student-t	1	0	2	2	1	1
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	1	1	1	1
	ARMA(1,1)-GJR(1,1) - norm	5	4	1	2	2	2
	ARMA(1,1)-GJR(1,1) - student-t	2	1	1	2	2	2
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	0	2	2	2
FHS	ARMA(0,0)-GARCH(1,1) - norm	1	0	2	1	1	1
	ARMA(0,0)-GARCH(1,1) - student-t	0	0	2	1	1	1
	ARMA(0,0)-GARCH(1,1) - skewed student-t	1	0	2	1	1	1
	ARMA(1,0)-GARCH(1,1) - norm	0	0	3	1	1	2
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	3	1	1	2
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	4	1	1	2
	ARMA(1,1)-GARCH(1,1) - norm	0	0	3	1	1	3
	ARMA(1,1)-GARCH(1,1) - student-t	0	0	2	1	1	3
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	3	1	1	3
	ARMA(0,0)-GJR(1,1) - norm	0	0	1	2	1	2
	ARMA(0,0)-GJR(1,1) - student-t	0	0	1	2	1	1
	ARMA(0,0)-GJR(1,1) - skewed student-t	1	0	2	1	1	1
	ARMA(1,0)-GJR(1,1) - norm	0	0	3	2	1	1
	ARMA(1,0)-GJR(1,1) - student-t	0	0	2	2	1	2
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	2	1	1	2
	ARMA(1,1)-GJR(1,1) - norm	0	0	0	2	2	2
	ARMA(1,1)-GJR(1,1) - student-t	0	0	0	2	2	2
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	0	2	2	2
EVT	ARMA(0,0)-GARCH(1,1) - norm	1	0	2	1	1	1
	ARMA(0,0)-GARCH(1,1) - student-t	0	0	2	1	1	1
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	1
	ARMA(1,0)-GARCH(1,1) - norm	0	0	4	1	1	1
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	2	1	1	1
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	2
	ARMA(1,1)-GARCH(1,1) - norm	0	0	1	1	1	3
	ARMA(1,1)-GARCH(1,1) - student-t	0	0	1	1	1	2
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	1	1	1	3
	ARMA(0,0)-GJR(1,1) - norm	0	0	1	2	1	2
	ARMA(0,0)-GJR(1,1) - student-t	0	0	1	1	1	2
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	2	1	1	2
	ARMA(1,0)-GJR(1,1) - norm	0	0	2	2	1	1
	ARMA(1,0)-GJR(1,1) - student-t	0	0	1	2	1	2
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	2	1	1	1
	ARMA(1,1)-GJR(1,1) - norm	0	0	0	2	2	2
	ARMA(1,1)-GJR(1,1) - student-t	0	0	0	2	2	2
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	0	2	2	2

Table 49.Total number of null hypotheses rejections per combination of method and filter for the portfolios created with the MAX(5) identified stocks and composed of value-weighted returns.

In this table, N 1 corresponds to the number of times the null hypothesis of unconditional coverage was rejected per combination of method and filter. Similarly, N 2 corresponds to the number of times the null hypothesis of conditional coverage was rejected, and N 3 corresponds to the number of times the null hypothesis of independence was rejected per combination of method and filter. A significance level of 5% was used.

		1 % VaR			5 % VaR		
		N 1	N 2	N 3	N 1	N 2	N 3
Parametric	ARMA(0,0)-GARCH(1,1) - norm	3	1	2	2	1	1
	ARMA(0,0)-GARCH(1,1) - student-t	1	0	1	2	2	0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	0
	ARMA(1,0)-GARCH(1,1) - norm	2	1	1	2	1	0
	ARMA(1,0)-GARCH(1,1) - student-t	1	0	1	2	2	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	0
	ARMA(1,1)-GARCH(1,1) - norm	2	1	2	3	1	0
	ARMA(1,1)-GARCH(1,1) - student-t	1	0	1	3	2	0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	2	2	1	0
	ARMA(0,0)-GJR(1,1) - norm	3	0	1	3	0	0
	ARMA(0,0)-GJR(1,1) - student-t	0	0	1	4	0	0
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	0	2	0	1
	ARMA(1,0)-GJR(1,1) - norm	0	0	0	3	1	0
	ARMA(1,0)-GJR(1,1) - student-t	0	0	0	3	1	0
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	0	3	1	0
	ARMA(1,1)-GJR(1,1) - norm	2	0	1	2	1	0
	ARMA(1,1)-GJR(1,1) - student-t	0	0	0	2	1	0
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	0	2	1	0
FHS	ARMA(0,0)-GARCH(1,1) - norm	0	0	3	1	1	0
	ARMA(0,0)-GARCH(1,1) - student-t	0	0	3	1	1	0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	3	1	1	0
	ARMA(1,0)-GARCH(1,1) - norm	0	0	1	1	1	1
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	1	1	1	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	1	1	1	0
	ARMA(1,1)-GARCH(1,1) - norm	0	0	1	1	1	1
	ARMA(1,1)-GARCH(1,1) - student-t	0	0	1	1	1	1
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	2	1	1	1
	ARMA(0,0)-GJR(1,1) - norm	0	0	1	2	1	0
	ARMA(0,0)-GJR(1,1) - student-t	0	0	0	1	1	0
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	0	1	1	0
	ARMA(1,0)-GJR(1,1) - norm	0	0	0	3	1	0
	ARMA(1,0)-GJR(1,1) - student-t	0	0	0	2	1	0
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	0	2	1	0
	ARMA(1,1)-GJR(1,1) - norm	0	0	0	2	1	0
	ARMA(1,1)-GJR(1,1) - student-t	0	0	0	1	1	0
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	0	1	1	0
EVT	ARMA(0,0)-GARCH(1,1) - norm	0	0	2	1	1	0
	ARMA(0,0)-GARCH(1,1) - student-t	0	0	2	1	1	0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	0
	ARMA(1,0)-GARCH(1,1) - norm	0	0	2	1	1	0
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	2	1	1	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	0
	ARMA(1,1)-GARCH(1,1) - norm	0	0	2	1	1	0
	ARMA(1,1)-GARCH(1,1) - student-t	0	0	2	2	1	0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	2	2	1	0
	ARMA(0,0)-GJR(1,1) - norm	0	0	0	3	1	0
	ARMA(0,0)-GJR(1,1) - student-t	0	0	0	2	0	0
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	0	2	1	0
	ARMA(1,0)-GJR(1,1) - norm	0	0	0	3	1	0
	ARMA(1,0)-GJR(1,1) - student-t	0	0	0	3	1	0
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	0	3	1	0
	ARMA(1,1)-GJR(1,1) - norm	0	0	0	2	1	0
	ARMA(1,1)-GJR(1,1) - student-t	0	0	0	2	1	0
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	1	2	1	0

Table 50.Total number of null hypotheses rejections per combination of method and filter for the portfolios created with the MAX identified stocks and composed of value-weighted returns.

In this table, N 1 corresponds to the number of times the null hypothesis of unconditional coverage was rejected per combination of method and filter. Similarly, N 2 corresponds to the number of times the null hypothesis of conditional coverage was rejected, and N 3 corresponds to the number of times the null hypothesis of independence was rejected per combination of method and filter. A significance level of 5% was used.

		1 % VaR			5 % VaR		
		N 1	N 2	N 3	N 1	N 2	N 3
Parametric	ARMA(0,0)-GARCH(1,1) - norm	1	1	1	2	2	0
	ARMA(0,0)-GARCH(1,1) - student-t	1	0	1	2	2	0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	0	1	1	0
	ARMA(1,0)-GARCH(1,1) - norm	1	1	2	1	2	0
	ARMA(1,0)-GARCH(1,1) - student-t	1	0	0	2	2	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	0	2	1	0
	ARMA(1,1)-GARCH(1,1) - norm	1	1	2	2	2	0
	ARMA(1,1)-GARCH(1,1) - student-t	1	1	1	2	2	0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	0	1	1	0
	ARMA(0,0)-GJR(1,1) - norm	2	1	0	1	0	1
	ARMA(0,0)-GJR(1,1) - student-t	0	0	0	1	0	0
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	1	0	0	1
	ARMA(1,0)-GJR(1,1) - norm	1	1	1	1	0	1
	ARMA(1,0)-GJR(1,1) - student-t	0	0	1	1	1	0
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	1	0	0	1
	ARMA(1,1)-GJR(1,1) - norm	1	1	0	1	1	1
	ARMA(1,1)-GJR(1,1) - student-t	0	0	0	1	1	0
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	0	0	0	1
FHS	ARMA(0,0)-GARCH(1,1) - norm	1	0	0	1	2	0
	ARMA(0,0)-GARCH(1,1) - student-t	0	0	0	0	1	0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	0	0	1	0
	ARMA(1,0)-GARCH(1,1) - norm	0	0	1	1	2	0
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	1	1	1	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	1	1	1	0
	ARMA(1,1)-GARCH(1,1) - norm	1	0	1	1	2	0
	ARMA(1,1)-GARCH(1,1) - student-t	0	0	1	1	1	0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	1	1	1	0
	ARMA(0,0)-GJR(1,1) - norm	0	0	0	1	2	0
	ARMA(0,0)-GJR(1,1) - student-t	1	0	1	0	0	1
	ARMA(0,0)-GJR(1,1) - skewed student-t	1	0	1	0	0	1
	ARMA(1,0)-GJR(1,1) - norm	0	0	1	1	0	0
	ARMA(1,0)-GJR(1,1) - student-t	0	0	2	0	0	1
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	2	0	0	1
	ARMA(1,1)-GJR(1,1) - norm	0	0	0	1	1	0
	ARMA(1,1)-GJR(1,1) - student-t	0	0	1	0	0	1
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	1	0	0	1
EVT	ARMA(0,0)-GARCH(1,1) - norm	0	0	0	2	2	0
	ARMA(0,0)-GARCH(1,1) - student-t	0	0	0	2	1	0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	0	2	1	0
	ARMA(1,0)-GARCH(1,1) - norm	0	0	0	2	2	0
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	0	1	1	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	0	2	1	0
	ARMA(1,1)-GARCH(1,1) - norm	0	0	0	1	2	0
	ARMA(1,1)-GARCH(1,1) - student-t	0	0	0	2	1	0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	0	2	1	0
	ARMA(0,0)-GJR(1,1) - norm	0	0	2	2	1	0
	ARMA(0,0)-GJR(1,1) - student-t	0	0	2	0	1	1
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	2	0	1	1
	ARMA(1,0)-GJR(1,1) - norm	0	0	2	2	0	0
	ARMA(1,0)-GJR(1,1) - student-t	0	0	2	0	0	1
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	2	0	0	1
	ARMA(1,1)-GJR(1,1) - norm	0	0	0	3	2	0
	ARMA(1,1)-GJR(1,1) - student-t	0	0	1	0	0	1
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	0	0	0	1

Table 51.Total number of null hypotheses rejections per combination of method and filter for the portfolios created with the MAX identified stocks and composed of equally-weighted returns.

In this table, N 1 corresponds to the number of times the null hypothesis of unconditional coverage was rejected per combination of method and filter. Similarly, N 2 corresponds to the number of times the null hypothesis of conditional coverage was rejected, and N 3 corresponds to the number of times the null hypothesis of independence was rejected per combination of method and filter. A significance level of 5% was used.

		1 % VaR			5 % VaR		
		N 1	N 2	N 3	N 1	N 2	N 3
Parametric	ARMA(0,0)-GARCH(1,1) - norm	4	2	1	3	1	1
	ARMA(0,0)-GARCH(1,1) - student-t	1	1	1	3	2	1
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	1
	ARMA(1,0)-GARCH(1,1) - norm	4	3	1	2	1	2
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	2	3	1	1
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	0
	ARMA(1,1)-GARCH(1,1) - norm	3	2	1	1	2	0
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	2	2	2	0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	2	1	1	0
	ARMA(0,0)-GJR(1,1) - norm	4	3	1	2	1	1
	ARMA(0,0)-GJR(1,1) - student-t	2	1	2	2	2	1
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	2	1	1	1
	ARMA(1,0)-GJR(1,1) - norm	3	3	2	2	2	2
	ARMA(1,0)-GJR(1,1) - student-t	1	1	2	2	1	1
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	3	1	1	1
	ARMA(1,1)-GJR(1,1) - norm	4	3	2	3	2	1
	ARMA(1,1)-GJR(1,1) - student-t	2	1	2	3	2	2
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	3	1	1	1
FHS	ARMA(0,0)-GARCH(1,1) - norm	0	0	1	2	1	1
	ARMA(0,0)-GARCH(1,1) - student-t	0	0	1	1	1	1
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	2	2	1	1
	ARMA(1,0)-GARCH(1,1) - norm	0	0	1	1	1	0
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	1	1	1	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	1	1	1	0
	ARMA(1,1)-GARCH(1,1) - norm	0	0	2	1	2	1
	ARMA(1,1)-GARCH(1,1) - student-t	0	0	3	1	1	1
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	2	1	1	1
	ARMA(0,0)-GJR(1,1) - norm	0	0	1	1	1	1
	ARMA(0,0)-GJR(1,1) - student-t	0	0	1	1	1	1
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	1	1	1	1
	ARMA(1,0)-GJR(1,1) - norm	0	0	1	1	1	0
	ARMA(1,0)-GJR(1,1) - student-t	0	0	1	1	1	0
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	2	0	1	0
	ARMA(1,1)-GJR(1,1) - norm	0	0	2	2	2	1
	ARMA(1,1)-GJR(1,1) - student-t	0	0	2	1	1	0
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	2	1	1	2
EVT	ARMA(0,0)-GARCH(1,1) - norm	0	0	2	2	1	2
	ARMA(0,0)-GARCH(1,1) - student-t	0	0	2	2	1	1
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	3	2	1	1
	ARMA(1,0)-GARCH(1,1) - norm	0	0	2	1	1	0
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	2	1	1	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	0
	ARMA(1,1)-GARCH(1,1) - norm	0	0	2	1	2	0
	ARMA(1,1)-GARCH(1,1) - student-t	0	0	2	1	1	1
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	2	1	1	0
	ARMA(0,0)-GJR(1,1) - norm	0	0	2	1	1	1
	ARMA(0,0)-GJR(1,1) - student-t	0	0	2	1	1	1
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	2	1	1	1
	ARMA(1,0)-GJR(1,1) - norm	0	0	2	1	1	0
	ARMA(1,0)-GJR(1,1) - student-t	0	0	2	1	1	1
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	3	1	1	1
	ARMA(1,1)-GJR(1,1) - norm	0	0	3	2	2	2
	ARMA(1,1)-GJR(1,1) - student-t	0	0	3	1	1	2
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	3	1	1	1

Appendix D. Value-at-risk estimation results from the application of the Ané et al. (2008) method to the portfolio created in 2009 using the MAX identified lottery stocks and including value-weighted returns. These tables represent VaR estimation results for a forecasting period of 500 and 250 days and for combinations of three different alphas with the two different ways of substituting the outliers as stated in Ané et al. (2008). These tables resemble table 4 of the dissertation and their analyses is done the same way. The alphas used are of 5%, 1% and 0,5% and the ways of substituting the outliers are by its predictive return and by the upper and lower value of the confidence interval.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Uncondit ional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Uncondit ional p-value	Conditional p-value	Indepen dence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	5	9	0,106	0,230	0,730	-0,065	25	28	0,546	0,730	0,880	-0,046
	ARMA(0,0)-GARCH(1,1) - student-t	5	7	0,397	0,632	0,830	-0,068	25	27	0,685	0,842	0,690	-0,046
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	5	1,000	0,950	0,580	-0,071	25	26	0,838	0,926	0,930	-0,047
	ARMA(1,0)-GARCH(1,1) - norm	5	8	0,215	0,407	0,420	-0,065	25	30	0,319	0,480	0,790	-0,045
	ARMA(1,0)-GARCH(1,1) - student-t	5	7	0,397	0,632	0,850	-0,068	25	31	0,235	0,365	0,910	-0,045
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	5	1,000	0,950	0,580	-0,070	25	30	0,319	0,480	0,790	-0,047
	ARMA(1,1)-GARCH(1,1) - norm	5	8	0,215	0,407	0,420	-0,065	25	30	0,319	0,480	0,790	-0,045
	ARMA(1,1)-GARCH(1,1) - student-t	5	7	0,397	0,632	0,850	-0,067	25	31	0,235	0,365	0,910	-0,045
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	5	1,000	0,950	0,580	-0,070	25	30	0,319	0,480	0,790	-0,047
	ARMA(0,0)-GJR(1,1) - norm	5	11	0,020	0,052	0,900	-0,062	25	32	0,168	0,266	0,550	-0,044
	ARMA(0,0)-GJR(1,1) - student-t	5	9	0,106	0,230	0,800	-0,064	25	32	0,168	0,266	0,550	-0,044
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	6	0,663	0,845	0,820	-0,067	25	32	0,168	0,266	0,550	-0,045
	ARMA(1,0)-GJR(1,1) - norm	5	13	0,008	0,021	0,450	-0,062	25	33	0,117	0,028	0,390	-0,043
	ARMA(1,0)-GJR(1,1) - student-t	5	7	0,397	0,632	0,850	0,064	25	33	0,117	0,028	0,390	-0,043
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	6	0,663	0,845	0,820	-0,067	25	31	0,235	0,365	0,330	-0,045
	ARMA(1,1)-GJR(1,1) - norm	5	12	0,008	0,021	0,350	-0,061	25	34	0,079	0,126	0,570	-0,043
	ARMA(1,1)-GJR(1,1) - student-t	5	9	0,106	0,230	0,780	-0,064	25	36	0,034	0,051	0,390	-0,043
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	6	0,663	0,845	0,820	-0,067	25	32	0,168	0,266	0,095	-0,045
FHS	ARMA(0,0)-GARCH(1,1) - norm	5	7	0,397	0,632	0,520	-0,066	25	26	0,838	0,030	0,926	-0,047
	ARMA(0,0)-GARCH(1,1) - student-t	5	6	0,663	0,845	0,800	-0,067	25	26	0,838	0,030	0,926	-0,048
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	6	0,663	0,845	0,800	-0,067	25	26	0,838	0,030	0,926	-0,048
	ARMA(1,0)-GARCH(1,1) - norm	5	7	0,397	0,632	0,850	-0,066	25	29	0,422	0,010	0,121	-0,047
	ARMA(1,0)-GARCH(1,1) - student-t	5	6	0,663	0,845	0,800	-0,067	25	29	0,422	0,010	0,422	-0,047
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	6	0,663	0,845	0,800	-0,067	25	28	0,546	0,010	0,730	-0,047
	ARMA(1,1)-GARCH(1,1) - norm	5	8	0,215	0,407	0,420	-0,066	25	28	0,546	0,020	0,730	-0,047
	ARMA(1,1)-GARCH(1,1) - student-t	5	7	0,397	0,632	0,850	-0,067	25	30	0,319	0,010	0,480	-0,047
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	7	0,397	0,632	0,850	-0,067	25	28	0,546	0,020	0,546	-0,047
	ARMA(0,0)-GJR(1,1) - norm	5	11	0,020	0,052	0,500	-0,062	25	32	0,168	0,030	0,266	-0,044
	ARMA(0,0)-GJR(1,1) - student-t	5	11	0,020	0,052	0,500	-0,062	25	32	0,168	0,060	0,266	-0,045
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	11	0,020	0,052	0,500	-0,062	25	32	0,168	0,030	0,266	-0,045
	ARMA(1,0)-GJR(1,1) - norm	5	10	0,050	0,110	0,140	-0,061	25	33	0,117	0,020	0,028	-0,044
	ARMA(1,0)-GJR(1,1) - student-t	5	8	0,215	0,407	0,700	-0,062	25	32	0,168	0,010	0,266	-0,044
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	8	0,215	0,407	0,700	-0,062	25	32	0,168	0,010	0,266	-0,044
	ARMA(1,1)-GJR(1,1) - norm	5	11	0,020	0,052	0,300	-0,061	25	34	0,079	0,020	0,126	-0,043
	ARMA(1,1)-GJR(1,1) - student-t	5	10	0,050	0,110	0,340	-0,062	25	35	0,050	0,010	0,010	-0,044
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	8	0,215	0,407	0,550	-0,062	25	34	0,079	0,010	0,126	-0,044
EVT	ARMA(0,0)-GARCH(1,1) - norm	5	6	0,663	0,845	0,800	-0,069	25	27	0,685	0,842	0,690	-0,046
	ARMA(0,0)-GARCH(1,1) - student-t	5	6	0,663	0,845	0,800	-0,070	25	27	0,685	0,842	0,690	-0,047
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	6	0,663	0,845	0,800	-0,071	25	27	0,685	0,842	0,690	-0,047
	ARMA(1,0)-GARCH(1,1) - norm	5	6	0,663	0,845	0,800	-0,069	25	30	0,319	0,480	0,790	-0,046
	ARMA(1,0)-GARCH(1,1) - student-t	5	6	0,663	0,845	0,800	-0,069	25	30	0,319	0,480	0,790	-0,046
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	5	1,000	0,950	0,580	-0,070	25	30	0,319	0,480	0,790	-0,047
	ARMA(1,1)-GARCH(1,1) - norm	5	6	0,663	0,845	0,800	-0,068	25	30	0,319	0,480	0,790	-0,046
	ARMA(1,1)-GARCH(1,1) - student-t	5	6	0,663	0,845	0,800	-0,069	25	30	0,319	0,480	0,790	-0,046
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	6	0,663	0,845	0,800	-0,070	25	30	0,319	0,480	0,790	-0,047
	ARMA(0,0)-GJR(1,1) - norm	5	8	0,215	0,407	0,460	-0,064	25	32	0,168	0,266	0,550	-0,043
	ARMA(0,0)-GJR(1,1) - student-t	5	6	0,663	0,845	0,820	-0,065	25	32	0,168	0,266	0,550	-0,044
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	6	0,663	0,845	0,820	-0,065	25	32	0,168	0,266	0,550	-0,044
	ARMA(1,0)-GJR(1,1) - norm	5	8	0,215	0,407	0,190	-0,063	25	33	0,117	0,028	0,390	-0,043
	ARMA(1,0)-GJR(1,1) - student-t	5	6	0,663	0,845	0,820	-0,064	25	34	0,079	0,126	0,470	-0,043
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	6	0,663	0,845	0,820	-0,065	25	32	0,168	0,040	0,350	-0,043
	ARMA(1,1)-GJR(1,1) - norm	5	7	0,397	0,632	0,520	-0,063	25	36	0,034	0,051	0,390	-0,043
	ARMA(1,1)-GJR(1,1) - student-t	5	7	0,397	0,632	0,520	-0,064	25	36	0,034	0,051	0,390	-0,043
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	6	0,663	0,845	0,820	-0,065	25	36	0,034	0,051	0,340	-0,043

Table 52. VaR estimation results of the portfolio when not corrected for outliers.

The forecasting period is of 500 days.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
FHS	ARMA(0,0)-GARCH(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
EVT	ARMA(0,0)-GARCH(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - norm	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - student-t	5	221	0	0	0	>0	25	221	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	221	0	0	0	>0	25	221	0	0	0	>0

Table 53. VaR estimation results of the portfolio when corrected for outliers.

The forecasting period is of 500 days. The Ané et al. (2008) method was applied with an alpha of 5% and only by substituting the outlier by the predictive return.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0

Table 54. VaR estimation results of the portfolio when corrected for outliers.

The forecasting period is of 250 days. The Ané et al. (2008) method was applied with an alpha of 5% and only by substituting the outlier by the predictive return.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	5	13	0,002	0,007	0,450	-0,060	25	38	0,010	0,030	0,820	-0,042
	ARMA(0,0)-GARCH(1,1) - student-t	5	13	0,002	0,007	0,450	-0,060	25	38	0,010	0,030	0,826	-0,042
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	11	0,02	0,052	0,59	-0,062	25	37	0,020	0,060	0,59	-0,043
	ARMA(1,0)-GARCH(1,1) - norm	5	13	0,002	0,007	0,410	-0,059	25	39	0,007	0,021	0,900	-0,041
	ARMA(1,0)-GARCH(1,1) - student-t	5	12	0,007	0,020	0,630	-0,059	25	39	0,007	0,021	0,900	-0,041
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	12	0,007	0,020	0,630	-0,061	25	39	0,007	0,021	0,900	-0,042
	ARMA(1,1)-GARCH(1,1) - norm	5	13	0,002	0,007	0,410	-0,059	25	39	0,007	0,021	0,900	-0,041
	ARMA(1,1)-GARCH(1,1) - student-t	5	13	0,002	0,007	0,410	-0,059	25	39	0,007	0,021	0,900	-0,041
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	12	0,007	0,020	0,630	-0,062	25	39	0,007	0,021	0,900	-0,042
	ARMA(0,0)-GJR(1,1) - norm	5	13	0,002	0,007	0,455	-0,057	25	38	0,010	0,030	0,680	-0,040
	ARMA(0,0)-GJR(1,1) - student-t	5	13	0,002	0,007	0,455	-0,057	25	38	0,010	0,030	0,680	-0,040
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	12	0,007	0,020	0,130	-0,060	25	37	0,020	0,060	0,800	-0,041
	ARMA(1,0)-GJR(1,1) - norm	5	17	0,000	0,000	0,97	-0,057	25	42	0,001	0,003	0,790	-0,040
	ARMA(1,0)-GJR(1,1) - student-t	5	17	0,000	0,000	0,97	-0,057	25	42	0,001	0,003	0,790	-0,040
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	12	0,007	0,020	0,400	-0,059	25	40	0,004	0,010	0,930	-0,041
	ARMA(1,1)-GJR(1,1) - norm	5	17	0,000	0,000	0,730	-0,057	25	43	0,000	0,002	0,830	-0,040
	ARMA(1,1)-GJR(1,1) - student-t	5	15	0,000	0,000	0,730	-0,057	25	43	0,000	0,002	0,830	-0,040
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	12	0,007	0,020	0,170	-0,059	25	40	0,004	0,010	0,820	-0,041
FHS	ARMA(0,0)-GARCH(1,1) - norm	5	13	0,00	0,01	0,450	-0,061	25	37	0,02	0,06	0,59	-0,043
	ARMA(0,0)-GARCH(1,1) - student-t	5	13	0,00	0,01	0,450	-0,061	25	37	0,02	0,06	0,59	-0,043
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	13	0,00	0,01	0,450	-0,061	25	37	0,02	0,06	0,59	-0,043
	ARMA(1,0)-GARCH(1,1) - norm	5	12	0,01	0,02	0,630	-0,061	25	39	0,01	0,02	0,90	-0,043
	ARMA(1,0)-GARCH(1,1) - student-t	5	13	0,00	0,01	0,410	-0,061	25	39	0,01	0,02	0,90	-0,043
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	13	0,00	0,01	0,410	-0,061	25	39	0,01	0,02	0,90	-0,043
	ARMA(1,1)-GARCH(1,1) - norm	5	13	0,00	0,01	0,410	-0,061	25	39	0,01	0,02	0,90	-0,043
	ARMA(1,1)-GARCH(1,1) - student-t	5	13	0,00	0,01	0,410	-0,061	25	39	0,01	0,02	0,90	-0,043
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	13	0,00	0,01	0,410	-0,061	25	38	0,01	0,03	0,89	-0,043
	ARMA(0,0)-GJR(1,1) - norm	5	14	0,00	0,00	0,770	-0,057	25	38	0,01	0,03	0,68	-0,041
	ARMA(0,0)-GJR(1,1) - student-t	5	14	0,00	0,00	0,770	-0,057	25	38	0,01	0,03	0,68	-0,041
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	14	0,00	0,00	0,770	-0,057	25	38	0,01	0,03	0,68	-0,041
	ARMA(1,0)-GJR(1,1) - norm	5	15	0,00	0,00	0,940	-0,056	25	43	0,00	0,00	0,70	-0,040
	ARMA(1,0)-GJR(1,1) - student-t	5	14	0,00	0,00	0,870	-0,057	25	41	0,00	0,01	0,82	-0,040
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	14	0,00	0,00	0,870	-0,057	25	41	0,00	0,01	0,82	-0,040
	ARMA(1,1)-GJR(1,1) - norm	5	15	0,00	0,00	0,910	-0,057	25	43	0,00	0,00	0,83	-0,040
	ARMA(1,1)-GJR(1,1) - student-t	5	15	0,00	0,00	0,910	-0,057	25	43	0,00	0,00	0,83	-0,040
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	14	0,00	0,00	0,910	-0,057	25	42	0,00	0,00	0,78	-0,040
EVT	ARMA(0,0)-GARCH(1,1) - norm	5	11	0,01	0,05	0,580	-0,064	25	37	0,02	0,06	0,59	-0,042
	ARMA(0,0)-GARCH(1,1) - student-t	5	11	0,01	0,05	0,580	-0,064	25	37	0,02	0,06	0,59	-0,043
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	11	0,01	0,05	0,580	-0,064	25	37	0,02	0,06	0,59	-0,043
	ARMA(1,0)-GARCH(1,1) - norm	5	12	0,01	0,02	0,630	-0,063	25	39	0,01	0,02	0,90	-0,042
	ARMA(1,0)-GARCH(1,1) - student-t	5	12	0,01	0,02	0,630	-0,063	25	39	0,01	0,02	0,90	-0,042
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	12	0,01	0,02	0,630	-0,063	25	39	0,01	0,02	0,90	-0,042
	ARMA(1,1)-GARCH(1,1) - norm	5	11	0,01	0,05	0,200	-0,062	25	39	0,01	0,02	0,90	-0,042
	ARMA(1,1)-GARCH(1,1) - student-t	5	10	0,04	0,11	0,220	-0,063	25	39	0,01	0,02	0,90	-0,042
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	11	0,01	0,05	0,220	-0,063	25	39	0,01	0,02	0,90	-0,042
	ARMA(0,0)-GJR(1,1) - norm	5	12	0,01	0,02	0,130	-0,059	25	40	0,00	0,01	0,71	-0,040
	ARMA(0,0)-GJR(1,1) - student-t	5	12	0,01	0,02	0,130	-0,060	25	39	0,01	0,02	0,71	-0,040
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	12	0,01	0,02	0,130	-0,060	25	38	0,01	0,03	0,68	-0,040
	ARMA(1,0)-GJR(1,1) - norm	5	12	0,01	0,02	0,400	-0,058	25	43	0,00	0,00	0,70	-0,039
	ARMA(1,0)-GJR(1,1) - student-t	5	11	0,01	0,05	0,410	-0,059	25	43	0,00	0,00	0,70	-0,040
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	11	0,01	0,05	0,410	-0,059	25	43	0,00	0,00	0,70	-0,040
	ARMA(1,1)-GJR(1,1) - norm	5	12	0,01	0,02	0,170	-0,058	25	44	0,00	0,00	0,74	-0,039
	ARMA(1,1)-GJR(1,1) - student-t	5	11	0,01	0,05	0,160	-0,059	25	44	0,00	0,00	0,74	-0,039
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	12	0,01	0,02	0,170	-0,059	25	44	0,00	0,00	0,74	-0,040

Table 55. VaR estimation results of the portfolio when corrected for outliers.

The forecasting period is of 500 days. The Ané et al. (2008) method was applied with an alpha of 5% and only by substituting the outlier by the upper and lower value of the confidence interval.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,02	0,05	0,48	-0,040	12	19	0,08	0,19	0,77	-0,028
	ARMA(0,0)-GARCH(1,1) - studentt	2	7	0,02	0,05	0,48	-0,040	12	19	0,08	0,19	0,77	-0,028
	ARMA(0,0)-GARCH(1,1) - skewed studentt	2	5	0,16	0,34	0,13	-0,042	12	19	0,08	0,19	0,77	-0,029
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,14	0,14	-0,039	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,0)-GARCH(1,1) - studentt	2	6	0,06	0,14	0,14	-0,040	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,0)-GARCH(1,1) - skewed studentt	2	6	0,06	0,14	0,14	-0,041	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,14	0,14	-0,039	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,1)-GARCH(1,1) - studentt	2	6	0,06	0,14	0,14	-0,040	12	19	0,08	0,19	0,77	-0,027
	ARMA(1,1)-GARCH(1,1) - skewed studentt	2	6	0,06	0,14	0,14	-0,041	12	19	0,08	0,19	0,77	-0,028
	ARMA(0,0)-GJR(1,1) - norm	2	8	0,005	0,016	0,32	-0,039	12	20	0,04	0,11	0,95	-0,027
	ARMA(0,0)-GJR(1,1) - studentt	2	8	0,005	0,016	0,32	-0,039	12	20	0,04	0,11	0,95	-0,027
	ARMA(0,0)-GJR(1,1) - skewed studentt	2	7	0,02	0,05	0,47	-0,040	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,005	0,016	0,27	-0,038	12	22	0,012	0,03	0,9	-0,027
	ARMA(1,0)-GJR(1,1) - studentt	2	8	0,005	0,016	0,27	-0,038	12	22	0,012	0,03	0,9	-0,027
	ARMA(1,0)-GJR(1,1) - skewed studentt	2	8	0,005	0,016	0,27	-0,040	12	20	0,04	0,02	0,51	-0,027
	ARMA(1,1)-GJR(1,1) - norm	2	9	0,001	0,004	0,15	-0,038	12	19	0,08	0,04	0,48	-0,027
	ARMA(1,1)-GJR(1,1) - studentt	2	8	0,005	0,016	0,27	-0,040	12	20	0,04	0,02	0,51	-0,027
	ARMA(1,1)-GJR(1,1) - skewed studentt	2	7	0,01	0,05	0,28	-0,040	12	18	0,13	0,08	0,5	-0,027
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,02	0,05	0,47	-0,041	12	19	0,08	0,19	0,77	-0,029
	ARMA(0,0)-GARCH(1,1) - studentt	2	6	0,06	0,14	0,14	-0,041	12	19	0,08	0,19	0,77	-0,029
	ARMA(0,0)-GARCH(1,1) - skewed studentt	2	6	0,06	0,14	0,14	-0,041	12	19	0,08	0,19	0,77	-0,029
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,14	0,14	-0,041	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,0)-GARCH(1,1) - studentt	2	6	0,06	0,14	0,14	-0,041	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,0)-GARCH(1,1) - skewed studentt	2	6	0,06	0,14	0,14	-0,041	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,14	0,14	-0,040	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,1)-GARCH(1,1) - studentt	2	6	0,06	0,14	0,14	-0,041	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,1)-GARCH(1,1) - skewed studentt	2	6	0,06	0,14	0,14	-0,041	12	19	0,08	0,19	0,77	-0,028
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,05	0,47	-0,038	12	19	0,08	0,19	0,77	-0,027
	ARMA(0,0)-GJR(1,1) - studentt	2	7	0,02	0,05	0,47	-0,038	12	19	0,08	0,19	0,77	-0,028
	ARMA(0,0)-GJR(1,1) - skewed studentt	2	7	0,02	0,05	0,47	-0,038	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,005	0,01	0,27	-0,038	12	21	0,023	0,06	0,74	-0,027
	ARMA(1,0)-GJR(1,1) - studentt	2	8	0,005	0,01	0,27	-0,038	12	21	0,023	0,06	0,74	-0,027
	ARMA(1,0)-GJR(1,1) - skewed studentt	2	8	0,005	0,01	0,27	-0,038	12	21	0,023	0,06	0,74	-0,027
	ARMA(1,1)-GJR(1,1) - norm	2	9	0,001	0,004	0,15	-0,037	12	21	0,023	0,06	0,74	-0,027
	ARMA(1,1)-GJR(1,1) - studentt	2	9	0,001	0,004	0,15	-0,038	12	22	0,01	0,03	0,9	-0,027
	ARMA(1,1)-GJR(1,1) - skewed studentt	2	10	0,0003	0,001	0,29	-0,038	12	20	0,05	0,11	0,73	-0,027
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,33	0,12	-0,043	12	19	0,08	0,19	0,77	-0,028
	ARMA(0,0)-GARCH(1,1) - studentt	2	5	0,16	0,33	0,12	-0,043	12	19	0,08	0,19	0,77	-0,028
	ARMA(0,0)-GARCH(1,1) - skewed studentt	2	5	0,16	0,33	0,12	-0,043	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,14	0,14	-0,042	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,0)-GARCH(1,1) - studentt	2	6	0,06	0,14	0,14	-0,042	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,0)-GARCH(1,1) - skewed studentt	2	6	0,06	0,14	0,14	-0,042	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,14	0,14	-0,041	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,1)-GARCH(1,1) - studentt	2	6	0,06	0,14	0,14	-0,042	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,1)-GARCH(1,1) - skewed studentt	2	6	0,06	0,14	0,14	-0,042	12	19	0,08	0,19	0,77	-0,028
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,05	0,47	-0,040	12	20	0,05	0,11	0,85	-0,027
	ARMA(0,0)-GJR(1,1) - studentt	2	6	0,06	0,14	0,14	-0,040	12	20	0,05	0,11	0,95	-0,027
	ARMA(0,0)-GJR(1,1) - skewed studentt	2	7	0,02	0,05	0,47	-0,040	12	20	0,05	0,11	0,95	-0,027
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,005	0,016	0,27	-0,039	12	22	0,01	0,03	0,9	-0,026
	ARMA(1,0)-GJR(1,1) - studentt	2	7	0,02	0,05	0,28	-0,040	12	22	0,01	0,03	0,9	-0,026
	ARMA(1,0)-GJR(1,1) - skewed studentt	2	8	0,005	0,016	0,27	-0,040	12	22	0,01	0,03	0,9	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,05	0,28	-0,039	12	21	0,02	0,06	0,74	-0,026
	ARMA(1,1)-GJR(1,1) - studentt	2	7	0,02	0,05	0,28	-0,039	12	21	0,02	0,01	0,66	-0,026
	ARMA(1,1)-GJR(1,1) - skewed studentt	2	7	0,02	0,05	0,28	-0,040	12	21	0,02	0,06	0,74	-0,026

Table 56. VaR estimation results of the portfolio when corrected for outliers.

The forecasting period is of 250 days. The Ané et al. (2008) method was applied with an alpha of 5% and only by substituting the outlier by the upper and lower value of the confidence interval.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - norm	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - student-t	2	109	0	0	0	>0	12	109	0	0	0	>0
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	109	0	0	0	>0	12	109	0	0	0	>0

Table 57. VaR estimation results of the portfolio when corrected for outliers.

The forecasting period is of 250 days. The Ané et al. (2008) method was applied with an alpha of 1% and only by substituting the outlier by the predictive return.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	5	189	0	0	1	-0,0061	25	194	0	0	0	-0,004
	ARMA(0,0)-GARCH(1,1) - student-t	5	189	0	0	1	-0,0062	25	194	0	0	0	-0,004
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	189	0	0	1	-0,0063	25	193	0	0	0	-0,004
	ARMA(1,0)-GARCH(1,1) - norm	5	190	0	0	0,004	-0,0061	25	194	0	0	0	-0,004
	ARMA(1,0)-GARCH(1,1) - student-t	5	189	0	0	1	-0,0062	25	193	0	0	0	-0,004
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	189	0	0	1	-0,0063	25	193	0	0	0	-0,004
	ARMA(1,1)-GARCH(1,1) - norm	5	189	0	0	1,000	-0,0061	25	194	0	0	0	-0,004
	ARMA(1,1)-GARCH(1,1) - student-t	5	189	0	0	1	-0,0062	25	194	0	0	0	-0,004
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	189	0	0	1	-0,0063	25	194	0	0	0	-0,004
	ARMA(0,0)-GJR(1,1) - norm	5	189	0	0	0,004	-0,0062	25	193	0	0	0	-0,004
	ARMA(0,0)-GJR(1,1) - student-t	5	189	0	0	1	-0,0063	25	193	0	0	0	-0,004
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	188	0	0	1	-0,0064	25	193	0	0	0	-0,0041
	ARMA(1,0)-GJR(1,1) - norm	5	189	0	0	0,004	-0,0062	25	192	0	0	0	-0,004
	ARMA(1,0)-GJR(1,1) - student-t	5	189	0	0	0,004	-0,0063	25	193	0	0	0	-0,0041
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	189	0	0	0,004	-0,0064	25	192	0	0	0	-0,0041
	ARMA(1,1)-GJR(1,1) - norm	5	189	0	0	0,004	-0,0062	25	193	0	0	0	-0,0041
	ARMA(1,1)-GJR(1,1) - student-t	5	189	0	0	0,004	-0,0063	25	193	0	0	0	-0,0041
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	189	0	0	0,004	-0,0064	25	193	0	0	0	-0,0041
FHS	ARMA(0,0)-GARCH(1,1) - norm	5	189	0	1	1	-0,006	25	193	0	0	0	-0,004
	ARMA(0,0)-GARCH(1,1) - student-t	5	189	0	1	1	-0,006	25	193	0	0	0	-0,004
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	189	0	1	1	-0,006	25	193	0	0	0	-0,004
	ARMA(1,0)-GARCH(1,1) - norm	5	189	0	1	1	-0,006	25	193	0	0	0	-0,004
	ARMA(1,0)-GARCH(1,1) - student-t	5	189	0	1	1	-0,006	25	193	0	0	0	-0,004
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	189	0	1	1	-0,006	25	193	0	0	0	-0,004
	ARMA(1,1)-GARCH(1,1) - norm	5	189	0	1	1	-0,006	25	194	0	0	0	-0,004
	ARMA(1,1)-GARCH(1,1) - student-t	5	189	0	1	1	-0,006	25	194	0	0	0	-0,004
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	189	0	1	1	-0,006	25	194	0	0	0	-0,004
	ARMA(0,0)-GJR(1,1) - norm	5	189	0	0,004	0,004	-0,006	25	193	0	0	0	-0,004
	ARMA(0,0)-GJR(1,1) - student-t	5	190	0	0,005	0,005	-0,006	25	193	0	0	0	-0,004
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	190	0	0,004	0,004	-0,006	25	192	0	0	0	-0,004
	ARMA(1,0)-GJR(1,1) - norm	5	189	0	0,004	0,004	-0,006	25	193	0	0	0	-0,004
	ARMA(1,0)-GJR(1,1) - student-t	5	189	0	0,005	0,005	-0,006	25	192	0	0	0	-0,004
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	189	0	0,005	0,005	-0,006	25	192	0	0	0	-0,004
	ARMA(1,1)-GJR(1,1) - norm	5	189	0	0,004	0,004	-0,006	25	193	0	0	0	-0,004
	ARMA(1,1)-GJR(1,1) - student-t	5	190	0	0,005	0,005	-0,006	25	193	0	0	0	-0,004
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	190	0	0,005	0,005	-0,006	25	193	0	0	0	-0,004
EVT	ARMA(0,0)-GARCH(1,1) - norm	5	189	0	0	1	-0,007	25	193	0	0	0	-0,004
	ARMA(0,0)-GARCH(1,1) - student-t	5	189	0	0	1	-0,007	25	193	0	0	0	-0,004
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	189	0	0	1	-0,007	25	193	0	0	0	-0,004
	ARMA(1,0)-GARCH(1,1) - norm	5	189	0	0	1	-0,006	25	193	0	0	0	-0,004
	ARMA(1,0)-GARCH(1,1) - student-t	5	189	0	0	1	-0,007	25	193	0	0	0	-0,004
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	189	0	0	1	-0,007	25	193	0	0	0	-0,004
	ARMA(1,1)-GARCH(1,1) - norm	5	189	0	0	1	-0,007	25	194	0	0	0	-0,004
	ARMA(1,1)-GARCH(1,1) - student-t	5	189	0	0	1	-0,007	25	194	0	0	0	-0,004
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	189	0	0	1	-0,007	25	194	0	0	0	-0,004
	ARMA(0,0)-GJR(1,1) - norm	5	188	0	0	1	-0,006	25	193	0	0	0	-0,004
	ARMA(0,0)-GJR(1,1) - student-t	5	188	0	0	1	-0,006	25	193	0	0	0	-0,004
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	188	0	0	1	-0,006	25	193	0	0	0	-0,004
	ARMA(1,0)-GJR(1,1) - norm	5	189	0	0	0,004	-0,006	25	193	0	0	0	-0,004
	ARMA(1,0)-GJR(1,1) - student-t	5	189	0	0	0,004	-0,006	25	193	0	0	0	-0,004
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	189	0	0	0,004	-0,006	25	193	0	0	0	-0,004
	ARMA(1,1)-GJR(1,1) - norm	5	189	0	0	0,004	-0,006	25	193	0	0	0	-0,004
	ARMA(1,1)-GJR(1,1) - student-t	5	189	0	0	0,004	-0,006	25	193	0	0	0	-0,004
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	189	0	0	0,004	-0,006	25	193	0	0	0	-0,004

Table 58. VaR estimation results of the portfolio when corrected for outliers.

The forecasting period is of 500 days. The Ané et al. (2008) method was applied with an alpha of 1% and only by substituting the outlier by the predictive return.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,12	-0,043	12	17	0,21	0,46	0,61	-0,030
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,18	-0,043	12	17	0,21	0,46	0,61	-0,030
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,18	-0,045	12	17	0,21	0,46	0,61	-0,031
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,05	-0,042	12	18	0,13	0,08	0,5	-0,030
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,05	-0,043	12	18	0,13	0,08	0,5	-0,030
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,18	-0,044	12	18	0,13	0,08	0,5	-0,030
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,05	-0,042	12	18	0,13	0,08	0,5	-0,030
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,05	-0,043	12	18	0,13	0,08	0,5	-0,029
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,18	-0,044	12	17	0,21	0,13	0,49	-0,030
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,05	0,47	-0,041	12	19	0,08	0,19	0,77	-0,029
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,042	12	19	0,08	0,19	0,77	-0,029
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,05	-0,043	12	19	0,08	0,19	0,77	-0,030
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,05	-0,041	12	19	0,08	0,04	0,48	-0,029
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,05	-0,041	12	19	0,08	0,04	0,48	-0,028
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,05	-0,042	12	18	0,13	0,08	0,5	-0,029
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,28	-0,041	12	18	0,13	0,08	0,5	-0,028
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,041	12	19	0,08	0,04	0,69	-0,028
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,28	-0,042	12	18	0,13	0,08	0,5	-0,029
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,18	-0,044	12	17	0,21	0,46	0,61	-0,031
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,18	-0,044	12	16	0,33	0,62	0,48	-0,031
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,18	-0,044	12	17	0,21	0,46	0,61	-0,031
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,05	-0,043	12	17	0,21	0,13	0,48	-0,030
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,05	-0,044	12	17	0,21	0,13	0,48	-0,030
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,05	-0,044	12	17	0,21	0,13	0,48	-0,030
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,05	-0,043	12	17	0,21	0,13	0,48	-0,030
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,05	-0,044	12	17	0,21	0,13	0,48	-0,030
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,05	-0,044	12	17	0,21	0,13	0,48	-0,031
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,14	-0,041	12	19	0,08	0,19	0,77	-0,029
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,14	-0,041	12	19	0,08	0,19	0,77	-0,029
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,14	-0,041	12	19	0,08	0,19	0,77	-0,030
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,05	-0,040	12	19	0,08	0,04	0,48	-0,029
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,05	-0,040	12	19	0,08	0,04	0,48	-0,029
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,05	-0,040	12	19	0,08	0,04	0,48	-0,029
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,27	-0,040	12	18	0,13	0,08	0,5	-0,028
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,27	-0,040	12	20	0,04	0,02	0,65	-0,029
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,27	-0,040	12	18	0,13	0,08	0,5	-0,029
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,18	-0,046	12	17	0,21	0,46	0,61	-0,030
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,18	-0,046	12	17	0,21	0,46	0,61	-0,030
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,18	-0,046	12	17	0,21	0,46	0,61	-0,030
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,18	-0,045	12	18	0,13	0,08	0,5	-0,030
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,18	-0,045	12	18	0,13	0,08	0,5	-0,030
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,18	-0,045	12	18	0,13	0,08	0,5	-0,030
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,18	-0,044	12	18	0,13	0,08	0,5	-0,030
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,18	-0,045	12	17	0,21	0,13	0,48	-0,030
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,18	-0,045	12	17	0,21	0,13	0,48	-0,030
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,05	-0,043	12	19	0,08	0,19	0,77	-0,029
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,05	-0,043	12	19	0,08	0,19	0,77	-0,029
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,05	-0,043	12	19	0,08	0,19	0,77	-0,029
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,05	-0,042	12	19	0,08	0,04	0,48	-0,028
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,05	-0,042	12	20	0,04	0,02	0,51	-0,028
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,05	-0,042	12	19	0,08	0,04	0,48	-0,028
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,27	-0,042	12	20	0,04	0,02	0,65	-0,028
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,27	-0,042	12	20	0,04	0,02	0,65	-0,028
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,27	-0,042	12	18	0,13	0,08	0,5	-0,028

Table 59. VaR estimation results of the portfolio when corrected for outliers.

The forecasting period is of 250 days. The Ané et al. (2008) method was applied with an alpha of 1% and only by substituting the outlier by the upper and lower value of the confidence interval.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	5	11	0,02	0,05	0,62	-0,064	25	33	0,11	0,29	0,32	-0,045
	ARMA(0,0)-GARCH(1,1) - student-t	5	11	0,02	0,05	0,62	-0,065	25	34	0,08	0,21	0,32	-0,045
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	8	0,21	0,41	0,20	-0,067	25	32	0,17	0,39	0,43	-0,046
	ARMA(1,0)-GARCH(1,1) - norm	5	10	0,05	0,12	0,77	-0,064	25	36	0,03	0,05	0,92	-0,045
	ARMA(1,0)-GARCH(1,1) - student-t	5	9	0,11	0,23	0,28	-0,064	25	36	0,03	0,05	0,99	-0,045
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	8	0,21	0,41	0,20	-0,066	25	35	0,05	0,08	0,997	-0,046
	ARMA(1,1)-GARCH(1,1) - norm	5	9	0,11	0,23	0,28	-0,064	25	34	0,08	0,13	0,82	-0,045
	ARMA(1,1)-GARCH(1,1) - student-t	5	9	0,11	0,23	0,28	-0,064	25	34	0,08	0,13	0,82	-0,045
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	8	0,21	0,41	0,20	-0,068	25	34	0,08	0,13	0,97	-0,046
	ARMA(0,0)-GJR(1,1) - norm	5	11	0,02	0,05	0,91	-0,061	25	34	0,08	0,13	0,78	-0,043
	ARMA(0,0)-GJR(1,1) - student-t	5	11	0,02	0,05	0,91	-0,062	25	35	0,05	0,08	0,79	-0,043
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	7	0,4	0,63	0,63	-0,064	25	34	0,08	0,13	0,78	-0,044
	ARMA(1,0)-GJR(1,1) - norm	5	11	0,02	0,05	0,37	-0,061	25	36	0,03	0,006	0,59	-0,043
	ARMA(1,0)-GJR(1,1) - student-t	5	10	0,05	0,12	0,29	-0,061	25	36	0,03	0,006	0,59	-0,043
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	7	0,4	0,63	0,63	-0,064	25	34	0,08	0,02	0,46	-0,044
	ARMA(1,1)-GJR(1,1) - norm	5	11	0,02	0,05	0,94	-0,061	25	36	0,03	0,006	0,72	-0,043
	ARMA(1,1)-GJR(1,1) - student-t	5	11	0,02	0,05	0,94	-0,061	25	36	0,03	0,006	0,72	-0,042
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	8	0,21	0,41	0,41	-0,064	25	36	0,03	0,006	0,30	-0,044
FHS	ARMA(0,0)-GARCH(1,1) - norm	5	9	0,10	0,22	0,57	-0,07	25	32	0,17	0,39	0,43	-0,047
	ARMA(0,0)-GARCH(1,1) - student-t	5	8	0,22	0,41	0,20	-0,07	25	32	0,17	0,39	0,43	-0,047
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	8	0,22	0,41	0,20	-0,07	25	32	0,17	0,39	0,43	-0,047
	ARMA(1,0)-GARCH(1,1) - norm	5	8	0,22	0,41	0,69	-0,07	25	35	0,05	0,08	1,00	-0,046
	ARMA(1,0)-GARCH(1,1) - student-t	5	7	0,40	0,63	0,58	-0,07	25	35	0,05	0,08	1,00	-0,066
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	7	0,40	0,63	0,58	-0,07	25	34	0,08	0,13	0,75	-0,046
	ARMA(1,1)-GARCH(1,1) - norm	5	9	0,10	0,22	0,28	-0,07	25	32	0,17	0,28	0,88	-0,046
	ARMA(1,1)-GARCH(1,1) - student-t	5	8	0,22	0,41	0,69	-0,07	25	34	0,08	0,21	0,67	-0,046
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	8	0,22	0,22	0,20	-0,07	25	32	0,17	38,00	0,48	-0,046
	ARMA(0,0)-GJR(1,1) - norm	5	10	0,05	0,11	0,28	-0,06	25	35	0,05	0,08	0,79	-0,044
	ARMA(0,0)-GJR(1,1) - student-t	5	10	0,05	0,11	0,28	-0,06	25	34	0,08	0,12	0,78	-0,044
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	11	0,02	0,05	0,50	-0,06	25	34	0,08	0,12	0,78	-0,044
	ARMA(1,0)-GJR(1,1) - norm	5	10	0,05	0,11	0,28	-0,06	25	36	0,03	0,01	0,59	-0,043
	ARMA(1,0)-GJR(1,1) - student-t	5	10	0,05	0,11	0,28	-0,06	25	35	0,05	0,01	0,48	-0,043
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	9	0,10	0,22	0,94	-0,06	25	35	0,05	0,01	0,57	-0,043
	ARMA(1,1)-GJR(1,1) - norm	5	11	0,02	0,05	0,48	-0,06	25	36	0,03	0,01	0,72	-0,043
	ARMA(1,1)-GJR(1,1) - student-t	5	11	0,02	0,05	0,48	-0,06	25	36	0,03	0,01	0,72	-0,043
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	10	0,05	0,11	0,89	-0,06	25	36	0,03	0,01	0,30	-0,043
EVT	ARMA(0,0)-GARCH(1,1) - norm	5	7	0,40	0,63	0,58	-0,07	25	32	0,17	0,39	0,43	-0,046
	ARMA(0,0)-GARCH(1,1) - student-t	5	7	0,40	0,63	0,58	-0,07	25	32	0,17	0,39	0,43	-0,046
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	7	0,40	0,63	0,58	-0,07	25	32	0,17	0,39	0,43	-0,046
	ARMA(1,0)-GARCH(1,1) - norm	5	7	0,40	0,63	0,58	-0,07	25	35	0,05	0,08	1,00	-0,045
	ARMA(1,0)-GARCH(1,1) - student-t	5	7	0,40	0,63	0,58	-0,07	25	35	0,05	0,08	1,00	-0,045
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	7	0,40	0,63	0,58	-0,07	25	35	0,05	0,08	1,00	-0,045
	ARMA(1,1)-GARCH(1,1) - norm	5	8	0,22	0,41	0,20	-0,07	25	34	0,08	0,13	0,82	-0,045
	ARMA(1,1)-GARCH(1,1) - student-t	5	8	0,22	0,41	0,20	-0,07	25	35	0,05	0,14	0,97	-0,045
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	8	0,22	0,41	0,20	-0,07	25	34	0,08	0,20	0,97	-0,046
	ARMA(0,0)-GJR(1,1) - norm	5	9	0,10	0,22	0,63	-0,06	25	36	0,03	0,05	0,97	-0,043
	ARMA(0,0)-GJR(1,1) - student-t	5	7	0,40	0,63	0,62	-0,06	25	35	0,05	0,14	0,79	-0,043
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	7	0,40	0,63	0,62	-0,06	25	36	0,03	0,05	0,97	-0,043
	ARMA(1,0)-GJR(1,1) - norm	5	7	0,40	0,63	0,62	-0,06	25	36	0,03	0,01	0,59	-0,042
	ARMA(1,0)-GJR(1,1) - student-t	5	7	0,40	0,63	0,62	-0,06	25	36	0,03	0,01	0,59	-0,043
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	7	0,40	0,63	0,62	-0,06	25	36	0,03	0,01	0,59	-0,043
	ARMA(1,1)-GJR(1,1) - norm	5	9	0,10	0,23	0,98	-0,06	25	37	0,02	0,00	0,39	-0,042
	ARMA(1,1)-GJR(1,1) - student-t	5	9	0,10	0,23	0,98	-0,06	25	36	0,03	0,01	0,72	-0,042
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	7	0,40	0,63	0,62	-0,06	25	37	0,02	0,00	0,39	-0,042

Table 60. VaR estimation results of the portfolio when corrected for outliers.

The forecasting period is of 500 days. The Ané et al. (2008) method was applied with an alpha of 1% and only by substituting the outlier by the upper and lower value of the confidence interval.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,02	0,05	0,53	-0,040	12	19	0,08	0,19	0,45	-0,028
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,14	0,78	-0,041	12	20	0,04	0,11	0,36	-0,028
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,87	-0,042	12	18	0,13	0,31	0,27	-0,029
	ARMA(1,0)-GARCH(1,1) - norm	2	7	0,02	0,05	0,53	-0,040	12	19	0,08	0,04	0,19	-0,028
	ARMA(1,0)-GARCH(1,1) - student-t	2	7	0,02	0,05	0,53	-0,040	12	19	0,08	0,04	0,19	-0,028
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,87	-0,042	12	18	0,13	0,08	0,50	-0,028
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,02	0,05	0,53	-0,040	12	19	0,08	0,04	0,19	-0,028
	ARMA(1,1)-GARCH(1,1) - student-t	2	7	0,02	0,05	0,53	-0,040	12	19	0,08	0,04	0,19	-0,028
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,68	-0,041	12	18	0,13	0,08	0,50	-0,028
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,05	0,53	-0,039	12	21	0,02	0,06	0,51	-0,027
	ARMA(0,0)-GJR(1,1) - student-t	2	7	0,02	0,05	0,53	-0,039	12	21	0,02	0,06	0,51	-0,027
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	7	0,02	0,05	0,53	-0,041	12	19	0,08	0,04	0,69	-0,028
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,005	0,016	0,39	-0,038	12	20	0,05	0,02	0,65	-0,027
	ARMA(1,0)-GJR(1,1) - student-t	2	7	0,02	0,05	0,53	-0,039	12	20	0,05	0,02	0,65	-0,027
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	7	0,02	0,05	0,53	-0,040	12	19	0,08	0,04	0,69	-0,027
	ARMA(1,1)-GJR(1,1) - norm	2	9	0,001	0,004	0,56	-0,038	12	18	0,13	0,08	0,5	-0,027
	ARMA(1,1)-GJR(1,1) - student-t	2	9	0,001	0,004	0,56	-0,039	12	18	0,13	0,08	0,5	-0,027
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	9	0,001	0,004	0,56	-0,040	12	18	0,13	0,08	0,5	-0,027
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,33	0,87	-0,041	12	17	0,21	0,45	0,61	-0,029
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,33	0,87	-0,041	12	17	0,21	0,45	0,61	-0,029
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,33	0,87	-0,041	12	17	0,21	0,45	0,61	-0,029
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,14	0,67	-0,041	12	18	0,13	0,08	0,5	-0,029
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,14	0,67	-0,041	12	18	0,13	0,08	0,5	-0,029
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,67	-0,041	12	18	0,13	0,08	0,5	-0,029
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,14	0,67	-0,041	12	18	0,13	0,08	0,5	-0,029
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,14	0,67	-0,041	12	18	0,13	0,08	0,5	-0,029
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	7	0,02	0,05	0,58	-0,041	12	18	0,13	0,08	0,5	-0,029
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,05	0,58	-0,038	12	19	0,08	0,19	0,77	-0,027
	ARMA(0,0)-GJR(1,1) - student-t	2	7	0,02	0,05	0,53	-0,038	12	19	0,08	0,19	0,77	-0,028
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	7	0,02	0,05	0,53	-0,038	12	19	0,08	0,19	0,77	-0,028
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,005	0,016	0,36	-0,038	12	20	0,05	0,02	0,65	-0,027
	ARMA(1,0)-GJR(1,1) - student-t	2	8	0,005	0,016	0,39	-0,038	12	19	0,08	0,04	0,48	-0,027
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	8	0,005	0,016	0,39	-0,038	12	19	0,08	0,04	0,48	-0,027
	ARMA(1,1)-GJR(1,1) - norm	2	9	0,001	0,004	0,56	-0,038	12	18	0,13	0,08	0,5	-0,027
	ARMA(1,1)-GJR(1,1) - student-t	2	9	0,001	0,004	0,56	-0,038	12	18	0,13	0,08	0,5	-0,027
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	9	0,001	0,004	0,56	-0,038	12	18	0,13	0,08	0,5	-0,027
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,33	0,87	-0,043	12	18	0,13	0,31	0,26	-0,029
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,33	0,87	-0,043	12	18	0,13	0,31	0,26	-0,029
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,33	0,87	-0,043	12	18	0,13	0,31	0,26	-0,029
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,33	0,87	-0,042	12	19	0,08	0,04	0,18	-0,028
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,33	0,87	-0,042	12	18	0,13	0,08	0,5	-0,028
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,33	0,87	-0,042	12	18	0,13	0,08	0,5	-0,028
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,14	0,67	-0,042	12	19	0,08	0,04	0,18	-0,028
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,33	0,87	-0,042	12	18	0,13	0,08	0,5	-0,028
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,33	0,87	-0,043	12	18	0,13	0,08	0,5	-0,028
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,05	0,53	-0,040	12	21	0,02	0,06	0,51	-0,027
	ARMA(0,0)-GJR(1,1) - student-t	2	7	0,02	0,05	0,53	-0,040	12	21	0,02	0,06	0,51	-0,027
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	7	0,02	0,05	0,53	-0,040	12	21	0,02	0,06	0,51	-0,027
	ARMA(1,0)-GJR(1,1) - norm	2	7	0,02	0,05	0,53	-0,039	12	21	0,02	0,01	0,27	-0,026
	ARMA(1,0)-GJR(1,1) - student-t	2	7	0,02	0,05	0,53	-0,040	12	20	0,04	0,02	0,65	-0,026
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	7	0,02	0,05	0,53	-0,040	12	20	0,04	0,02	0,65	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	9	0,001	0,004	0,56	-0,039	12	19	0,08	0,04	0,18	-0,026
	ARMA(1,1)-GJR(1,1) - student-t	2	9	0,001	0,004	0,56	-0,040	12	18	0,13	0,08	0,5	-0,026
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	9	0,001	0,004	0,56	-0,040	12	18	0,13	0,08	0,5	-0,026

Table 61. VaR estimation results of the portfolio when corrected for outliers.

The forecasting period is of 250 days. The Ané et al. (2008) method was applied with an alpha of 0,5% and only by substituting the outlier by the predictive return.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	5	22	0	0	0,03	-0,058	25	46	0	0	0,06	-0,041
	ARMA(0,0)-GARCH(1,1) - student-t	5	21	0	0	0	-0,059	25	46	0	0	0,06	-0,041
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	17	0	0	0	-0,061	25	43	0	0	0,11	-0,042
	ARMA(1,0)-GARCH(1,1) - norm	5	22	0	0	0	-0,058	25	47	0	0	0,31	-0,041
	ARMA(1,0)-GARCH(1,1) - student-t	5	21	0	0	0	-0,058	25	48	0	0	0,24	-0,040
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	19	0	0	0	-0,060	25	45	0	0	0,26	-0,041
	ARMA(1,1)-GARCH(1,1) - norm	5	21	0	0	0	-0,058	25	48	0	0	0,3	-0,040
	ARMA(1,1)-GARCH(1,1) - student-t	5	20	0	0	0	-0,058	25	48	0	0	0,3	-0,040
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	20	0	0	0	-0,060	25	46	0	0	0,08	-0,041
	ARMA(0,0)-GJR(1,1) - norm	5	23	0	0	0	-0,056	25	47	0	0	0,17	-0,039
	ARMA(0,0)-GJR(1,1) - student-t	5	23	0	0	0	-0,056	25	48	0	0	0,12	-0,039
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	20	0	0	0	-0,058	25	47	0	0	0,17	-0,040
	ARMA(1,0)-GJR(1,1) - norm	5	22	0	0	0	-0,055	25	47	0	0	0,26	-0,039
	ARMA(1,0)-GJR(1,1) - student-t	5	22	0	0	0	-0,056	25	47	0	0	0,26	-0,039
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	21	0	0	0	-0,058	25	47	0	0	0,26	-0,040
	ARMA(1,1)-GJR(1,1) - norm	5	24	0	0	0,02	-0,055	25	47	0	0	0,17	-0,039
	ARMA(1,1)-GJR(1,1) - student-t	5	24	0	0	0,02	-0,056	25	47	0	0	0,17	-0,039
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	21	0	0	0	-0,058	25	46	0	0	0,22	-0,040
FHS	ARMA(0,0)-GARCH(1,1) - norm	5	17	0	0	0	-0,059	25	44	0	0	0,06	-0,042
	ARMA(0,0)-GARCH(1,1) - student-t	5	17	0	0	0	-0,060	25	43	0	0	0,11	-0,042
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	17	0	0	0	-0,060	25	44	0	0	0,13	-0,042
	ARMA(1,0)-GARCH(1,1) - norm	5	20	0	0	0	-0,059	25	46	0	0	0,17	-0,042
	ARMA(1,0)-GARCH(1,1) - student-t	5	19	0	0	0	-0,060	25	45	0	0	0,26	-0,042
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	19	0	0	0	-0,060	25	44	0	0	0,15	-0,042
	ARMA(1,1)-GARCH(1,1) - norm	5	20	0	0	0	-0,059	25	47	0	0	0,15	-0,042
	ARMA(1,1)-GARCH(1,1) - student-t	5	20	0	0	0	-0,060	25	46	0	0	0,08	-0,042
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	20	0	0	0	-0,060	25	46	0	0	0,08	-0,042
	ARMA(0,0)-GJR(1,1) - norm	5	22	0	0	0	-0,055	25	48	0	0	0,3	-0,040
	ARMA(0,0)-GJR(1,1) - student-t	5	22	0	0	0	-0,055	25	48	0	0	0,3	-0,040
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	21	0	0	0	-0,055	25	48	0	0	0,3	-0,040
	ARMA(1,0)-GJR(1,1) - norm	5	22	0	0	0	-0,055	25	48	0	0	0,27	-0,039
	ARMA(1,0)-GJR(1,1) - student-t	5	21	0	0	0	-0,055	25	47	0	0	0,26	-0,039
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	21	0	0	0	-0,055	25	47	0	0	0,26	-0,039
	ARMA(1,1)-GJR(1,1) - norm	5	23	0	0	0	-0,055	25	46	0	0	0,22	-0,039
	ARMA(1,1)-GJR(1,1) - student-t	5	23	0	0	0	-0,056	25	46	0	0	0,22	-0,039
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	22	0	0	0	-0,056	25	46	0	0	0,22	-0,039
EVT	ARMA(0,0)-GARCH(1,1) - norm	5	17	0	0	0	-0,062	25	45	0	0	0,05	-0,041
	ARMA(0,0)-GARCH(1,1) - student-t	5	17	0	0	0	-0,063	25	44	0	0	0,08	-0,042
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	17	0	0	0	-0,063	25	44	0	0	0,08	-0,042
	ARMA(1,0)-GARCH(1,1) - norm	5	18	0	0	0	-0,061	25	47	0	0	0,31	-0,041
	ARMA(1,0)-GARCH(1,1) - student-t	5	18	0	0	0	-0,062	25	45	0	0	0,26	-0,041
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	18	0	0	0	-0,062	25	46	0	0	0,17	-0,041
	ARMA(1,1)-GARCH(1,1) - norm	5	20	0	0	0	-0,061	25	47	0	0	0,15	-0,041
	ARMA(1,1)-GARCH(1,1) - student-t	5	18	0	0	0	-0,062	25	47	0	0	0,15	-0,041
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	19	0	0	0	-0,062	25	46	0	0	0,08	-0,041
	ARMA(0,0)-GJR(1,1) - norm	5	21	0	0	0	-0,058	25	49	0	0	0,22	-0,039
	ARMA(0,0)-GJR(1,1) - student-t	5	21	0	0	0	-0,058	25	48	0	0	0,11	-0,039
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	21	0	0	0	-0,058	25	48	0	0	0,11	-0,039
	ARMA(1,0)-GJR(1,1) - norm	5	21	0	0	0	-0,057	25	48	0	0	0,27	-0,038
	ARMA(1,0)-GJR(1,1) - student-t	5	20	0	0	0	-0,057	25	48	0	0	0,27	-0,039
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	20	0	0	0	-0,057	25	48	0	0	0,27	-0,039
	ARMA(1,1)-GJR(1,1) - norm	5	22	0	0	0	-0,057	25	48	0	0	0,2	-0,038
	ARMA(1,1)-GJR(1,1) - student-t	5	23	0	0	0	-0,057	25	47	0	0	0,25	-0,038
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	19	0	0	0	-0,057	25	47	0	0	0,16	-0,039

Table 62. VaR estimation results of the portfolio when corrected for outliers.

The forecasting period is of 500 days. The Ané et al. (2008) method was applied with an alpha of 0,5% and only by substituting the outlier by the predictive return.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	5	10	0,04	0,11	0,86	-0,065	25	32	0,17	0,39	0,43	-0,045
	ARMA(0,0)-GARCH(1,1) - student-t	5	9	0,11	0,23	0,63	-0,065	25	32	0,17	0,39	0,43	-0,045
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	7	0,397	0,632	0,58	-0,068	25	30	0,32	0,6	0,68	-0,047
	ARMA(1,0)-GARCH(1,1) - norm	5	9	0,11	0,23	0,61	-0,064	25	33	0,12	0,02	0,57	-0,045
	ARMA(1,0)-GARCH(1,1) - student-t	5	8	0,21	0,41	0,69	-0,065	25	34	0,08	0,13	0,78	-0,045
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	7	0,397	0,632	0,58	-0,067	25	32	0,17	0,04	0,55	-0,046
	ARMA(1,1)-GARCH(1,1) - norm	5	9	0,11	0,23	0,28	-0,064	25	33	0,12	0,02	0,57	-0,045
	ARMA(1,1)-GARCH(1,1) - student-t	5	9	0,11	0,23	0,28	-0,065	25	34	0,08	0,13	0,78	-0,045
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	7	0,397	0,632	0,58	-0,068	25	32	0,17	0,27	0,92	-0,046
	ARMA(0,0)-GJR(1,1) - norm	5	11	0,02	0,05	0,91	-0,062	25	34	0,08	0,13	0,78	-0,043
	ARMA(0,0)-GJR(1,1) - student-t	5	11	0,02	0,05	0,91	-0,062	25	34	0,08	0,13	0,78	-0,043
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	7	0,397	0,632	0,63	-0,065	25	32	0,17	0,27	0,55	-0,045
	ARMA(1,0)-GJR(1,1) - norm	5	11	0,02	0,05	0,37	-0,061	25	34	0,08	0,017	0,48	-0,043
	ARMA(1,0)-GJR(1,1) - student-t	5	9	0,11	0,23	0,63	-0,062	25	34	0,08	0,017	0,48	-0,043
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	7	0,397	0,632	0,63	-0,064	25	33	0,12	0,02	0,45	-0,044
	ARMA(1,1)-GJR(1,1) - norm	5	11	0,02	0,05	0,8	-0,061	25	37	0,02	0,03	0,46	-0,043
	ARMA(1,1)-GJR(1,1) - student-t	5	11	0,02	0,05	0,8	-0,062	25	37	0,02	0,03	0,46	-0,043
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	7	0,397	0,632	0,63	-0,064	25	34	0,08	0,017	0,28	-0,044
FHS	ARMA(0,0)-GARCH(1,1) - norm	5	8	0,21	0,4	0,78	-0,066	25	30	0,32	0,6	0,68	-0,047
	ARMA(0,0)-GARCH(1,1) - student-t	5	7	0,397	0,632	0,58	-0,066	25	30	0,32	0,6	0,68	-0,047
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	7	0,397	0,632	0,58	-0,066	25	30	0,32	0,6	0,68	-0,047
	ARMA(1,0)-GARCH(1,1) - norm	5	8	0,21	0,4	0,68	-0,066	25	32	0,16	0,04	0,54	-0,046
	ARMA(1,0)-GARCH(1,1) - student-t	5	7	0,397	0,632	0,58	-0,066	25	32	0,16	0,04	0,54	-0,046
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	7	0,397	0,632	0,58	-0,066	25	31	0,23	0,06	0,76	-0,047
	ARMA(1,1)-GARCH(1,1) - norm	5	8	0,21	0,4	0,68	-0,066	25	31	0,23	0,06	0,84	-0,046
	ARMA(1,1)-GARCH(1,1) - student-t	5	8	0,21	0,4	0,68	-0,066	25	32	0,16	0,26	0,92	-0,046
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	7	0,397	0,632	0,58	-0,066	25	31	0,23	0,36	0,7	-0,047
	ARMA(0,0)-GJR(1,1) - norm	5	10	0,04	0,11	0,28	-0,061	25	33	0,11	0,19	0,65	-0,044
	ARMA(0,0)-GJR(1,1) - student-t	5	11	0,02	0,05	0,5	-0,062	25	33	0,11	0,19	0,65	-0,044
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	11	0,02	0,05	0,5	-0,062	25	33	0,11	0,19	0,65	-0,044
	ARMA(1,0)-GJR(1,1) - norm	5	10	0,04	0,11	0,28	-0,061	25	35	0,05	0,01	0,48	-0,043
	ARMA(1,0)-GJR(1,1) - student-t	5	10	0,04	0,11	0,28	-0,061	25	34	0,08	0,017	0,48	-0,044
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	9	0,1	0,22	0,94	-0,061	25	33	0,11	0,03	0,45	-0,044
	ARMA(1,1)-GJR(1,1) - norm	5	12	0,007	0,02	0,4	-0,061	25	36	0,03	0,006	0,31	-0,043
	ARMA(1,1)-GJR(1,1) - student-t	5	11	0,02	0,05	0,48	-0,061	25	36	0,03	0,006	0,31	-0,061
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	10	0,04	0,11	0,89	-0,062	25	34	0,08	0,017	0,48	-0,044
EVT	ARMA(0,0)-GARCH(1,1) - norm	5	7	0,397	0,632	0,58	-0,069	25	30	0,32	0,6	0,68	-0,046
	ARMA(0,0)-GARCH(1,1) - student-t	5	7	0,397	0,632	0,58	-0,069	25	30	0,32	0,6	0,68	-0,046
	ARMA(0,0)-GARCH(1,1) - skewed student-t	5	7	0,397	0,632	0,58	-0,070	25	30	0,32	0,6	0,68	-0,046
	ARMA(1,0)-GARCH(1,1) - norm	5	7	0,397	0,632	0,58	-0,068	25	32	0,16	0,04	0,54	-0,046
	ARMA(1,0)-GARCH(1,1) - student-t	5	7	0,397	0,632	0,58	-0,068	25	32	0,16	0,04	0,54	-0,046
	ARMA(1,0)-GARCH(1,1) - skewed student-t	5	7	0,397	0,632	0,58	-0,068	25	33	0,11	0,02	0,57	-0,046
	ARMA(1,1)-GARCH(1,1) - norm	5	7	0,397	0,632	0,58	-0,068	25	33	0,11	0,02	0,57	-0,046
	ARMA(1,1)-GARCH(1,1) - student-t	5	7	0,397	0,632	0,58	-0,068	25	34	0,079	0,12	0,78	-0,046
	ARMA(1,1)-GARCH(1,1) - skewed student-t	5	7	0,397	0,632	0,58	-0,069	25	33	0,11	0,18	0,76	-0,046
	ARMA(0,0)-GJR(1,1) - norm	c	8	0,21	0,4	0,72	-0,064	25	34	0,079	0,12	0,78	-0,043
	ARMA(0,0)-GJR(1,1) - student-t	5	7	0,397	0,632	0,62	-0,064	25	34	0,079	0,12	0,78	-0,043
	ARMA(0,0)-GJR(1,1) - skewed student-t	5	7	0,397	0,632	0,62	-0,065	25	34	0,079	0,12	0,78	-0,043
	ARMA(1,0)-GJR(1,1) - norm	5	7	0,397	0,632	0,62	-0,063	25	35	0,05	0,01	0,48	-0,043
	ARMA(1,0)-GJR(1,1) - student-t	5	7	0,397	0,632	0,62	-0,064	25	35	0,05	0,01	0,48	-0,043
	ARMA(1,0)-GJR(1,1) - skewed student-t	5	7	0,397	0,632	0,62	-0,064	25	35	0,05	0,01	0,48	-0,043
	ARMA(1,1)-GJR(1,1) - norm	5	9	0,1	0,22	0,98	-0,063	25	37	0,02	0,03	0,46	-0,042
	ARMA(1,1)-GJR(1,1) - student-t	5	9	0,1	0,22	0,98	-0,063	25	36	0,03	0,006	0,3	-0,042
	ARMA(1,1)-GJR(1,1) - skewed student-t	5	7	0,397	0,632	0,62	-0,064	25	36	0,03	0,05	0,43	-0,043

Table 63. VaR estimation results of the portfolio when corrected for outliers.

The forecasting period is of 500 days. The Ané et al. (2008) method was applied with an alpha of 0,5% and only by substituting the outlier by the upper and lower value of the confidence interval.

Appendix E. VaR estimation results of the portfolios when corrected for outliers. The method was applied with an alpha of 0,5% and only by substituting the outlier by the upper and lower value of the confidence interval. For help in reading this table, refer to table 6 of the dissertation.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,38	-0,031	12	20	0,04	0,02	0,15	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,032	12	21	0,02	0,01	0,19	-0,021
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,033	12	19	0,08	0,04	0,27	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,38	-0,031	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,38	-0,032	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,38	-0,031	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,38	-0,032	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,38	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,64	-0,032	12	18	0,13	0,08	0,12	-0,022
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,033	12	18	0,13	0,08	0,12	-0,022
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,034	12	17	0,21	0,13	0,13	-0,023
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,64	-0,032	12	15	0,48	0,3	0,43	-0,023
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,64	-0,033	12	17	0,21	0,13	0,13	-0,023
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,034	12	16	0,33	0,21	0,24	-0,023
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,64	-0,032	12	16	0,33	0,21	0,43	-0,023
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,64	-0,033	12	17	0,21	0,13	0,23	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,034	12	15	0,48	0,3	0,43	-0,023
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,53	-0,031	12	19	0,08	0,04	0,27	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,53	-0,031	12	19	0,08	0,04	0,27	-0,022
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,031	12	19	0,08	0,04	0,27	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,38	-0,031	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,38	-0,031	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,38	-0,031	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,38	-0,031	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,38	-0,031	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,38	-0,032	12	20	0,04	0,02	0,15	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,032	12	19	0,08	0,04	0,09	-0,022
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,032	12	16	0,33	0,21	0,27	-0,022
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,032	12	16	0,33	0,21	0,27	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,38	-0,032	12	18	0,13	0,08	0,12	-0,022
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,38	-0,032	12	17	0,21	0,13	0,23	-0,022
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,38	-0,032	12	17	0,21	0,13	0,23	-0,022
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,64	-0,032	12	17	0,21	0,13	0,39	-0,022
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,38	-0,032	12	16	0,33	0,21	0,43	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,38	-0,032	12	16	0,33	0,21	0,43	-0,022
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,74	-0,032	12	21	0,02	0,01	0,19	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,033	12	21	0,02	0,01	0,19	-0,022
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,033	12	21	0,02	0,01	0,19	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,53	-0,032	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,53	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,38	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,38	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,38	-0,033	12	20	0,04	0,02	0,15	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,033	12	20	0,04	0,02	0,12	-0,022
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,033	12	19	0,08	0,04	0,16	-0,022
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,033	12	19	0,08	0,04	0,16	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,033	12	18	0,13	0,08	0,12	-0,022
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,033	12	18	0,13	0,08	0,12	-0,022
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,033	12	18	0,13	0,08	0,12	-0,022
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,64	-0,033	12	19	0,08	0,04	0,19	-0,022
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,64	-0,034	12	17	0,21	0,13	0,23	-0,022
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,034	12	18	0,13	0,08	0,36	-0,022

Table 64. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2007 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,74	-0,037	12	23	0,01	0,02	0,7	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,038	12	24	0,003	0,01	0,42	-0,025
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,039	12	22	0,01	0,03	0,76	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,53	-0,037	12	24	0,003	0,01	0,44	-0,026
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,039	12	25	0,001	0,003	0,38	-0,026
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,039	12	24	0,003	0,01	0,44	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,53	-0,037	12	23	0,01	0,02	0,34	-0,026
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,039	12	26	0	0	0,32	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,039	12	24	0,003	0,01	0,44	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,038	12	21	0,02	0,06	0,23	-0,026
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,039	12	21	0,02	0,06	0,23	-0,026
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,039	12	21	0,02	0,06	0,23	-0,026
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,13	-0,038	12	22	0,01	0,01	0,21	-0,026
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,04	12	22	0,01	0,01	0,21	-0,026
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,04	12	22	0,01	0,01	0,21	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,13	-0,038	12	22	0,01	0,01	0,21	-0,026
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,04	12	22	0,01	0,01	0,21	-0,026
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,04	12	22	0,01	0,01	0,21	-0,026
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,02	-0,037	12	22	0,01	0,03	0,76	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,02	-0,037	12	22	0,01	0,03	0,76	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,02	-0,037	12	22	0,01	0,03	0,76	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,53	-0,037	12	24	0,003	0,01	0,44	-0,026
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,53	-0,037	12	24	0,003	0,01	0,44	-0,026
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,73	-0,037	12	24	0,003	0,01	0,44	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,53	-0,037	12	23	0,01	0,02	0,34	-0,026
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,53	-0,037	12	24	0,003	0,01	0,44	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,18	-0,037	12	23	0,01	0,02	0,89	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,037	12	22	0,01	0,03	0,34	-0,026
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,037	12	21	0,02	0,06	0,23	-0,026
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,037	12	22	0,01	0,03	0,34	-0,026
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,13	-0,037	12	23	0,01	0,02	0,13	-0,026
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,13	-0,037	12	22	0,01	0,01	0,21	-0,026
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,13	-0,037	12	22	0,01	0,01	0,21	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,13	-0,037	12	23	0,01	0,02	0,34	-0,026
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,13	-0,037	12	21	0,02	0,01	0,55	-0,026
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,13	-0,037	12	21	0,02	0,01	0,55	-0,026
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,74	-0,039	12	23	0,01	0,02	0,7	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,039	12	24	0,003	0,01	0,42	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,039	12	24	0,003	0,01	0,42	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,74	-0,039	12	26	0	0	0,32	-0,026
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,039	12	25	0,001	0,003	0,38	-0,026
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,039	12	25	0,001	0,003	0,38	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,74	-0,039	12	26	0	0	0,32	-0,026
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,74	-0,039	12	25	0,001	0,003	0,38	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,039	12	26	0	0	0,32	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,039	12	22	0,01	0,03	0,34	-0,026
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,039	12	21	0,02	0,06	0,23	-0,026
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,039	12	21	0,02	0,06	0,23	-0,026
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,039	12	23	0,01	0,02	0,34	-0,026
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,13	-0,039	12	22	0,01	0,01	0,21	-0,026
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,13	-0,039	12	22	0,01	0,01	0,21	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,13	-0,038	12	23	0,01	0,02	0,34	-0,026
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,13	-0,039	12	22	0,01	0,01	0,21	-0,026
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,13	-0,039	12	22	0,01	0,01	0,21	-0,026

Table 65. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2007 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,68	-0,023	12	27	0	0	0,04	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,86	-0,024	12	29	0	0	0,02	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	22	0,01	0,01	0,69	-0,017
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,99	-0,023	12	29	0	0	0,07	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,28	-0,025	12	31	0	0	0,03	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,28	0,64	0,47	-0,026	12	26	0	0	0,34	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,28	0,64	0,86	-0,023	12	24	0	0	0,12	-0,016
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,86	-0,025	12	25	0	0	0,054	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,86	-0,026	12	23	0,01	0	0,11	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,33	-0,024	12	26	0	0	0,04	-0,016
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,86	-0,025	12	29	0	0	0,01	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	22	0,01	0,01	0,46	-0,017
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,28	-0,024	12	24	0	0	0,06	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,28	-0,025	12	26	0	0	0,01	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,026	12	24	0	0	0,06	-0,017
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,48	-0,024	12	24	0	0	0	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,99	-0,026	12	25	0	0	0	-0,017
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	21	0,02	0,01	0,1	-0,018
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,64	-0,026	12	22	0,01	0,01	0,28	-0,017
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,64	-0,026	12	20	0,04	0,02	0,36	-0,017
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,17	-0,026	12	22	0,01	0,01	0,28	-0,017
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,47	-0,026	12	21	0,02	0,01	0,21	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,47	-0,027	12	21	0,02	0,01	0,21	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,67	-0,027	12	22	0,01	0,01	0,27	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,64	-0,026	12	21	0,02	0,01	0,14	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,64	-0,027	12	21	0,02	0,01	0,14	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	21	0,02	0,01	0,14	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,64	-0,026	12	22	0,01	0,01	0,14	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,64	-0,026	12	23	0,01	0	0,14	-0,017
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,026	12	21	0,02	0,01	0,22	-0,017
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,64	-0,026	12	22	0,01	0,01	0,58	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,64	-0,027	12	22	0,01	0,01	0,17	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,47	-0,026	12	20	0,04	0,02	0,38	-0,017
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,32	-0,026	12	22	0,01	0,01	0,045	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,32	-0,026	12	23	0,01	0	0	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,32	-0,027	12	24	0	0	0	-0,018
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,64	-0,027	12	25	0	0	0,049	-0,017
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,64	-0,027	12	24	0	0	0,04	-0,017
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	22	0,01	0,01	0,69	-0,017
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,47	-0,027	12	22	0,01	0,01	0,27	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,47	-0,027	12	21	0,02	0,01	0,21	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,47	-0,027	12	22	0,01	0,01	0,27	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,64	-0,027	12	24	0	0	0,12	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,64	-0,027	12	24	0	0	0,12	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	23	0,01	0	0,11	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,64	-0,027	12	24	0	0	0,16	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,64	-0,027	12	24	0	0	0,16	-0,017
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	23	0,01	0	0,16	-0,017
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,64	-0,027	12	24	0	0	0,06	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,64	-0,027	12	23	0,01	0	0,03	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,64	-0,027	12	24	0	0	0,06	-0,017
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,64	-0,027	12	24	0	0	0	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,61	-0,027	12	23	0,01	0	0	-0,017
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,61	-0,027	12	23	0,01	0	0	-0,017

Table 66. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2007 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,77	-0,024	12	30	0	0	0,02	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,9	-0,025	12	31	0	0	0,02	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,61	-0,028	12	23	0,01	0	0,06	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,84	-0,024	12	30	0	0	0,03	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,96	-0,026	12	31	0	0	0,01	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,47	-0,027	12	28	0	0	0,09	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,02	0,052	0,12	-0,024	12	27	0	0	0,03	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,99	-0,026	12	27	0	0	0,03	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,32	-0,027	12	27	0	0	0,03	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,9	-0,024	12	25	0	0	0,04	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,49	-0,025	12	28	0	0	0,01	-0,017
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,61	-0,028	12	21	0,02	0,01	0,4	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,96	-0,025	12	28	0	0	0,04	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,96	-0,026	12	29	0	0	0,01	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,96	-0,027	12	26	0	0	0,08	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,39	-0,025	12	27	0	0	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,99	-0,026	12	26	0	0	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,82	-0,028	12	24	0	0	0,01	-0,018
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,64	-0,027	12	22	0,01	0,01	0,12	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,64	-0,027	12	22	0,01	0,01	0,12	-0,018
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,61	-0,027	12	22	0,01	0,01	0,12	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,47	-0,027	12	25	0	0	0,09	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,47	-0,028	12	25	0	0	0,09	-0,018
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,47	-0,027	12	24	0	0	0,14	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,32	-0,027	12	26	0	0	0,01	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,82	-0,027	12	26	0	0	0,01	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,82	-0,027	12	27	0	0	0,03	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,49	-0,027	12	24	0	0	0,08	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,64	-0,027	12	23	0,01	0	0,31	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,61	-0,027	12	22	0,01	0,01	0,12	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,28	-0,028	12	25	0	0	0,09	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,28	-0,028	12	24	0	0	0,04	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,28	-0,028	12	24	0	0	0,04	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,37	-0,027	12	24	0	0	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,37	-0,028	12	23	0,01	0	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,37	-0,028	12	23	0,01	0	0,01	-0,018
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,61	-0,028	12	22	0,01	0,01	0,12	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,61	-0,028	12	22	0,01	0,01	0,12	-0,018
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,61	-0,028	12	23	0,01	0	0,06	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0	-0,028	12	26	0	0	0,14	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0	-0,028	12	26	0	0	0,14	-0,018
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0	-0,028	12	25	0	0	0,09	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,82	-0,028	12	27	0	0	0,03	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,82	-0,028	12	27	0	0	0,03	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,82	-0,028	12	27	0	0	0,03	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,61	-0,028	12	23	0,01	0	0,31	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,61	-0,028	12	24	0	0	0,07	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,61	-0,028	12	21	0,02	0,01	0,4	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,28	-0,028	12	26	0	0	0,08	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,28	-0,029	12	25	0	0	0,04	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,28	-0,028	12	26	0	0	0,08	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,82	-0,028	12	26	0	0	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,82	-0,029	12	25	0	0	0	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,82	-0,028	12	25	0	0	0	-0,018

Table 67. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2007 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,084	12	18	0,13	0,08	0,25	-0,059
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,01	-0,087	12	19	0,08	0,2	0,48	-0,058
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,089	12	18	0,13	0,08	0,25	-0,059
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,084	12	18	0,13	0,08	0,25	-0,059
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,01	-0,087	12	18	0,13	0,08	0,25	-0,058
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,089	12	18	0,13	0,08	0,25	-0,059
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,084	12	19	0,08	0,19	0,48	-0,059
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,087	12	19	0,08	0,19	0,48	-0,058
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,089	12	19	0,08	0,19	0,48	-0,059
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,081	12	17	0,22	0,13	0,2	-0,057
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,083	12	17	0,22	0,13	0,2	-0,057
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,086	12	17	0,22	0,13	0,2	-0,058
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,082	12	18	0,13	0,08	0,44	-0,058
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,084	12	18	0,13	0,08	0,44	-0,057
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,086	12	17	0,22	0,13	0,37	-0,058
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,081	12	16	0,33	0,21	0,23	-0,057
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,083	12	16	0,33	0,21	0,23	-0,057
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,085	12	16	0,33	0,21	0,23	-0,058
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,089	12	16	0,33	0,21	0,27	-0,061
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,089	12	16	0,33	0,21	0,27	-0,061
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,089	12	16	0,33	0,21	0,27	-0,061
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,088	12	17	0,22	0,13	0,2	-0,061
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,087	12	17	0,22	0,13	0,2	-0,061
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,088	12	17	0,22	0,13	0,2	-0,061
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,087	12	17	0,22	0,13	0,2	-0,061
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,087	12	17	0,22	0,13	0,2	-0,061
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,087	12	17	0,22	0,13	0,2	-0,061
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,084	12	19	0,08	0,04	0,13	-0,056
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,085	12	18	0,13	0,08	0,25	-0,057
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,085	12	17	0,22	0,13	0,2	-0,057
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,085	12	18	0,13	0,08	0,44	-0,057
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,085	12	18	0,13	0,08	0,44	-0,057
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,085	12	18	0,13	0,08	0,44	-0,057
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,084	12	16	0,33	0,21	0,23	-0,057
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,084	12	16	0,33	0,21	0,23	-0,057
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,084	12	16	0,33	0,21	0,23	-0,057
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,092	12	18	0,13	0,08	0,25	-0,06
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,092	12	18	0,13	0,08	0,25	-0,06
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,092	12	18	0,13	0,08	0,25	-0,06
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,092	12	18	0,13	0,08	0,25	-0,06
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,092	12	18	0,13	0,08	0,25	-0,06
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,092	12	18	0,13	0,08	0,25	-0,06
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,092	12	17	0,22	0,13	0,2	-0,06
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,092	12	17	0,22	0,13	0,2	-0,06
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,092	12	17	0,22	0,13	0,2	-0,06
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,086	12	17	0,22	0,13	0,2	-0,057
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,086	12	17	0,22	0,13	0,2	-0,057
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,087	12	17	0,22	0,13	0,2	-0,057
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,086	12	18	0,13	0,08	0,44	-0,057
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,086	12	18	0,13	0,08	0,44	-0,057
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,086	12	18	0,13	0,08	0,44	-0,057
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,74	-0,086	12	16	0,33	0,21	0,23	-0,057
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,74	-0,086	12	16	0,33	0,21	0,23	-0,057
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,74	-0,087	12	16	0,33	0,21	0,23	-0,057

Table 68. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2008 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,27	-0,093	12	17	0,21	0,13	0,3	-0,066
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,097	12	17	0,21	0,13	0,3	-0,065
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,52	-0,099	12	17	0,21	0,13	0,3	-0,066
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,27	-0,094	12	17	0,21	0,13	0,3	-0,066
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,097	12	18	0,13	0,08	0,35	-0,065
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,68	-0,099	12	17	0,21	0,13	0,3	-0,066
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,25	-0,094	12	16	0,33	0,21	0,15	-0,066
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,097	12	19	0,08	0,04	0,27	-0,065
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,68	-0,099	12	16	0,33	0,21	0,15	-0,066
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	1	-0,092	12	18	0,13	0,08	0,24	-0,065
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,53	-0,094	12	18	0,13	0,08	0,24	-0,064
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,56	-0,097	12	17	0,21	0,13	0,13	-0,066
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	1	-0,092	12	18	0,13	0,08	0,24	-0,065
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,96	-0,095	12	18	0,13	0,08	0,24	-0,064
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,56	-0,097	12	17	0,21	0,13	0,3	-0,066
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	1	-0,092	12	17	0,21	0,13	0,12	-0,065
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	1	-0,094	12	17	0,21	0,13	0,12	-0,064
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,53	-0,097	12	17	0,21	0,13	0,12	-0,066
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,27	-0,098	12	15	0,48	0,3	0,36	-0,068
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,098	12	16	0,33	0,21	0,58	-0,068
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,098	12	17	0,21	0,13	0,3	-0,068
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,27	-0,098	12	16	0,33	0,21	0,58	-0,067
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,52	-0,097	12	16	0,33	0,21	0,58	-0,067
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,097	12	16	0,33	0,21	0,58	-0,067
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,27	-0,097	12	16	0,33	0,21	0,15	-0,068
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,097	12	16	0,33	0,21	0,15	-0,068
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,097	12	15	0,48	0,3	0,1	-0,068
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	1	-0,093	12	17	0,21	0,13	0,13	-0,065
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	1	-0,094	12	17	0,21	0,13	0,13	-0,065
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,53	-0,094	12	17	0,21	0,13	0,13	-0,066
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,96	-0,094	12	18	0,13	0,08	0,24	-0,065
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,96	-0,094	12	18	0,13	0,08	0,24	-0,065
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,96	-0,094	12	18	0,13	0,08	0,24	-0,065
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	1	-0,094	12	17	0,21	0,13	0,12	-0,065
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	1	-0,094	12	17	0,21	0,13	0,12	-0,065
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	1	-0,094	12	17	0,21	0,13	0,12	-0,066
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,52	-0,102	12	17	0,21	0,13	0,3	-0,067
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,52	-0,102	12	17	0,21	0,13	0,3	-0,067
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,52	-0,102	12	17	0,21	0,13	0,3	-0,067
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,52	-0,102	12	17	0,21	0,13	0,3	-0,067
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,52	-0,102	12	17	0,21	0,13	0,3	-0,067
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,52	-0,102	12	17	0,21	0,13	0,3	-0,067
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,52	-0,103	12	16	0,33	0,21	0,15	-0,067
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,52	-0,102	12	16	0,33	0,21	0,15	-0,067
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,52	-0,103	12	16	0,33	0,21	0,15	-0,067
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,56	-0,099	12	18	0,13	0,08	0,24	-0,065
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,56	-0,099	12	18	0,13	0,08	0,24	-0,065
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,56	-0,099	12	18	0,13	0,08	0,24	-0,065
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,56	-0,099	12	18	0,13	0,08	0,24	-0,065
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,56	-0,099	12	18	0,13	0,08	0,24	-0,065
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,56	-0,099	12	18	0,13	0,08	0,24	-0,065
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,56	-0,098	12	17	0,21	0,13	0,12	-0,065
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,56	-0,099	12	17	0,21	0,13	0,12	-0,065
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,56	-0,099	12	17	0,21	0,13	0,12	-0,065

Table 69. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2008 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,051	12	18	0,13	0,31	0,59	-0,036
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,053	12	18	0,13	0,31	0,59	-0,036
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,14	0,5	-0,058	12	16	0,33	0,62	0,45	-0,038
	ARMA(1,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,28	-0,049	12	16	0,33	0,21	0,74	-0,035
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,051	12	16	0,33	0,21	0,74	-0,034
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,055	12	16	0,33	0,21	0,74	-0,036
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,02	0,052	0,76	-0,048	12	18	0,13	0,08	0,58	-0,034
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,051	12	19	0,08	0,04	0,26	-0,034
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,053	12	17	0,21	0,13	0,7	-0,035
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,5	-0,05	12	18	0,13	0,31	0,97	-0,035
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,5	-0,051	12	19	0,08	0,19	0,86	-0,035
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,057	12	16	0,33	0,62	0,45	-0,038
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,01	0,02	0,49	-0,048	12	18	0,13	0,08	0,37	-0,034
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,5	-0,05	12	18	0,13	0,08	0,37	-0,033
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,33	0,16	-0,053	12	17	0,21	0,13	0,7	-0,035
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0,76	-0,047	12	19	0,08	0,04	0,26	-0,033
	ARMA(1,1)-GJR(1,1) - student-t	2	7	0,02	0,052	0,76	-0,049	12	18	0,13	0,08	0,17	-0,032
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	7	0,02	0,052	0,76	-0,051	12	17	0,21	0,13	0,22	-0,034
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,055	12	15	0,48	0,78	0,25	-0,039
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,056	12	14	0,67	0,4	0,42	-0,039
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,056	12	15	0,48	0,78	0,25	-0,039
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,16	-0,055	12	16	0,33	0,21	0,74	-0,037
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,055	12	16	0,33	0,21	0,74	-0,037
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,16	-0,056	12	16	0,33	0,21	0,74	-0,037
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,053	12	16	0,33	0,21	0,79	-0,035
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,054	12	17	0,21	0,13	0,7	-0,035
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,054	12	16	0,33	0,21	0,79	-0,036
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,5	-0,052	12	15	0,48	0,3	0,68	-0,037
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,5	-0,052	12	15	0,48	0,3	0,68	-0,037
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,054	12	15	0,48	0,3	0,68	-0,038
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,16	-0,052	12	18	0,13	0,08	0,37	-0,035
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,16	-0,053	12	18	0,13	0,08	0,37	-0,035
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,16	-0,053	12	17	0,21	0,13	0,7	-0,035
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,26	-0,051	12	17	0,21	0,13	0,22	-0,034
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,26	-0,051	12	16	0,33	0,21	0,23	-0,034
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,26	-0,051	12	16	0,33	0,21	0,23	-0,034
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,058	12	16	0,33	0,62	0,45	-0,038
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,059	12	16	0,33	0,62	0,45	-0,038
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,059	12	16	0,33	0,62	0,45	-0,038
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,056	12	16	0,33	0,21	0,74	-0,036
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,16	-0,056	12	16	0,33	0,21	0,74	-0,037
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,16	-0,057	12	16	0,33	0,21	0,74	-0,037
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,054	12	17	0,21	0,13	0,7	-0,035
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,055	12	16	0,33	0,21	0,78	-0,035
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,055	12	16	0,33	0,21	0,78	-0,036
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,5	-0,055	12	16	0,33	0,62	0,45	-0,036
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,5	-0,056	12	15	0,48	0,29	0,68	-0,037
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,057	12	16	0,33	0,62	0,45	-0,037
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,16	-0,053	12	17	0,21	0,13	0,7	-0,035
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,16	-0,054	12	17	0,21	0,13	0,7	-0,035
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,16	-0,054	12	17	0,21	0,13	0,7	-0,035
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0,76	-0,051	12	18	0,13	0,08	0,17	-0,033
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,26	-0,052	12	18	0,13	0,08	0,17	-0,033
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,26	-0,052	12	18	0,13	0,08	0,17	-0,034

Table 70. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2008 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	8	0,01	0,02	0,3	-0,053	12	16	0,33	0,62	0,28	-0,037
	ARMA(0,0)-GARCH(1,1) - student-t	2	8	0,01	0,02	0,3	-0,055	12	17	0,21	0,46	0,51	-0,037
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,061	12	15	0,48	0,78	0,27	-0,04
	ARMA(1,0)-GARCH(1,1) - norm	2	9	0	0	0,53	-0,051	12	17	0,21	0,13	0,58	-0,036
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,054	12	17	0,21	0,13	0,58	-0,036
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,058	12	15	0,48	0,3	0,73	-0,038
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,02	0,052	0,76	-0,05	12	17	0,21	0,13	0,58	-0,035
	ARMA(1,1)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,76	-0,053	12	17	0,21	0,13	0,58	-0,035
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,056	12	16	0,33	0,21	0,97	-0,036
	ARMA(0,0)-GJR(1,1) - norm	2	8	0,01	0,02	0,3	-0,052	12	17	0,21	0,46	0,51	-0,036
	ARMA(0,0)-GJR(1,1) - student-t	2	8	0,01	0,02	0,3	-0,053	12	17	0,21	0,46	0,51	-0,036
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,06	12	15	0,48	0,78	0,27	-0,039
	ARMA(1,0)-GJR(1,1) - norm	2	9	0	0	0,53	-0,05	12	17	0,21	0,13	0,58	-0,035
	ARMA(1,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0,76	-0,052	12	17	0,21	0,13	0,58	-0,035
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,056	12	16	0,33	0,21	0,7	-0,037
	ARMA(1,1)-GJR(1,1) - norm	2	8	0,01	0,02	0,49	-0,049	12	19	0,08	0,04	0,18	-0,034
	ARMA(1,1)-GJR(1,1) - student-t	2	8	0,01	0,02	0,49	-0,051	12	19	0,08	0,04	0,18	-0,034
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	7	0,02	0,052	0,76	-0,054	12	19	0,08	0,04	0,18	-0,035
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,49	-0,058	12	15	0,48	0,78	0,27	-0,04
	ARMA(0,0)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,49	-0,059	12	15	0,48	0,78	0,27	-0,04
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	7	0,02	0,052	0,49	-0,059	12	15	0,48	0,78	0,27	-0,04
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,058	12	16	0,33	0,21	0,7	-0,038
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,058	12	16	0,33	0,21	0,7	-0,038
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,058	12	16	0,33	0,21	0,7	-0,038
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,056	12	16	0,33	0,21	0,97	-0,037
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,056	12	16	0,33	0,21	0,97	-0,037
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,056	12	15	0,48	0,29	0,89	-0,037
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,49	-0,055	12	15	0,48	0,78	0,27	-0,038
	ARMA(0,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0,49	-0,056	12	15	0,48	0,78	0,27	-0,038
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	7	0,02	0,052	0,49	-0,058	12	15	0,48	0,78	0,27	-0,039
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,16	-0,055	12	17	0,21	0,13	0,58	-0,036
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,16	-0,055	12	17	0,21	0,13	0,58	-0,036
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,16	-0,056	12	16	0,33	0,21	0,7	-0,037
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0,76	-0,053	12	19	0,08	0,04	0,18	-0,035
	ARMA(1,1)-GJR(1,1) - student-t	2	7	0,02	0,052	0,76	-0,053	12	19	0,08	0,04	0,18	-0,035
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	7	0,02	0,052	0,76	-0,053	12	19	0,08	0,04	0,18	-0,035
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,06	12	16	0,33	0,62	0,28	-0,039
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,06	12	15	0,48	0,78	0,27	-0,04
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,061	12	15	0,48	0,78	0,27	-0,04
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,058	12	16	0,33	0,21	0,7	-0,037
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,059	12	16	0,33	0,21	0,7	-0,038
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,059	12	15	0,48	0,29	0,73	-0,038
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,057	12	17	0,21	0,13	0,58	-0,036
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,057	12	16	0,33	0,21	0,97	-0,037
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,058	12	16	0,33	0,21	0,97	-0,037
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,5	-0,057	12	17	0,21	0,46	0,51	-0,038
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,5	-0,058	12	16	0,33	0,62	0,49	-0,038
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,06	12	15	0,48	0,78	0,27	-0,039
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,5	-0,055	12	17	0,21	0,13	0,58	-0,036
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,16	-0,056	12	17	0,21	0,13	0,58	-0,036
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,057	12	17	0,21	0,13	0,58	-0,036
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0,76	-0,053	12	19	0,08	0,04	0,18	-0,034
	ARMA(1,1)-GJR(1,1) - student-t	2	7	0,02	0,052	0,76	-0,054	12	19	0,08	0,04	0,18	-0,035
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	7	0,02	0,052	0,76	-0,054	12	19	0,08	0,04	0,18	-0,035

Table 71. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2008 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,19	-0,043	12	16	0,33	0,62	0,48	-0,03
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,19	-0,044	12	17	0,21	0,46	0,62	-0,03
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,19	-0,046	12	16	0,33	0,62	0,48	-0,031
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,043	12	18	0,13	0,08	0,5	-0,03
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,043	12	18	0,13	0,08	0,5	-0,03
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,19	-0,045	12	17	0,21	0,13	0,49	-0,031
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,043	12	17	0,21	0,13	0,49	-0,03
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,043	12	17	0,21	0,13	0,49	-0,03
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,19	-0,045	12	16	0,33	0,21	0,54	-0,031
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,48	-0,042	12	18	0,13	0,31	0,66	-0,029
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,3	-0,042	12	18	0,13	0,31	0,66	-0,029
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,044	12	18	0,13	0,31	0,66	-0,03
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,049	-0,041	12	19	0,08	0,04	0,48	-0,029
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,049	-0,042	12	19	0,08	0,04	0,48	-0,029
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,043	12	18	0,13	0,08	0,5	-0,029
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,28	-0,041	12	18	0,13	0,08	0,5	-0,029
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,041	12	19	0,08	0,04	0,69	-0,029
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,28	-0,043	12	19	0,08	0,04	0,38	-0,029
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,19	-0,044	12	16	0,33	0,62	0,48	-0,031
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,19	-0,044	12	16	0,33	0,62	0,48	-0,031
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,19	-0,044	12	15	0,48	0,78	0,57	-0,031
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,044	12	17	0,21	0,13	0,49	-0,031
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,044	12	17	0,21	0,13	0,49	-0,031
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,044	12	16	0,33	0,21	0,54	-0,031
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,044	12	17	0,21	0,13	0,49	-0,031
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,044	12	17	0,21	0,13	0,49	-0,031
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,044	12	16	0,33	0,21	0,54	-0,031
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,15	-0,041	12	19	0,08	0,19	0,77	-0,03
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,049	-0,041	12	18	0,13	0,31	0,66	-0,03
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,041	12	18	0,13	0,31	0,66	-0,03
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,049	-0,041	12	19	0,08	0,04	0,48	-0,029
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,049	-0,041	12	19	0,08	0,04	0,48	-0,029
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,041	12	19	0,08	0,04	0,48	-0,029
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,28	-0,04	12	18	0,13	0,08	0,5	-0,029
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,041	12	20	0,04	0,02	0,65	-0,029
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,28	-0,041	12	19	0,08	0,04	0,38	-0,029
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,19	-0,046	12	16	0,33	0,62	0,48	-0,031
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,19	-0,046	12	16	0,33	0,62	0,48	-0,031
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,19	-0,046	12	16	0,33	0,62	0,48	-0,031
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,19	-0,045	12	18	0,13	0,08	0,5	-0,03
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,19	-0,045	12	18	0,13	0,08	0,5	-0,03
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,19	-0,046	12	18	0,13	0,08	0,5	-0,03
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,19	-0,045	12	17	0,21	0,13	0,49	-0,03
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,19	-0,045	12	17	0,21	0,13	0,49	-0,03
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,19	-0,046	12	16	0,33	0,21	0,54	-0,03
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,049	-0,043	12	19	0,08	0,19	0,77	-0,029
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,049	-0,043	12	19	0,08	0,19	0,77	-0,029
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,044	12	19	0,08	0,19	0,77	-0,029
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,049	-0,042	12	19	0,08	0,04	0,48	-0,028
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,049	-0,043	12	19	0,08	0,04	0,48	-0,029
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,043	12	19	0,08	0,04	0,48	-0,029
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,28	-0,042	12	19	0,08	0,04	0,48	-0,028
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,042	12	20	0,04	0,02	0,65	-0,028
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,28	-0,043	12	19	0,08	0,04	0,38	-0,029

Table 72. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2009 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,3	-0,046	12	19	0,08	0,19	0,73	-0,032
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,048	12	20	0,04	0,13	1	-0,032
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,05	12	19	0,08	0,19	0,73	-0,033
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,046	12	20	0,04	0,11	0,95	-0,032
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,047	12	20	0,04	0,11	0,95	-0,032
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,049	12	20	0,04	0,11	0,95	-0,033
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,046	12	20	0,04	0,11	0,95	-0,032
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,28	-0,047	12	20	0,04	0,11	0,95	-0,031
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,048	12	20	0,04	0,11	0,95	-0,032
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,28	-0,045	12	20	0,04	0,11	0,95	-0,032
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,046	12	20	0,04	0,11	0,95	-0,031
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,28	-0,048	12	20	0,04	0,11	0,95	-0,032
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,28	-0,044	12	20	0,04	0,11	0,95	-0,031
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,045	12	20	0,04	0,11	0,95	-0,031
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,28	-0,047	12	20	0,04	0,11	0,95	-0,032
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0,08	-0,044	12	20	0,04	0,11	0,95	-0,031
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,28	-0,045	12	20	0,04	0,11	0,95	-0,031
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,48	-0,047	12	20	0,04	0,11	0,95	-0,032
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,049	12	18	0,13	0,31	0,71	-0,033
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,049	12	19	0,08	0,19	0,73	-0,034
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,049	12	18	0,13	0,31	0,71	-0,034
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,048	12	20	0,04	0,11	0,95	-0,033
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,049	12	20	0,04	0,11	0,95	-0,033
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,3	-0,049	12	20	0,04	0,11	0,95	-0,033
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,048	12	19	0,08	0,19	0,73	-0,033
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,048	12	20	0,04	0,11	0,95	-0,033
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,3	-0,048	12	20	0,04	0,11	0,95	-0,032
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,28	-0,045	12	20	0,04	0,11	0,95	-0,032
	ARMA(0,0)-GJR(1,1) - student-t	2	8	0,01	0,02	0,15	-0,045	12	20	0,04	0,11	0,95	-0,032
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	7	0,02	0,052	0,08	-0,045	12	20	0,04	0,11	0,95	-0,032
	ARMA(1,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,14	-0,045	12	20	0,04	0,11	0,95	-0,031
	ARMA(1,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0,14	-0,045	12	20	0,04	0,11	0,95	-0,031
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	7	0,02	0,052	0,14	-0,045	12	20	0,04	0,11	0,95	-0,031
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0,08	-0,045	12	20	0,04	0,11	0,95	-0,031
	ARMA(1,1)-GJR(1,1) - student-t	2	7	0,02	0,052	0,14	-0,046	12	20	0,04	0,11	0,95	-0,031
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	7	0,02	0,052	0,31	-0,046	12	20	0,04	0,11	0,95	-0,031
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,05	12	19	0,08	0,19	0,73	-0,033
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,051	12	19	0,08	0,19	0,73	-0,033
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,051	12	19	0,08	0,19	0,73	-0,033
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,05	12	20	0,04	0,11	0,95	-0,032
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,05	12	20	0,04	0,11	0,95	-0,033
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,049	-0,05	12	20	0,04	0,11	0,95	-0,033
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,049	12	19	0,08	0,19	0,73	-0,032
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,049	-0,049	12	20	0,04	0,11	0,95	-0,032
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,3	-0,049	12	20	0,04	0,11	0,95	-0,032
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,48	-0,048	12	20	0,04	0,11	0,95	-0,031
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,48	-0,048	12	20	0,04	0,11	0,95	-0,031
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,48	-0,048	12	20	0,04	0,11	0,95	-0,031
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,48	-0,047	12	20	0,04	0,11	0,95	-0,031
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,48	-0,047	12	20	0,04	0,11	0,95	-0,031
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,48	-0,047	12	20	0,04	0,11	0,95	-0,031
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,48	-0,047	12	20	0,04	0,11	0,95	-0,03
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,48	-0,047	12	20	0,04	0,11	0,95	-0,031
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,48	-0,047	12	20	0,04	0,11	0,95	-0,031

Table 73. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2009 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,029	12	17	0,21	0,34	0,4	-0,02
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,03	12	17	0,21	0,34	0,4	-0,02
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,033	12	14	0,67	0,4	0,33	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,028	12	14	0,67	0,4	0,047	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,029	12	14	0,67	0,4	0,047	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,031	12	13	0,89	0,48	0,12	-0,02
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,027	12	16	0,33	0,21	0,1	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,028	12	16	0,33	0,21	0,1	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,03	12	15	0,48	0,3	0,14	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,028	12	15	0,48	0,3	0,16	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0	-0,029	12	15	0,48	0,3	0,16	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,033	12	14	0,67	0,4	0,33	-0,021
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,027	12	16	0,33	0,21	0,06	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0	-0,028	12	16	0,33	0,21	0,06	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,03	12	14	0,67	0,4	0,14	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,027	12	17	0,21	0,13	0,06	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0	-0,028	12	17	0,21	0,13	0,06	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0	-0,03	12	16	0,33	0,21	0,09	-0,019
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,031	12	14	0,67	0,4	0,33	-0,021
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,031	12	14	0,67	0,4	0,33	-0,021
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,032	12	14	0,67	0,4	0,33	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,03	12	13	0,89	0,48	0,12	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,03	12	13	0,89	0,48	0,12	-0,02
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,03	12	13	0,89	0,48	0,12	-0,02
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,03	12	15	0,48	0,3	0,14	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,03	12	15	0,48	0,3	0,14	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,03	12	15	0,48	0,3	0,14	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,03	12	15	0,48	0,3	0,16	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0	-0,031	12	14	0,67	0,4	0,047	-0,021
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,031	12	14	0,67	0,4	0,33	-0,021
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,029	12	15	0,48	0,3	0,14	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,02	-0,029	12	15	0,48	0,3	0,14	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,029	12	14	0,67	0,4	0,14	-0,019
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,14	-0,029	12	16	0,33	0,21	0,09	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0	-0,03	12	16	0,33	0,21	0,09	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0	-0,03	12	16	0,33	0,21	0,09	-0,019
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,033	12	15	0,48	0,3	0,16	-0,021
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,033	12	14	0,67	0,4	0,33	-0,021
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,033	12	14	0,67	0,4	0,33	-0,021
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,031	12	13	0,89	0,48	0,12	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,031	12	13	0,89	0,48	0,12	-0,02
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,032	12	13	0,89	0,48	0,12	-0,02
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,03	12	15	0,48	0,3	0,14	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,031	12	15	0,48	0,3	0,14	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,031	12	15	0,48	0,3	0,14	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,031	12	15	0,48	0,3	0,16	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0	-0,032	12	15	0,48	0,3	0,16	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,032	12	15	0,48	0,3	0,16	-0,021
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,03	12	16	0,33	0,21	0,06	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0	-0,03	12	15	0,48	0,3	0,14	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,03	12	14	0,67	0,4	0,14	-0,019
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0	-0,029	12	17	0,21	0,13	0,06	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0	-0,03	12	16	0,33	0,21	0,09	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0	-0,03	12	16	0,33	0,21	0,09	-0,019

Table 74. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2009 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0	-0,03	12	16	0,33	0,62	0,55	-0,021
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0	-0,03	12	16	0,33	0,62	0,55	-0,02
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,049	-0,034	12	14	0,67	0,4	0,33	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0	-0,028	12	15	0,48	0,3	0,2	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0	-0,029	12	16	0,33	0,21	0,21	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,049	-0,032	12	13	0,89	0,48	0,12	-0,021
	ARMA(1,1)-GARCH(1,1) - norm	2	8	0,01	0,02	0,02	-0,028	12	16	0,33	0,21	0,1	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	7	0,02	0,052	0	-0,029	12	16	0,33	0,21	0,1	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,031	12	15	0,48	0,3	0,14	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0	-0,029	12	14	0,67	0,4	0,33	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0	-0,03	12	15	0,48	0,3	0,26	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,033	12	13	0,89	0,48	0,12	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,01	0,02	0,02	-0,028	12	17	0,21	0,13	0,41	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0	-0,029	12	18	0,13	0,08	0,35	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,031	12	16	0,33	0,21	0,53	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	10	0	0	0	-0,027	12	17	0,22	0,13	0,24	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	9	0	0	0,02	-0,028	12	17	0,22	0,13	0,24	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,42	-0,03	12	15	0,48	0,3	0,14	-0,019
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0	-0,032	12	13	0,89	0,48	0,12	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0	-0,032	12	13	0,89	0,48	0,12	-0,022
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0	-0,032	12	13	0,89	0,48	0,12	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0	-0,03	12	14	0,67	0,4	0,25	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,03	12	14	0,67	0,4	0,25	-0,02
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,03	12	14	0,67	0,4	0,25	-0,021
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,03	12	15	0,48	0,3	0,14	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,15	0	-0,03	12	15	0,48	0,3	0,14	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0	-0,03	12	14	0,67	0,4	0,14	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0	-0,03	12	13	0,89	0,48	0,12	-0,021
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0	-0,03	12	14	0,67	0,4	0,1	-0,021
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0	-0,03	12	13	0,89	0,48	0,12	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,029	12	16	0,33	0,21	0,53	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0	-0,03	12	16	0,33	0,21	0,53	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0	-0,03	12	16	0,33	0,21	0,53	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,42	-0,03	12	15	0,48	0,3	0,14	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,42	-0,03	12	15	0,48	0,3	0,14	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,42	-0,03	12	15	0,48	0,3	0,14	-0,019
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,049	-0,034	12	14	0,67	0,4	0,33	-0,021
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,049	-0,034	12	14	0,67	0,4	0,33	-0,022
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,049	-0,034	12	14	0,67	0,4	0,33	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,049	-0,032	12	14	0,67	0,4	0,25	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,049	-0,032	12	14	0,67	0,4	0,25	-0,02
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,049	-0,032	12	14	0,67	0,4	0,25	-0,02
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0	-0,031	12	15	0,48	0,3	0,14	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0	-0,032	12	15	0,48	0,3	0,14	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,032	12	15	0,48	0,3	0,14	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,032	12	14	0,67	0,4	0,33	-0,021
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0	-0,032	12	15	0,48	0,3	0,26	-0,021
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,033	12	14	0,67	0,4	0,33	-0,021
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0	-0,03	12	16	0,33	0,21	0,53	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0	-0,031	12	16	0,33	0,21	0,53	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0	-0,031	12	16	0,33	0,21	0,53	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,42	-0,03	12	16	0,33	0,21	0,1	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,42	-0,031	12	15	0,48	0,3	0,14	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,42	-0,031	12	15	0,48	0,3	0,14	-0,019

Table 75. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2009 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,87	-0,034	12	11	0,66	0,71	0,58	-0,024
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,7	-0,036	12	11	0,66	0,71	0,58	-0,023
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,7	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,99	-0,034	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,8	-0,036	12	11	0,66	0,71	0,58	-0,023
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,7	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,87	-0,034	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,7	-0,036	12	11	0,66	0,71	0,58	-0,023
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,33	-0,032	12	12	0,88	0,86	0,36	-0,023
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,034	12	12	0,88	0,86	0,36	-0,022
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,22	-0,032	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,034	12	12	0,88	0,86	0,36	-0,022
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,33	-0,032	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,034	12	12	0,88	0,86	0,36	-0,022
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,7	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,037	12	11	0,66	0,71	0,58	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,035	12	12	0,88	0,86	0,36	-0,023
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,024
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,024
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,1)-GARCH(1,1) - norm	2	0	-	-	-	-0,038	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,024
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	0	-	-	-	-0,039	12	11	0,66	0,71	0,58	-0,024
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,023

Table 76. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2010 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,049	-0,035	12	12	0,88	0,86	0,36	-0,024
	ARMA(0,0)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,049	-0,035	12	12	0,88	0,86	0,36	-0,024
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,23	-0,038	12	11	0,66	0,72	0,58	-0,025
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,36	-0,035	12	11	0,66	0,72	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,19	-0,035	12	11	0,66	0,72	0,58	-0,024
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,19	-0,037	12	11	0,66	0,72	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,36	-0,035	12	11	0,66	0,72	0,58	-0,024
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,19	-0,035	12	11	0,66	0,72	0,58	-0,024
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,99	-0,037	12	11	0,66	0,72	0,58	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,13	-0,034	12	12	0,88	0,86	0,36	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,13	-0,034	12	12	0,88	0,86	0,36	-0,024
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,78	-0,037	12	12	0,88	0,86	0,36	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,049	-0,034	12	12	0,88	0,86	0,36	-0,023
	ARMA(1,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0,049	-0,034	12	13	0,89	0,92	0,21	-0,023
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,78	-0,036	12	12	0,88	0,86	0,36	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0,049	-0,034	12	13	0,89	0,92	0,21	-0,023
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,36	-0,034	12	13	0,89	0,92	0,21	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,78	-0,036	12	12	0,88	0,86	0,36	-0,025
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,038	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,78	-0,036	12	12	0,88	0,86	0,36	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,78	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,22	-0,036	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,78	-0,036	12	13	0,89	0,92	0,21	-0,024
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,036	12	13	0,89	0,92	0,21	-0,024
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,78	-0,036	12	12	0,88	0,86	0,36	-0,024
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,039	12	11	0,66	0,71	0,58	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,78	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,78	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,78	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,53	-0,036	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,53	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,53	-0,037	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,78	-0,036	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,78	-0,036	12	12	0,88	0,86	0,36	-0,024
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,78	-0,037	12	12	0,88	0,86	0,36	-0,024

Table 77. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2010 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,021	12	19	0,08	0,1	0,53	-0,015
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,021	12	19	0,08	0,1	0,53	-0,015
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	16	0,33	0,62	0,85	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,52	-0,021	12	17	0,21	0,34	0,56	-0,014
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,021	12	17	0,21	0,34	0,56	-0,014
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,023	12	15	0,48	0,78	0,57	-0,015
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,83	-0,021	12	16	0,33	0,62	0,32	-0,014
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,021	12	16	0,33	0,62	0,32	-0,014
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,023	12	13	0,89	0,48	0,26	-0,015
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,021	12	17	0,21	0,13	0,71	-0,015
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,021	12	18	0,13	0,12	0,6	-0,015
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,59	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,83	-0,021	12	17	0,21	0,46	0,1	-0,015
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,021	12	17	0,21	0,46	0,1	-0,015
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,023	12	13	0,89	0,92	0,47	-0,015
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,83	-0,021	12	15	0,48	0,78	0,08	-0,015
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,83	-0,021	12	16	0,33	0,62	0,04	-0,015
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,023	12	12	0,88	0,54	0,04	-0,016
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	17	0,21	0,34	0,86	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	16	0,33	0,62	0,85	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	17	0,21	0,46	0,97	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,78	0,57	-0,015
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,78	0,57	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,78	0,57	-0,015
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,26	-0,015
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	13	0,89	0,92	0,47	-0,015
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,78	0,57	-0,015
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,56	-0,016
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,56	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,44	0,92	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,26	-0,015
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	12	0,88	0,86	0,36	-0,015
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,78	0,57	-0,015
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,26	-0,015
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	13	0,89	0,92	0,19	-0,015
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,26	-0,015
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	16	0,33	0,62	0,85	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,78	0,67	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	16	0,33	0,62	0,85	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,78	0,57	-0,015
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,78	0,57	-0,015
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,78	0,57	-0,015
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,56	-0,015
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	12	0,88	0,54	0,18	-0,015
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	13	0,89	0,48	0,26	-0,015
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,44	0,93	-0,015
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,44	0,93	-0,015
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,78	0,7	-0,015
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,26	-0,015
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	13	0,89	0,92	0,47	-0,015
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,56	-0,015
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,78	0,08	-0,015
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,024	12	14	0,67	0,89	0,051	-0,015
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	15	0,48	0,78	0,08	-0,015

Table 78. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2010 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,055	-0,022	12	19	0,08	0,19	0,26	-0,015
	ARMA(0,0)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,055	-0,022	12	19	0,08	0,19	0,26	-0,015
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,024	12	15	0,48	0,3	0,09	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,022	12	17	0,22	0,46	0,07	-0,015
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,022	12	18	0,13	0,31	0,11	-0,015
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,024	12	16	0,33	0,21	0,02	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,5	-0,022	12	15	0,48	0,3	0,02	-0,015
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,5	-0,022	12	16	0,33	0,21	0,04	-0,015
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,83	-0,024	12	15	0,48	0,3	0,02	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,055	-0,022	12	17	0,22	0,46	0,14	-0,015
	ARMA(0,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0,055	-0,022	12	17	0,22	0,46	0,14	-0,015
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,024	12	16	0,33	0,21	0,04	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,5	-0,022	12	16	0,33	0,62	0,07	-0,015
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,5	-0,022	12	16	0,33	0,62	0,07	-0,015
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,83	-0,024	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0,78	-0,022	12	15	0,48	0,3	0,02	-0,015
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,5	-0,022	12	15	0,48	0,3	0,02	-0,015
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,83	-0,024	12	14	0,67	0,4	0,01	-0,016
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,025	12	16	0,33	0,21	0,1	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,44	-0,025	12	15	0,48	0,3	0,09	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,025	12	16	0,33	0,21	0,1	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,83	-0,024	12	16	0,33	0,21	0,02	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,83	-0,024	12	16	0,33	0,21	0,02	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,024	12	16	0,33	0,21	0,02	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,83	-0,024	12	14	0,67	0,4	0,01	-0,016
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,83	-0,024	12	14	0,67	0,4	0,01	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,024	12	14	0,67	0,4	0,01	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,5	-0,024	12	16	0,33	0,21	0,04	-0,016
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,5	-0,025	12	16	0,33	0,21	0,04	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,83	-0,024	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,83	-0,024	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,83	-0,024	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,83	-0,024	12	14	0,67	0,4	0,01	-0,016
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,83	-0,024	12	14	0,67	0,4	0,01	-0,016
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,83	-0,024	12	14	0,67	0,4	0,01	-0,016
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,44	-0,025	12	16	0,33	0,21	0,04	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,94	-0,025	12	16	0,33	0,21	0,04	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,94	-0,025	12	15	0,48	0,3	0,09	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,99	-0,025	12	16	0,33	0,21	0,02	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,99	-0,025	12	16	0,33	0,21	0,02	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,83	-0,025	12	16	0,33	0,21	0,02	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,99	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,99	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,99	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,44	-0,025	12	16	0,33	0,21	0,04	-0,016
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,44	-0,025	12	16	0,33	0,21	0,04	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,44	-0,025	12	16	0,33	0,21	0,04	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,83	-0,024	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,83	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,83	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,99	-0,025	12	15	0,48	0,3	0,02	-0,016
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,99	-0,025	12	14	0,67	0,4	0,01	-0,016
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,99	-0,025	12	15	0,48	0,3	0,02	-0,016

Table 79. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2010 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,31	-0,035	12	16	0,33	0,62	0,74	-0,024
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,45	-0,036	12	15	0,48	0,3	0,97	-0,024
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,65	-0,037	12	14	0,67	0,4	0,55	-0,025
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,31	-0,035	12	16	0,33	0,62	0,74	-0,024
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,45	-0,036	12	15	0,48	0,3	0,97	-0,024
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,65	-0,037	12	14	0,67	0,4	0,55	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,45	-0,035	12	16	0,33	0,62	0,74	-0,024
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,45	-0,036	12	15	0,48	0,78	0,34	-0,024
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,45	-0,037	12	13	0,89	0,48	0,44	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,23	-0,034	12	17	0,21	0,13	0,57	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,23	-0,035	12	17	0,21	0,13	0,57	-0,024
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,23	-0,036	12	15	0,48	0,3	0,98	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,23	-0,034	12	17	0,21	0,13	0,57	-0,024
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,23	-0,035	12	17	0,21	0,13	0,57	-0,024
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,23	-0,036	12	15	0,48	0,3	0,98	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,23	-0,034	12	17	0,21	0,13	0,57	-0,024
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,23	-0,035	12	17	0,21	0,13	0,57	-0,024
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,23	-0,036	12	15	0,48	0,3	0,98	-0,025
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,45	-0,036	12	14	0,67	0,4	0,55	-0,025
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,45	-0,037	12	13	0,89	0,48	0,44	-0,025
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,45	-0,037	12	14	0,67	0,4	0,55	-0,025
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,45	-0,036	12	14	0,67	0,4	0,55	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,57	-0,036	12	13	0,89	0,48	0,44	-0,025
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,45	-0,036	12	13	0,89	0,48	0,44	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,45	-0,037	12	13	0,89	0,48	0,57	-0,026
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,65	-0,037	12	13	0,89	0,48	0,57	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,45	-0,037	12	12	0,88	0,54	0,47	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,23	-0,035	12	16	0,33	0,21	0,86	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,23	-0,036	12	15	0,48	0,3	0,63	-0,025
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,23	-0,036	12	13	0,89	0,48	0,22	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,23	-0,035	12	16	0,33	0,21	0,86	-0,024
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,23	-0,036	12	14	0,67	0,4	0,28	-0,025
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,23	-0,036	12	13	0,89	0,48	0,22	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,23	-0,035	12	13	0,89	0,48	0,22	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,23	-0,036	12	13	0,89	0,48	0,22	-0,025
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,23	-0,036	12	14	0,67	0,4	0,51	-0,025
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,45	-0,038	12	14	0,67	0,4	0,55	-0,025
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,45	-0,038	12	13	0,89	0,48	0,44	-0,025
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,038	12	13	0,89	0,48	0,44	-0,025
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,45	-0,038	12	14	0,67	0,4	0,55	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,45	-0,038	12	13	0,89	0,48	0,44	-0,025
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,038	12	13	0,89	0,48	0,44	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,45	-0,038	12	13	0,89	0,48	0,44	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,45	-0,038	12	13	0,89	0,48	0,44	-0,025
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,038	12	12	0,88	0,54	0,47	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,45	-0,037	12	17	0,21	0,13	0,57	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,45	-0,037	12	15	0,48	0,3	0,98	-0,024
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,037	12	15	0,48	0,3	0,98	-0,024
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,45	-0,037	12	17	0,21	0,13	0,57	-0,024
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,45	-0,037	12	15	0,48	0,3	0,98	-0,024
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,037	12	15	0,48	0,3	0,98	-0,024
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,45	-0,037	12	15	0,48	0,3	0,98	-0,024
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,45	-0,037	12	15	0,48	0,3	0,98	-0,024
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,45	-0,037	12	15	0,48	0,3	0,98	-0,024

Table 80. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2011 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	8	0,01	0,02	0,33	-0,038	12	18	0,13	0,31	0,77	-0,027
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,39	-0,039	12	18	0,13	0,31	0,77	-0,027
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,39	-0,042	12	17	0,21	0,46	0,73	-0,028
	ARMA(1,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,14	-0,038	12	18	0,13	0,31	0,77	-0,027
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,39	-0,039	12	18	0,13	0,31	0,77	-0,027
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,39	-0,042	12	17	0,21	0,46	0,73	-0,028
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,02	0,052	0,14	-0,038	12	18	0,13	0,31	0,77	-0,027
	ARMA(1,1)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,39	-0,039	12	18	0,13	0,31	0,77	-0,027
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,39	-0,042	12	17	0,21	0,46	0,73	-0,028
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,71	-0,038	12	20	0,04	0,11	0,78	-0,027
	ARMA(0,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0,71	-0,039	12	20	0,04	0,11	0,78	-0,027
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,042	12	17	0,21	0,46	0,52	-0,028
	ARMA(1,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,71	-0,038	12	20	0,04	0,11	0,78	-0,027
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,39	-0,039	12	20	0,04	0,11	0,78	-0,027
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,042	12	17	0,21	0,46	0,52	-0,028
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,39	-0,038	12	20	0,04	0,11	0,78	-0,027
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,39	-0,039	12	20	0,04	0,11	0,78	-0,027
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,042	12	17	0,21	0,46	0,52	-0,028
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,17	-0,043	12	16	0,33	0,62	0,92	-0,029
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,17	-0,043	12	16	0,33	0,62	0,92	-0,029
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,39	-0,043	12	16	0,33	0,62	0,92	-0,029
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,39	-0,043	12	17	0,21	0,46	0,73	-0,029
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,17	-0,043	12	16	0,33	0,62	0,92	-0,029
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,39	-0,043	12	17	0,21	0,46	0,73	-0,029
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,39	-0,043	12	17	0,21	0,46	0,73	-0,029
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,17	-0,043	12	17	0,21	0,46	0,73	-0,029
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,044	12	16	0,33	0,62	0,92	-0,029
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,17	-0,043	12	17	0,21	0,46	0,52	-0,028
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,17	-0,043	12	16	0,33	0,62	0,68	-0,028
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,043	12	16	0,33	0,62	0,68	-0,028
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,17	-0,043	12	17	0,21	0,46	0,52	-0,028
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,17	-0,043	12	17	0,21	0,46	0,52	-0,028
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,043	12	17	0,21	0,46	0,52	-0,028
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,17	-0,043	12	17	0,21	0,46	0,52	-0,028
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,17	-0,043	12	17	0,21	0,46	0,52	-0,028
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,043	12	17	0,21	0,46	0,52	-0,028
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,56	-0,043	12	17	0,21	0,46	0,73	-0,028
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,56	-0,044	12	17	0,21	0,46	0,73	-0,028
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,56	-0,044	12	17	0,21	0,46	0,73	-0,029
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,56	-0,044	12	17	0,21	0,46	0,73	-0,028
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,56	-0,044	12	17	0,21	0,46	0,73	-0,028
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,56	-0,044	12	17	0,21	0,46	0,73	-0,029
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,56	-0,044	12	17	0,21	0,46	0,73	-0,028
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,56	-0,044	12	17	0,21	0,46	0,73	-0,028
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,56	-0,044	12	17	0,21	0,46	0,73	-0,029
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,17	-0,042	12	20	0,04	0,11	0,78	-0,028
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,17	-0,043	12	19	0,08	0,19	0,92	-0,028
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,043	12	19	0,08	0,19	0,92	-0,028
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,17	-0,042	12	19	0,08	0,19	0,86	-0,028
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,17	-0,043	12	18	0,13	0,31	0,65	-0,028
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,043	12	18	0,13	0,31	0,65	-0,028
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,17	-0,043	12	19	0,08	0,19	0,94	-0,028
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,17	-0,043	12	17	0,21	0,46	0,52	-0,028
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,17	-0,043	12	17	0,21	0,46	0,52	-0,028

Table 81. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2011 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	8	0,01	0,02	0,27	-0,027	12	20	0,04	0,12	0,76	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,12	-0,028	12	19	0,08	0,19	0,97	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,032	12	17	0,21	0,34	0,84	-0,021
	ARMA(1,0)-GARCH(1,1) - norm	2	8	0,01	0,02	0,27	-0,027	12	20	0,04	0,13	0,52	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,39	-0,029	12	19	0,08	0,19	0,82	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,031	12	17	0,21	0,34	0,84	-0,021
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,02	0,052	0,39	-0,027	12	20	0,04	0,13	0,27	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,029	12	20	0,04	0,13	0,27	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,031	12	17	0,21	0,34	0,94	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	8	0,01	0,02	0,27	-0,027	12	21	0,02	0,08	0,35	-0,019
	ARMA(0,0)-GJR(1,1) - student-t	2	8	0,01	0,02	0,27	-0,028	12	20	0,04	0,13	0,52	-0,019
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,031	12	17	0,21	0,34	0,84	-0,021
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,01	0,02	0,27	-0,027	12	19	0,08	0,19	0,39	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,48	-0,028	12	19	0,08	0,19	0,39	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,031	12	17	0,21	0,46	0,44	-0,021
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,48	-0,027	12	18	0,13	0,31	0,15	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,45	-0,028	12	18	0,13	0,31	0,15	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,031	12	17	0,21	0,46	0,18	-0,02
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,27	-0,032	12	17	0,22	0,34	0,84	-0,02
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,033	12	17	0,22	0,34	0,84	-0,021
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,033	12	18	0,13	0,27	0,74	-0,021
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,27	-0,032	12	17	0,22	0,34	0,84	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,032	12	17	0,22	0,34	0,84	-0,021
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,032	12	17	0,22	0,34	0,84	-0,021
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,27	-0,031	12	19	0,08	0,19	0,39	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,032	12	16	0,33	0,62	0,63	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,032	12	17	0,22	0,34	0,94	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,27	-0,032	12	17	0,22	0,34	0,84	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,27	-0,032	12	17	0,22	0,34	0,84	-0,021
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,032	12	17	0,22	0,34	0,84	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,48	-0,031	12	18	0,13	0,31	0,2	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,76	-0,032	12	17	0,22	0,46	0,44	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,032	12	18	0,13	0,27	0,71	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,76	-0,031	12	18	0,13	0,31	0,15	-0,02
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,76	-0,032	12	17	0,22	0,46	0,18	-0,02
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,032	12	17	0,22	0,46	0,18	-0,02
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,76	-0,032	12	18	0,13	0,27	0,74	-0,02
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,76	-0,033	12	17	0,22	0,34	0,84	-0,021
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,033	12	18	0,13	0,27	0,74	-0,02
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,27	-0,032	12	17	0,22	0,34	0,84	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,76	-0,033	12	17	0,22	0,34	0,84	-0,021
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,033	12	17	0,22	0,34	0,84	-0,02
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,76	-0,032	12	19	0,08	0,19	0,39	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,76	-0,032	12	16	0,33	0,62	0,63	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,032	12	17	0,22	0,34	0,94	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,76	-0,032	12	18	0,13	0,27	0,81	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,76	-0,032	12	17	0,22	0,34	0,84	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,032	12	17	0,22	0,34	0,84	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,76	-0,032	12	18	0,13	0,31	0,2	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,76	-0,032	12	17	0,22	0,46	0,44	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,032	12	17	0,22	0,46	0,44	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,76	-0,031	12	17	0,22	0,46	0,18	-0,02
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,76	-0,032	12	17	0,22	0,46	0,18	-0,02
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,032	12	17	0,22	0,46	0,18	-0,02

Table 82. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2011 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	8	0,01	0,02	0,27	-0,027	12	20	0,04	0,13	0,91	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	8	0,01	0,02	0,27	-0,029	12	22	0,01	0,04	0,68	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,48	-0,032	12	18	0,13	0,31	0,49	-0,021
	ARMA(1,0)-GARCH(1,1) - norm	2	8	0,01	0,02	0,14	-0,027	12	20	0,04	0,13	0,42	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,39	-0,029	12	20	0,04	0,13	0,42	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,09	-0,032	12	19	0,08	0,19	0,23	-0,021
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,02	0,052	0,39	-0,027	12	19	0,08	0,19	0,23	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,39	-0,029	12	20	0,04	0,11	0,16	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,031	12	19	0,08	0,19	0,23	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	8	0,01	0,02	0,27	-0,027	12	20	0,04	0,13	0,42	-0,019
	ARMA(0,0)-GJR(1,1) - student-t	2	8	0,01	0,02	0,27	-0,029	12	20	0,04	0,13	0,42	-0,019
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,48	-0,032	12	18	0,13	0,31	0,49	-0,021
	ARMA(1,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,39	-0,027	12	19	0,08	0,19	0,23	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,07	-0,029	12	19	0,08	0,19	0,23	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,032	12	19	0,08	0,19	0,23	-0,021
	ARMA(1,1)-GJR(1,1) - norm	2	8	0,01	0,02	0,82	-0,027	12	19	0,08	0,19	0,19	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,9	-0,028	12	20	0,04	0,11	0,13	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,031	12	18	0,13	0,31	0,18	-0,02
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,19	-0,032	12	19	0,08	0,19	0,76	-0,02
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,27	-0,033	12	19	0,08	0,19	0,76	-0,021
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,27	-0,032	12	19	0,08	0,19	0,76	-0,021
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,03	-0,032	12	19	0,08	0,19	0,23	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,04	-0,033	12	19	0,08	0,19	0,23	-0,021
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,04	-0,033	12	19	0,08	0,19	0,23	-0,02
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,04	-0,031	12	19	0,08	0,19	0,23	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,17	-0,032	12	19	0,08	0,19	0,23	-0,021
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,04	-0,032	12	19	0,08	0,19	0,23	-0,021
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,48	-0,032	12	18	0,13	0,31	0,49	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,76	-0,032	12	19	0,08	0,19	0,23	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,19	-0,032	12	18	0,13	0,31	0,49	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,1	-0,031	12	19	0,08	0,19	0,23	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,3	-0,032	12	18	0,13	0,31	0,27	-0,021
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,032	12	19	0,08	0,19	0,23	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,17	-0,031	12	17	0,22	0,46	0,26	-0,02
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,17	-0,032	12	18	0,13	0,31	0,18	-0,02
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,031	12	17	0,22	0,46	0,26	-0,02
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,09	-0,033	12	19	0,08	0,19	0,76	-0,02
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,17	-0,033	12	18	0,13	0,31	0,49	-0,021
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,76	-0,033	12	19	0,08	0,19	0,76	-0,021
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,17	-0,033	12	19	0,08	0,19	0,23	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,17	-0,033	12	19	0,08	0,19	0,23	-0,021
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,033	12	19	0,08	0,19	0,23	-0,021
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,17	-0,032	12	19	0,08	0,19	0,23	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,17	-0,033	12	19	0,08	0,19	0,23	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,033	12	19	0,08	0,19	0,23	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,09	-0,032	12	19	0,08	0,19	0,23	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,17	-0,033	12	19	0,08	0,19	0,23	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,033	12	18	0,13	0,31	0,49	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,17	-0,032	12	19	0,08	0,19	0,23	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,17	-0,033	12	18	0,13	0,31	0,27	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,033	12	19	0,08	0,19	0,23	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,17	-0,032	12	19	0,08	0,19	0,19	-0,02
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,17	-0,032	12	18	0,13	0,31	0,18	-0,02
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,17	-0,032	12	19	0,08	0,19	0,19	-0,02

Table 83. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2011 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,026	12	14	0,67	0,4	0,38	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,026	12	15	0,48	0,3	0,32	-0,017
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,028	12	13	0,89	0,48	0,23	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,025	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,026	12	13	0,89	0,48	0,34	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,028	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,025	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,026	12	13	0,89	0,48	0,34	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,028	12	13	0,89	0,48	0,34	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,83	-0,025	12	14	0,67	0,4	0,3	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,83	-0,025	12	14	0,67	0,4	0,3	-0,017
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,83	-0,027	12	12	0,88	0,54	0,17	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,83	-0,025	12	13	0,89	0,48	0,34	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,83	-0,025	12	13	0,89	0,48	0,34	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,83	-0,027	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,83	-0,025	12	13	0,89	0,48	0,34	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,83	-0,025	12	13	0,89	0,48	0,34	-0,017
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,83	-0,027	12	13	0,89	0,48	0,34	-0,018
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,028	12	9	0,29	0,4	0,28	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,028	12	9	0,29	0,4	0,28	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,028	12	9	0,29	0,4	0,28	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,028	12	11	0,66	0,54	0,48	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,027	12	11	0,66	0,54	0,48	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,027	12	10	0,45	0,5	0,22	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,028	12	11	0,66	0,54	0,48	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,027	12	11	0,66	0,54	0,48	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,027	12	10	0,45	0,5	0,22	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,83	-0,026	12	12	0,88	0,54	0,17	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,83	-0,026	12	12	0,88	0,54	0,17	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,83	-0,026	12	12	0,88	0,54	0,17	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,83	-0,026	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,83	-0,026	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,83	-0,026	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,83	-0,026	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,83	-0,026	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,83	-0,026	12	13	0,89	0,48	0,34	-0,018
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,029	12	10	0,45	0,5	0,22	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,029	12	10	0,45	0,5	0,22	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,029	12	11	0,66	0,54	0,24	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,028	12	11	0,66	0,54	0,48	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,029	12	11	0,66	0,54	0,48	-0,018
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,029	12	11	0,66	0,54	0,48	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,028	12	11	0,66	0,54	0,48	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,028	12	11	0,66	0,54	0,48	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,029	12	11	0,66	0,54	0,48	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,95	-0,027	12	12	0,88	0,54	0,17	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,95	-0,027	12	12	0,88	0,54	0,17	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,027	12	12	0,88	0,54	0,17	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,027	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,99	-0,027	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,99	-0,027	12	13	0,89	0,48	0,34	-0,017
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,027	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,99	-0,027	12	13	0,89	0,48	0,34	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,99	-0,027	12	13	0,89	0,48	0,34	-0,017

Table 84. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2012 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,69	-0,03	12	12	0,88	0,54	0,27	-0,021
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,031	12	12	0,88	0,54	0,27	-0,021
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,53	-0,03	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,031	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,53	-0,03	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,031	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,029	12	12	0,88	0,54	0,27	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,029	12	13	0,89	0,48	0,1	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,032	12	11	0,66	0,54	0,12	-0,021
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,028	12	14	0,67	0,4	0,17	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,029	12	14	0,67	0,4	0,17	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,031	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,028	12	14	0,67	0,4	0,17	-0,02
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,029	12	14	0,67	0,4	0,17	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,031	12	12	0,88	0,54	0,27	-0,02
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,023
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,023
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,023
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,023
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,023
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,023
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,023
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,023
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,033	12	12	0,88	0,54	0,27	-0,023
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,031	12	11	0,66	0,54	0,12	-0,021
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,031	12	11	0,66	0,54	0,12	-0,021
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,031	12	11	0,66	0,54	0,12	-0,021
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,03	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,03	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,03	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,03	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,03	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,03	12	12	0,88	0,54	0,27	-0,021
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,034	12	12	0,88	0,54	0,27	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,035	12	12	0,88	0,54	0,27	-0,022
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,035	12	12	0,88	0,54	0,27	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,034	12	12	0,88	0,54	0,27	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,034	12	12	0,88	0,54	0,27	-0,022
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,034	12	12	0,88	0,54	0,27	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,95	-0,034	12	12	0,88	0,54	0,27	-0,022
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,95	-0,034	12	12	0,88	0,54	0,27	-0,022
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,95	-0,034	12	12	0,88	0,54	0,27	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,021
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,032	12	11	0,66	0,54	0,12	-0,021
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,021
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,031	12	12	0,88	0,54	0,27	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,07	-0,031	12	12	0,88	0,54	0,27	-0,02
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,02
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,07	-0,032	12	12	0,88	0,54	0,27	-0,02

Table 85. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2012 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,018	12	13	0,89	0,92	0,77	-0,012
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,12	-0,019	12	13	0,89	0,92	0,77	-0,012
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,021	12	12	0,88	0,54	0,84	-0,013
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,018	12	12	0,88	0,54	0,84	-0,012
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,12	-0,019	12	13	0,89	0,48	0,61	-0,012
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,21	-0,02	12	11	0,66	0,54	0,64	-0,013
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,018	12	12	0,88	0,54	0,84	-0,012
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,12	-0,019	12	12	0,88	0,54	0,84	-0,012
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,21	-0,02	12	11	0,66	0,54	0,64	-0,013
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,12	-0,018	12	13	0,89	0,92	0,77	-0,012
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,12	-0,018	12	13	0,89	0,92	0,77	-0,012
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,21	-0,021	12	12	0,88	0,54	0,84	-0,013
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,12	-0,018	12	13	0,89	0,48	0,61	-0,012
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,21	-0,018	12	13	0,89	0,48	0,61	-0,012
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,21	-0,02	12	11	0,66	0,54	0,64	-0,013
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,03	-0,018	12	13	0,89	0,48	0,61	-0,012
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,03	-0,018	12	13	0,89	0,48	0,61	-0,012
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,02	12	11	0,66	0,54	0,64	-0,013
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,022	12	12	0,89	0,54	0,84	-0,014
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,92	-0,022	12	12	0,89	0,54	0,84	-0,014
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,022	12	12	0,89	0,54	0,84	-0,014
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,92	-0,021	12	11	0,66	0,54	0,64	-0,013
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,92	-0,021	12	11	0,66	0,54	0,64	-0,013
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,92	-0,021	12	11	0,66	0,54	0,64	-0,013
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,021	12	11	0,66	0,54	0,64	-0,013
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,21	-0,021	12	11	0,66	0,54	0,64	-0,013
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,21	-0,021	12	11	0,66	0,54	0,64	-0,013
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,92	-0,021	12	12	0,89	0,54	0,84	-0,013
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,92	-0,021	12	12	0,89	0,54	0,84	-0,013
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,92	-0,021	12	12	0,89	0,54	0,84	-0,013
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,92	-0,021	12	12	0,89	0,54	0,83	-0,013
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,21	-0,021	12	12	0,89	0,54	0,83	-0,013
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,21	-0,021	12	11	0,66	0,54	0,64	-0,013
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,01	-0,021	12	12	0,89	0,54	0,83	-0,013
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,01	-0,021	12	12	0,89	0,54	0,83	-0,013
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,21	-0,021	12	11	0,66	0,54	0,64	-0,013
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,022	12	12	0,89	0,54	0,84	-0,014
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,54	0,64	-0,014
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,54	0,64	-0,014
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,54	0,64	-0,013
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,54	0,64	-0,013
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,54	0,64	-0,013
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,54	0,64	-0,013
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,01	-0,021	12	11	0,66	0,54	0,64	-0,013
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,022	12	11	0,66	0,54	0,64	-0,013
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,01	-0,022	12	12	0,89	0,54	0,84	-0,013
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,01	-0,021	12	12	0,89	0,54	0,84	-0,013
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,022	12	12	0,89	0,54	0,84	-0,013
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,01	-0,021	12	11	0,66	0,54	0,64	-0,013
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,01	-0,021	12	12	0,89	0,54	0,83	-0,013
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,021	12	11	0,66	0,54	0,64	-0,013
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,01	-0,021	12	10	0,45	0,5	0,98	-0,013
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,01	-0,021	12	10	0,45	0,5	0,98	-0,013
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,01	-0,021	12	11	0,66	0,54	0,64	-0,013

Table 86. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2012 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,84	-0,02	12	14	0,67	0,89	0,99	-0,014
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,84	-0,021	12	15	0,48	0,78	0,82	-0,014
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,024	12	12	0,88	0,54	0,85	-0,015
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,02	12	14	0,67	0,89	0,99	-0,014
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,12	-0,021	12	15	0,48	0,78	0,94	-0,014
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,023	12	13	0,89	0,48	0,62	-0,015
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,02	12	14	0,67	0,89	0,99	-0,014
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,12	-0,021	12	16	0,33	0,62	0,72	-0,014
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,023	12	13	0,89	0,48	0,62	-0,015
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,84	-0,02	12	13	0,89	0,48	0,62	-0,014
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,84	-0,021	12	15	0,48	0,78	0,82	-0,014
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,023	12	12	0,88	0,54	0,85	-0,015
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,12	-0,02	12	14	0,67	0,89	0,99	-0,014
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,12	-0,021	12	15	0,48	0,78	0,78	-0,014
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,023	12	14	0,67	0,89	0,99	-0,015
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,84	-0,02	12	15	0,48	0,78	0,78	-0,014
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,84	-0,021	12	16	0,33	0,62	0,57	-0,013
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,023	12	14	0,67	0,89	0,99	-0,015
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,024	12	12	0,88	0,54	0,85	-0,015
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,12	-0,024	12	12	0,88	0,54	0,85	-0,015
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,024	12	12	0,88	0,54	0,85	-0,015
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,024	12	14	0,67	0,89	0,99	-0,015
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,21	-0,024	12	14	0,67	0,89	0,99	-0,015
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,024	12	13	0,89	0,48	0,62	-0,015
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,024	12	14	0,67	0,89	0,99	-0,015
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,12	-0,024	12	14	0,67	0,89	0,99	-0,015
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,024	12	13	0,89	0,48	0,62	-0,015
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,12	-0,024	12	13	0,89	0,48	0,62	-0,015
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,12	-0,024	12	13	0,89	0,48	0,62	-0,015
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,024	12	12	0,88	0,54	0,85	-0,015
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,12	-0,023	12	14	0,67	0,89	0,99	-0,015
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,21	-0,024	12	13	0,89	0,92	0,79	-0,014
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,024	12	14	0,67	0,89	0,99	-0,015
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,12	-0,023	12	13	0,89	0,92	0,71	-0,015
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,12	-0,024	12	14	0,67	0,89	0,53	-0,015
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,024	12	14	0,67	0,89	0,99	-0,015
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,12	-0,025	12	12	0,88	0,54	0,85	-0,015
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,025	12	12	0,88	0,54	0,85	-0,015
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,025	12	12	0,88	0,54	0,85	-0,015
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,12	-0,024	12	13	0,89	0,48	0,62	-0,015
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,12	-0,024	12	14	0,67	0,89	0,99	-0,015
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,024	12	13	0,89	0,48	0,62	-0,015
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,12	-0,024	12	14	0,67	0,89	0,99	-0,015
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,12	-0,024	12	14	0,67	0,89	0,99	-0,015
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,024	12	13	0,89	0,48	0,62	-0,015
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,12	-0,024	12	12	0,88	0,54	0,85	-0,015
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,12	-0,024	12	13	0,89	0,48	0,62	-0,015
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,024	12	12	0,88	0,54	0,85	-0,015
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,12	-0,024	12	14	0,67	0,89	0,99	-0,015
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,12	-0,024	12	14	0,67	0,89	0,99	-0,015
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,12	-0,024	12	14	0,67	0,89	0,99	-0,015
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,12	-0,023	12	13	0,89	0,92	0,71	-0,015
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,12	-0,023	12	13	0,89	0,92	0,71	-0,014
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,12	-0,023	12	14	0,67	0,89	0,99	-0,014

Table 87. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2012 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,2	-0,028	12	15	0,48	0,78	0,68	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,91	-0,029	12	15	0,48	0,78	0,68	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,031	12	14	0,67	0,89	0,68	-0,02
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,16	-0,028	12	15	0,48	0,78	0,68	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,91	-0,029	12	15	0,48	0,78	0,68	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,031	12	14	0,67	0,89	0,68	-0,02
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,16	-0,028	12	15	0,48	0,78	0,68	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,91	-0,029	12	15	0,48	0,78	0,68	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,031	12	13	0,89	0,92	0,75	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,42	-0,027	12	15	0,48	0,78	0,68	-0,019
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,83	-0,028	12	15	0,48	0,78	0,68	-0,019
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,28	-0,03	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,42	-0,027	12	15	0,48	0,78	0,68	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,42	-0,028	12	15	0,48	0,78	0,68	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,83	-0,03	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,42	-0,027	12	15	0,48	0,78	0,68	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,42	-0,028	12	15	0,48	0,78	0,68	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,28	-0,03	12	13	0,89	0,92	0,62	-0,02
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,91	-0,031	12	14	0,67	0,89	0,68	-0,02
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,91	-0,032	12	13	0,89	0,92	0,62	-0,02
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,032	12	14	0,67	0,89	0,68	-0,02
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	13	0,89	0,92	0,62	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,032	12	14	0,67	0,89	0,68	-0,02
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,032	12	14	0,67	0,89	0,68	-0,02
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	14	0,67	0,89	0,68	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,032	12	14	0,67	0,89	0,68	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,032	12	13	0,89	0,92	0,75	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,21	-0,031	12	14	0,67	0,89	0,68	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,21	-0,031	12	13	0,89	0,92	0,62	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,031	12	13	0,89	0,92	0,62	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	0	-	-	1	-0,031	12	13	0,89	0,92	0,62	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,28	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,031	12	13	0,89	0,92	0,62	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	0	-	-	1	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,28	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	13	0,89	0,92	0,62	-0,02
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,91	-0,032	12	14	0,67	0,89	0,68	-0,02
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,032	12	14	0,67	0,89	0,68	-0,02
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,032	12	14	0,67	0,89	0,68	-0,02
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,032	12	14	0,67	0,89	0,68	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,032	12	13	0,89	0,92	0,62	-0,02
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,032	12	14	0,67	0,89	0,68	-0,02
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,032	12	14	0,67	0,89	0,68	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,032	12	14	0,67	0,89	0,68	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,032	12	13	0,89	0,92	0,75	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,21	-0,031	12	15	0,48	0,78	0,68	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,21	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,031	12	15	0,48	0,78	0,68	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,8	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	0	-	-	1	-0,031	12	15	0,48	0,78	0,68	-0,02
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,28	-0,031	12	14	0,67	0,89	0,64	-0,02
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	15	0,48	0,78	0,68	-0,02

Table 88. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2013 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,24	-0,034	12	16	0,33	0,21	0,4	-0,024
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,77	-0,035	12	16	0,33	0,21	0,4	-0,023
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,38	-0,035	12	11	0,66	0,54	0,39	-0,025
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,24	-0,034	12	16	0,33	0,21	0,4	-0,024
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,77	-0,035	12	17	0,21	0,46	0,7	-0,023
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,77	-0,038	12	12	0,88	0,54	0,39	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,24	-0,034	12	17	0,21	0,46	0,7	-0,024
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,77	-0,035	12	17	0,21	0,46	0,7	-0,023
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,38	-0,038	12	13	0,89	0,48	0,19	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,34	-0,033	12	16	0,33	0,21	0,12	-0,023
	ARMA(0,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0,34	-0,034	12	17	0,21	0,46	0,3	-0,023
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,92	-0,037	12	13	0,89	0,48	0,32	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,34	-0,033	12	16	0,33	0,21	0,12	-0,023
	ARMA(1,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0,34	-0,034	12	16	0,33	0,21	0,12	-0,023
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,81	-0,037	12	13	0,89	0,48	0,32	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0,34	-0,033	12	16	0,33	0,21	0,12	-0,023
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,44	-0,034	12	17	0,21	0,46	0,29	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,92	-0,037	12	13	0,89	0,48	0,32	-0,025
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,91	-0,039	12	12	0,88	0,54	0,24	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,91	-0,039	12	11	0,66	0,54	0,39	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,04	12	11	0,66	0,54	0,39	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,16	-0,039	12	13	0,89	0,48	0,23	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,91	-0,039	12	12	0,88	0,54	0,39	-0,026
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,04	12	12	0,88	0,54	0,39	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,16	-0,039	12	13	0,89	0,48	0,23	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,91	-0,039	12	12	0,88	0,54	0,39	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,04	12	11	0,66	0,54	0,39	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,92	-0,037	12	14	0,67	0,4	0,16	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,92	-0,037	12	13	0,89	0,48	0,32	-0,025
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,92	-0,037	12	13	0,89	0,48	0,32	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,24	-0,037	12	13	0,89	0,48	0,32	-0,024
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,44	-0,037	12	13	0,89	0,48	0,32	-0,024
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,24	-0,037	12	13	0,89	0,48	0,32	-0,024
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,44	-0,037	12	13	0,89	0,48	0,32	-0,024
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,17	-0,037	12	13	0,89	0,48	0,32	-0,024
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,24	-0,037	12	13	0,89	0,48	0,32	-0,025
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,91	-0,039	12	11	0,66	0,54	0,39	-0,025
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,91	-0,04	12	11	0,66	0,54	0,39	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,91	-0,04	12	11	0,66	0,54	0,39	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,77	-0,039	12	13	0,89	0,48	0,23	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,38	-0,04	12	12	0,88	0,54	0,39	-0,025
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,38	-0,04	12	11	0,66	0,54	0,39	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,77	-0,039	12	13	0,89	0,48	0,23	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,38	-0,039	12	12	0,88	0,54	0,39	-0,025
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,38	-0,04	12	11	0,66	0,54	0,39	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,92	-0,038	12	13	0,89	0,48	0,32	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,92	-0,038	12	13	0,89	0,48	0,32	-0,025
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,92	-0,038	12	13	0,89	0,48	0,32	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,44	-0,037	12	13	0,89	0,48	0,32	-0,024
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,81	-0,038	12	13	0,89	0,48	0,32	-0,024
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,92	-0,039	12	13	0,89	0,48	0,32	-0,024
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,44	-0,037	12	14	0,67	0,4	0,2	-0,024
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,83	-0,038	12	13	0,89	0,48	0,32	-0,024
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,92	-0,038	12	13	0,89	0,48	0,32	-0,025

Table 89. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2013 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,73	-0,022	12	16	0,33	0,62	0,86	-0,015
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,73	-0,023	12	17	0,21	0,46	0,51	-0,015
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,4	0,34	-0,016
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,89	-0,022	12	15	0,48	0,78	0,7	-0,015
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,69	-0,022	12	16	0,33	0,62	0,37	-0,015
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,89	-0,022	12	14	0,67	0,89	0,88	-0,015
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,89	-0,022	12	16	0,33	0,62	0,37	-0,015
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,73	-0,022	12	15	0,48	0,78	0,7	-0,015
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,73	-0,023	12	16	0,33	0,62	0,37	-0,015
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,025	12	13	0,89	0,48	0,45	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,69	-0,022	12	14	0,67	0,89	0,88	-0,015
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,73	-0,022	12	16	0,33	0,62	0,37	-0,015
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,89	-0,022	12	14	0,67	0,89	0,88	-0,015
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,89	-0,023	12	16	0,33	0,62	0,91	-0,015
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,025	12	13	0,89	0,92	0,76	-0,016
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,06	-0,026	12	13	0,89	0,48	0,71	-0,017
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,06	-0,026	12	13	0,89	0,48	0,71	-0,017
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,06	-0,026	12	13	0,89	0,48	0,71	-0,017
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,06	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,06	-0,025	12	12	0,88	0,54	0,81	-0,016
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,06	-0,026	12	12	0,88	0,54	0,81	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,06	-0,026	12	12	0,88	0,54	0,81	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,06	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,21	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,21	-0,025	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,025	12	14	0,67	0,89	0,88	-0,016
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,21	-0,027	12	14	0,67	0,4	0,34	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,21	-0,027	12	14	0,67	0,4	0,34	-0,017
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,027	12	14	0,67	0,4	0,34	-0,017
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,21	-0,026	12	13	0,89	0,48	0,45	-0,016
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,21	-0,026	12	13	0,89	0,48	0,45	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,026	12	13	0,89	0,48	0,45	-0,016
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,21	-0,026	12	14	0,67	0,89	0,88	-0,016
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,21	-0,026	12	13	0,89	0,92	0,76	-0,016
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,21	-0,026	12	13	0,89	0,92	0,76	-0,016

Table 90. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2013 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,89	-0,023	12	15	0,48	0,78	0,84	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,73	-0,024	12	16	0,33	0,62	0,49	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	14	0,67	0,89	0,84	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,89	-0,023	12	15	0,48	0,78	0,84	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,89	-0,024	12	17	0,22	0,46	0,36	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,027	12	14	0,67	0,89	0,88	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,89	-0,023	12	15	0,48	0,78	0,84	-0,016
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,08	-0,024	12	17	0,22	0,46	0,36	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,027	12	13	0,89	0,92	0,82	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,89	-0,023	12	16	0,33	0,62	0,68	-0,016
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,89	-0,024	12	17	0,22	0,46	0,36	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,027	12	13	0,89	0,92	0,99	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,89	-0,023	12	16	0,33	0,62	0,68	-0,016
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,89	-0,024	12	17	0,22	0,46	0,36	-0,016
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,027	12	14	0,67	0,89	0,88	-0,017
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,08	-0,023	12	16	0,33	0,62	0,68	-0,016
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,08	-0,024	12	17	0,22	0,46	0,75	-0,016
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,08	-0,026	12	12	0,88	0,86	0,41	-0,017
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,08	-0,028	12	14	0,67	0,89	0,84	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,08	-0,029	12	14	0,67	0,89	0,84	-0,018
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,029	12	14	0,67	0,89	0,84	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,08	-0,027	12	14	0,67	0,89	0,88	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	14	0,67	0,89	0,88	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	15	0,48	0,78	0,84	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,08	-0,027	12	12	0,88	0,86	0,41	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	14	0,67	0,89	0,84	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,08	-0,028	12	14	0,67	0,89	0,84	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	13	0,89	0,92	0,99	-0,017
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	13	0,89	0,92	0,99	-0,017
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,08	-0,027	12	15	0,48	0,78	0,73	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,08	-0,027	12	15	0,48	0,78	0,73	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	14	0,67	0,89	0,84	-0,017
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,08	-0,027	12	13	0,89	0,92	0,48	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	13	0,89	0,92	0,48	-0,017
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	13	0,89	0,92	0,76	-0,017
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,08	-0,028	12	14	0,67	0,89	0,84	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,08	-0,029	12	13	0,89	0,92	0,99	-0,018
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,029	12	14	0,67	0,89	0,84	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,08	-0,027	12	14	0,67	0,89	0,88	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	14	0,67	0,89	0,88	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	13	0,89	0,92	0,82	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,08	-0,027	12	12	0,88	0,86	0,41	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	12	0,88	0,86	0,41	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	13	0,89	0,92	0,82	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,08	-0,028	12	13	0,89	0,92	0,99	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,08	-0,028	12	13	0,89	0,92	0,99	-0,017
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,028	12	13	0,89	0,92	0,99	-0,017
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,08	-0,027	12	15	0,48	0,78	0,73	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,08	-0,027	12	15	0,48	0,78	0,73	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,027	12	14	0,67	0,89	0,88	-0,017
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,08	-0,027	12	13	0,89	0,92	0,48	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,08	-0,027	12	13	0,89	0,92	0,48	-0,017
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,08	-0,027	12	13	0,89	0,92	0,81	-0,017

Table 91. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2013 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,049	-0,025	12	19	0,08	0,19	0,71	-0,017
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,49	-0,027	12	20	0,04	0,11	0,91	-0,017
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	17	0,22	0,46	0,66	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,13	-0,025	12	18	0,13	0,31	0,5	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,49	-0,027	12	19	0,08	0,19	0,7	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	17	0,22	0,46	0,66	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,13	-0,025	12	18	0,13	0,31	0,5	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,49	-0,027	12	19	0,08	0,19	0,7	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,8	-0,029	12	17	0,22	0,46	0,66	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,49	-0,026	12	19	0,08	0,19	0,76	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,71	-0,027	12	19	0,08	0,19	0,76	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,8	-0,03	12	16	0,33	0,62	0,4	-0,019
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,71	-0,026	12	17	0,22	0,46	0,44	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,71	-0,027	12	17	0,22	0,46	0,44	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,8	-0,03	12	16	0,33	0,62	0,4	-0,019
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,71	-0,026	12	17	0,22	0,46	0,44	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,71	-0,027	12	17	0,22	0,46	0,44	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,8	-0,03	12	16	0,33	0,62	0,4	-0,019
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,74	-0,028	12	16	0,33	0,62	0,59	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,49	-0,028	12	15	0,48	0,78	0,5	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,49	-0,028	12	16	0,33	0,62	0,59	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,8	-0,028	12	16	0,33	0,62	0,59	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,028	12	16	0,33	0,62	0,59	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,49	-0,028	12	15	0,48	0,78	0,5	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,8	-0,028	12	17	0,22	0,46	0,44	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,028	12	16	0,33	0,62	0,59	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,49	-0,028	12	16	0,33	0,62	0,59	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,8	-0,029	12	17	0,22	0,46	0,44	-0,019
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,8	-0,029	12	18	0,13	0,27	0,71	-0,019
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,8	-0,029	12	18	0,13	0,27	0,71	-0,019
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,8	-0,029	12	17	0,22	0,46	0,44	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,8	-0,029	12	17	0,22	0,46	0,44	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,8	-0,029	12	17	0,22	0,46	0,44	-0,019
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,8	-0,029	12	17	0,22	0,46	0,44	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,8	-0,029	12	17	0,22	0,46	0,44	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,8	-0,029	12	16	0,33	0,62	0,4	-0,019
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	16	0,33	0,62	0,63	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	17	0,22	0,46	0,66	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	17	0,22	0,46	0,66	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	16	0,33	0,62	0,63	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	17	0,22	0,46	0,66	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	17	0,22	0,46	0,66	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	16	0,33	0,62	0,63	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	15	0,48	0,78	0,54	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	16	0,33	0,62	0,63	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,8	-0,029	12	16	0,33	0,62	0,4	-0,019
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,8	-0,029	12	16	0,33	0,62	0,4	-0,019
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,8	-0,029	12	16	0,33	0,62	0,4	-0,019
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,8	-0,029	12	16	0,33	0,62	0,4	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,8	-0,029	12	17	0,22	0,46	0,44	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,8	-0,029	12	17	0,22	0,46	0,44	-0,019
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,8	-0,029	12	16	0,33	0,62	0,4	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,8	-0,029	12	16	0,33	0,62	0,4	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,8	-0,029	12	16	0,33	0,62	0,4	-0,019

Table 92. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2014 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,01	-0,031	12	17	0,21	0,46	0,51	-0,021
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,03	-0,032	12	17	0,21	0,46	0,51	-0,021
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,39	-0,035	12	14	0,67	0,4	0,16	-0,022
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,01	-0,031	12	15	0,48	0,3	0,36	-0,021
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,03	-0,032	12	18	0,13	0,08	0,34	-0,021
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,39	-0,035	12	14	0,67	0,4	0,16	-0,022
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,01	-0,031	12	15	0,48	0,3	0,36	-0,021
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,03	-0,032	12	17	0,21	0,13	0,48	-0,021
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,035	12	13	0,89	0,48	0,09	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,052	0	-0,031	12	15	0,48	0,78	0,55	-0,022
	ARMA(0,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0	-0,032	12	16	0,33	0,62	0,43	-0,021
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,39	-0,035	12	14	0,67	0,89	0,59	-0,023
	ARMA(1,0)-GJR(1,1) - norm	2	7	0,02	0,052	0	-0,031	12	17	0,21	0,46	0,67	-0,022
	ARMA(1,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0	-0,032	12	18	0,13	0,31	0,69	-0,021
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,11	-0,035	12	14	0,67	0,89	0,59	-0,023
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0	-0,031	12	16	0,33	0,62	0,74	-0,022
	ARMA(1,1)-GJR(1,1) - student-t	2	7	0,02	0,052	0	-0,032	12	17	0,21	0,46	0,78	-0,021
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,66	-0,035	12	14	0,67	0,89	0,59	-0,023
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,03	-0,035	12	13	0,89	0,48	0,16	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,39	-0,036	12	13	0,89	0,48	0,16	-0,023
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,39	-0,036	12	13	0,89	0,48	0,16	-0,023
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,39	-0,034	12	15	0,48	0,3	0,36	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,036	12	14	0,67	0,4	0,16	-0,023
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,39	-0,036	12	14	0,67	0,4	0,16	-0,023
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,39	-0,034	12	14	0,67	0,4	0,16	-0,022
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,036	12	12	0,88	0,54	0,08	-0,023
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,036	12	13	0,89	0,48	0,16	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,03	-0,033	12	14	0,67	0,89	0,59	-0,022
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,01	-0,034	12	14	0,67	0,89	0,59	-0,022
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,01	-0,034	12	14	0,67	0,89	0,59	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,01	-0,033	12	17	0,21	0,46	0,6	-0,021
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,11	-0,034	12	14	0,67	0,89	0,59	-0,022
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,11	-0,034	12	14	0,67	0,89	0,59	-0,022
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0	-0,033	12	16	0,33	0,62	0,74	-0,021
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,11	-0,034	12	15	0,48	0,78	0,55	-0,022
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,11	-0,034	12	15	0,48	0,78	0,55	-0,022
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,39	-0,034	12	13	0,89	0,48	0,09	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,39	-0,035	12	12	0,88	0,54	0,08	-0,023
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,39	-0,035	12	12	0,88	0,54	0,08	-0,023
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,39	-0,034	12	14	0,67	0,4	0,16	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,39	-0,035	12	14	0,67	0,4	0,16	-0,023
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,39	-0,035	12	14	0,67	0,4	0,16	-0,023
	ARMA(1,1)-GARCH(1,1) - norm	2	4	0,38	0,64	0,39	-0,034	12	13	0,89	0,48	0,09	-0,022
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,035	12	12	0,88	0,54	0,08	-0,023
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,035	12	13	0,89	0,48	0,09	-0,022
	ARMA(0,0)-GJR(1,1) - norm	2	7	0,02	0,052	0	-0,033	12	15	0,48	0,78	0,55	-0,022
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,11	-0,034	12	14	0,67	0,89	0,59	-0,022
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,11	-0,034	12	14	0,67	0,89	0,59	-0,022
	ARMA(1,0)-GJR(1,1) - norm	2	7	0,02	0,052	0	-0,033	12	16	0,33	0,62	0,74	-0,022
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,16	0,34	0,11	-0,034	12	14	0,67	0,89	0,59	-0,022
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,11	-0,034	12	14	0,67	0,89	0,59	-0,022
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0	-0,033	12	16	0,33	0,62	0,74	-0,022
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,16	0,34	0,11	-0,034	12	15	0,48	0,78	0,55	-0,022
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,11	-0,034	12	15	0,48	0,78	0,55	-0,022

Table 93. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2014 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	8	0,01	0	0,34	-0,023	12	20	0,04	0,07	0,71	-0,016
	ARMA(0,0)-GARCH(1,1) - student-t	2	8	0,01	0	0,34	-0,024	12	21	0,02	0,02	0,52	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,31	-0,027	12	19	0,08	0,1	0,48	-0,017
	ARMA(1,0)-GARCH(1,1) - norm	2	8	0,01	0	0,34	-0,023	12	19	0,08	0,19	0,94	-0,016
	ARMA(1,0)-GARCH(1,1) - student-t	2	7	0,02	0,03	0,85	-0,024	12	21	0,02	0,02	0,7	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,87	-0,027	12	18	0,13	0,27	0,69	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,02	0,03	0,85	-0,023	12	20	0,04	0,07	0,71	-0,016
	ARMA(1,1)-GARCH(1,1) - student-t	2	7	0,02	0,03	0,85	-0,024	12	20	0,04	0,07	0,71	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,87	-0,027	12	18	0,13	0,27	0,69	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	8	0,01	0	0,34	-0,024	12	20	0,04	0,07	0,71	-0,016
	ARMA(0,0)-GJR(1,1) - student-t	2	7	0,02	0,03	0,85	-0,025	12	20	0,04	0,07	0,71	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,31	-0,028	12	18	0,13	0,12	0,5	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	7	0,02	0,03	0,85	-0,024	12	18	0,13	0,12	0,93	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,31	-0,025	12	20	0,04	0,07	0,71	-0,016
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,33	-0,028	12	17	0,22	0,13	0,69	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	8	0,01	0,01	0,82	-0,024	12	18	0,13	0,12	0,5	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	8	0,01	0,01	0,82	-0,025	12	19	0,08	0,1	0,73	-0,016
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,37	-0,028	12	17	0,22	0,13	0,69	-0,018
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,74	-0,029	12	17	0,22	0,13	0,62	-0,017
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,87	-0,029	12	17	0,22	0,13	0,62	-0,017
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,029	12	18	0,13	0,27	0,69	-0,017
	ARMA(1,0)-GARCH(1,1) - norm	2	2	0,74	0,93	0,63	-0,029	12	17	0,22	0,13	0,73	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,028	12	17	0,22	0,34	0,73	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,028	12	18	0,13	0,27	0,69	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	2	0,74	0,93	0,63	-0,029	12	17	0,22	0,34	0,73	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,63	-0,028	12	16	0,33	0,41	0,9	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,029	12	17	0,22	0,34	0,73	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,37	-0,029	12	17	0,22	0,13	0,62	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,37	-0,029	12	16	0,33	0,14	0,84	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,33	-0,029	12	18	0,13	0,12	0,8	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,63	-0,028	12	17	0,22	0,13	0,69	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,37	-0,029	12	17	0,22	0,13	0,69	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,37	-0,029	12	17	0,22	0,13	0,69	-0,017
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,63	-0,029	12	17	0,22	0,13	0,69	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,37	-0,029	12	15	0,48	0,12	0,78	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,37	-0,029	12	17	0,22	0,13	0,69	-0,018
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,04	-0,028	12	17	0,22	0,13	0,62	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,31	-0,028	12	17	0,22	0,34	0,83	-0,018
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,028	12	18	0,13	0,27	0,69	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,74	-0,028	12	17	0,22	0,34	0,73	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,74	-0,028	12	17	0,22	0,34	0,73	-0,018
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,028	12	17	0,22	0,34	0,73	-0,017
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,74	-0,028	12	17	0,22	0,34	0,73	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,33	-0,028	12	17	0,22	0,34	0,73	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,74	-0,028	12	17	0,22	0,34	0,73	-0,017
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,87	-0,028	12	17	0,22	0,34	0,73	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,33	-0,028	12	17	0,22	0,13	0,91	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,87	-0,028	12	18	0,13	0,12	0,5	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,62	-0,028	12	16	0,33	0,41	0,98	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,37	-0,028	12	16	0,33	0,41	0,98	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,37	-0,028	12	17	0,22	0,13	0,69	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,37	-0,028	12	17	0,22	0,13	0,69	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,29	-0,028	12	15	0,48	0,12	0,78	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,37	-0,028	12	17	0,22	0,13	0,69	-0,018

Table 94. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2014 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	9	0	0	0,33	-0,024	12	21	0,02	0,051	0,51	-0,017
	ARMA(0,0)-GARCH(1,1) - student-t	2	8	0,01	0	0,34	-0,025	12	21	0,02	0,051	0,51	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,029	12	19	0,08	0,1	0,6	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	8	0,01	0	0,34	-0,024	12	19	0,08	0,1	0,87	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	8	0,01	0	0,34	-0,026	12	19	0,08	0,1	0,87	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,028	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	9	0	0	0,33	-0,024	12	18	0,13	0,27	0,83	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	7	0,02	0,03	0,85	-0,026	12	19	0,08	0,1	0,6	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,028	12	18	0,13	0,27	0,83	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	9	0	0	0,58	-0,025	12	19	0,08	0,1	0,6	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	7	0,02	0,03	0,85	-0,026	12	20	0,04	0,07	0,85	-0,017
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,029	12	18	0,13	0,12	0,5	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	9	0	0	0,58	-0,025	12	18	0,13	0,27	0,83	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	8	0,01	0	0,82	-0,026	12	19	0,08	0,1	0,6	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,029	12	18	0,13	0,27	0,83	-0,019
	ARMA(1,1)-GJR(1,1) - norm	2	8	0,01	0	0,82	-0,025	12	19	0,08	0,1	0,6	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	8	0,01	0	0,82	-0,026	12	19	0,08	0,1	0,6	-0,017
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,029	12	18	0,13	0,27	0,83	-0,019
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,04	-0,03	12	17	0,22	0,13	0,62	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,04	-0,03	12	17	0,22	0,13	0,62	-0,018
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,03	12	16	0,33	0,41	0,9	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,36	-0,029	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,36	-0,03	12	17	0,22	0,34	0,98	-0,018
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,03	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,36	-0,03	12	17	0,22	0,34	0,98	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,36	-0,03	12	17	0,22	0,34	0,98	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,03	12	17	0,22	0,34	0,98	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,08	-0,03	12	17	0,22	0,13	0,62	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,31	-0,03	12	17	0,22	0,13	0,62	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,03	12	17	0,22	0,13	0,62	-0,019
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,01	-0,03	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,36	-0,03	12	17	0,22	0,34	0,93	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,36	-0,03	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,36	-0,03	12	19	0,08	0,1	0,6	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,36	-0,03	12	18	0,13	0,12	0,71	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,36	-0,03	12	19	0,08	0,1	0,6	-0,018
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,04	-0,029	12	17	0,22	0,13	0,62	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,04	-0,029	12	17	0,22	0,13	0,62	-0,018
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,03	12	18	0,13	0,12	0,5	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,31	-0,029	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,31	-0,029	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,029	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,36	-0,029	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,31	-0,029	12	17	0,22	0,34	0,98	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,029	12	18	0,13	0,27	0,83	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,16	0,34	0,04	-0,029	12	17	0,22	0,13	0,62	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,31	-0,03	12	17	0,22	0,13	0,62	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,04	-0,03	12	18	0,13	0,12	0,5	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,36	-0,029	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,36	-0,029	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,31	-0,029	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,36	-0,029	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,25	-0,029	12	18	0,13	0,27	0,83	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,36	-0,029	12	19	0,08	0,1	0,6	-0,018

Table 95. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2014 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	11	0	0	0,36	-0,034	12	22	0,01	0,02	0,61	-0,024
	ARMA(0,0)-GARCH(1,1) - student-t	2	9	0	0	0,74	-0,037	12	22	0,01	0,02	0,61	-0,024
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,97	-0,041	12	20	0,04	0,07	0,67	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	11	0	0	0,36	-0,034	12	22	0,01	0,02	0,61	-0,024
	ARMA(1,0)-GARCH(1,1) - student-t	2	9	0	0	0,74	-0,037	12	22	0,01	0,02	0,61	-0,024
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,97	-0,041	12	20	0,04	0,07	0,67	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	11	0	0	0,36	-0,034	12	22	0,01	0,02	0,61	-0,024
	ARMA(1,1)-GARCH(1,1) - student-t	2	9	0	0	0,74	-0,037	12	22	0,01	0,02	0,61	-0,024
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,85	-0,041	12	20	0,04	0,03	0,62	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	8	0,01	0,02	0,98	-0,036	12	21	0,02	0,051	0,4	-0,025
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,68	-0,038	12	21	0,02	0,051	0,4	-0,025
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,59	-0,042	12	19	0,08	0,1	0,76	-0,027
	ARMA(1,0)-GJR(1,1) - norm	2	8	0,01	0,02	0,98	-0,036	12	20	0,04	0,07	0,91	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0,8	-0,038	12	22	0,01	0,03	0,29	-0,025
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,59	-0,042	12	19	0,08	0,1	0,76	-0,027
	ARMA(1,1)-GJR(1,1) - norm	2	9	0	0	0,74	-0,036	12	20	0,04	0,07	0,91	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	7	0,02	0,052	0,8	-0,038	12	22	0,01	0,03	0,29	-0,025
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,44	-0,042	12	20	0,04	0,07	0,91	-0,027
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,87	-0,04	12	19	0,08	0,1	0,76	-0,027
	ARMA(0,0)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,87	-0,041	12	18	0,13	0,12	0,5	-0,027
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	7	0,02	0,052	0,87	-0,041	12	18	0,13	0,12	0,5	-0,027
	ARMA(1,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,87	-0,04	12	18	0,13	0,12	0,5	-0,027
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,68	-0,041	12	18	0,13	0,12	0,5	-0,027
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	7	0,02	0,052	0,87	-0,041	12	18	0,13	0,12	0,5	-0,027
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,02	0,052	0,87	-0,04	12	18	0,13	0,12	0,5	-0,027
	ARMA(1,1)-GARCH(1,1) - student-t	2	7	0,02	0,052	0,87	-0,041	12	18	0,13	0,12	0,5	-0,027
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	7	0,02	0,052	0,87	-0,041	12	18	0,13	0,12	0,37	-0,027
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,44	-0,04	12	18	0,13	0,12	0,78	-0,027
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,44	-0,041	12	16	0,33	0,41	0,77	-0,028
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,44	-0,041	12	15	0,48	0,44	0,75	-0,028
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,68	-0,04	12	19	0,08	0,1	0,76	-0,027
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,44	-0,041	12	17	0,21	0,34	0,95	-0,028
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,44	-0,041	12	15	0,48	0,44	0,75	-0,028
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,16	0,34	0,97	-0,04	12	19	0,08	0,1	0,76	-0,027
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,44	-0,041	12	18	0,13	0,27	0,99	-0,028
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,44	-0,041	12	17	0,21	0,34	0,73	-0,028
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,97	-0,041	12	19	0,08	0,1	0,76	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,97	-0,042	12	19	0,08	0,1	0,76	-0,027
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,97	-0,042	12	19	0,08	0,1	0,76	-0,027
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,97	-0,041	12	19	0,08	0,1	0,76	-0,026
	ARMA(1,0)-GARCH(1,1) - student-t	2	4	0,38	0,64	0,13	-0,042	12	19	0,08	0,1	0,76	-0,027
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,97	-0,042	12	19	0,08	0,1	0,76	-0,027
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,97	-0,041	12	19	0,08	0,1	0,76	-0,026
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,97	-0,042	12	19	0,08	0,1	0,76	-0,027
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,97	-0,042	12	18	0,13	0,12	0,37	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,44	-0,042	12	20	0,04	0,07	0,91	-0,027
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,043	12	19	0,08	0,1	0,76	-0,027
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,043	12	19	0,08	0,1	0,76	-0,027
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,02	-0,042	12	20	0,04	0,07	0,91	-0,027
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,043	12	20	0,04	0,07	0,91	-0,027
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,043	12	19	0,08	0,1	0,76	-0,027
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,44	-0,042	12	20	0,04	0,07	0,91	-0,027
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,043	12	19	0,08	0,1	0,76	-0,027
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,043	12	18	0,13	0,12	0,5	-0,027

Table 96. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2015 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	10	0	0	0,36	-0,049	12	23	0,01	0,02	0,6	-0,035
	ARMA(0,0)-GARCH(1,1) - student-t	2	9	0	0	0,14	-0,052	12	23	0,01	0,02	0,6	-0,034
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,42	-0,057	12	20	0,04	0,07	0,5	-0,037
	ARMA(1,0)-GARCH(1,1) - norm	2	10	0	0	0,36	-0,049	12	23	0,01	0,02	0,6	-0,035
	ARMA(1,0)-GARCH(1,1) - student-t	2	9	0	0	0,14	-0,052	12	23	0,01	0,02	0,6	-0,034
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,42	-0,057	12	18	0,13	0,12	0,92	-0,037
	ARMA(1,1)-GARCH(1,1) - norm	2	10	0	0	0,36	-0,049	12	23	0,01	0,02	0,6	-0,035
	ARMA(1,1)-GARCH(1,1) - student-t	2	9	0	0	0,14	-0,052	12	23	0,01	0,02	0,6	-0,034
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,42	-0,057	12	18	0,13	0,12	0,92	-0,037
	ARMA(0,0)-GJR(1,1) - norm	2	9	0	0	0,5	-0,049	12	21	0,02	0,051	0,49	-0,035
	ARMA(0,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,42	-0,052	12	21	0,02	0,051	0,49	-0,035
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,057	12	21	0,02	0,051	0,49	-0,037
	ARMA(1,0)-GJR(1,1) - norm	2	7	0,02	0,052	0,69	-0,049	12	21	0,02	0,051	0,49	-0,035
	ARMA(1,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0,69	-0,052	12	21	0,02	0,051	0,49	-0,035
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,056	12	20	0,04	0,07	0,99	-0,037
	ARMA(1,1)-GJR(1,1) - norm	2	7	0,02	0,052	0,69	-0,049	12	21	0,02	0,051	0,49	-0,035
	ARMA(1,1)-GJR(1,1) - student-t	2	7	0,02	0,052	0,69	-0,052	12	21	0,02	0,051	0,49	-0,035
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,056	12	20	0,04	0,07	0,99	-0,037
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,19	-0,057	12	19	0,08	0,1	0,48	-0,037
	ARMA(0,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,32	-0,058	12	19	0,08	0,1	0,86	-0,037
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,32	-0,059	12	18	0,13	0,12	0,68	-0,037
	ARMA(1,0)-GARCH(1,1) - norm	2	7	0,02	0,052	0,19	-0,057	12	19	0,08	0,1	0,3	-0,036
	ARMA(1,0)-GARCH(1,1) - student-t	2	6	0,06	0,15	0,32	-0,058	12	17	0,21	0,13	0,47	-0,037
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,32	-0,058	12	18	0,13	0,12	0,68	-0,037
	ARMA(1,1)-GARCH(1,1) - norm	2	7	0,02	0,052	0,19	-0,057	12	18	0,13	0,12	0,3	-0,036
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,02	0,34	0,75	-0,059	12	18	0,13	0,12	0,68	-0,037
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	6	0,06	0,15	0,32	-0,058	12	19	0,08	0,1	0,86	-0,037
	ARMA(0,0)-GJR(1,1) - norm	2	5	0,02	0,34	0,54	-0,056	12	21	0,02	0,051	0,49	-0,037
	ARMA(0,0)-GJR(1,1) - student-t	2	5	0,02	0,34	0,54	-0,057	12	21	0,02	0,051	0,49	-0,037
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,02	0,34	0,54	-0,057	12	20	0,04	0,07	0,99	-0,037
	ARMA(1,0)-GJR(1,1) - norm	2	5	0,02	0,34	0,54	-0,055	12	20	0,04	0,07	0,99	-0,037
	ARMA(1,0)-GJR(1,1) - student-t	2	5	0,02	0,34	0,54	-0,056	12	19	0,08	0,1	0,67	-0,037
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,02	0,34	0,54	-0,057	12	19	0,08	0,1	0,67	-0,037
	ARMA(1,1)-GJR(1,1) - norm	2	5	0,02	0,34	0,54	-0,055	12	20	0,04	0,07	0,99	-0,036
	ARMA(1,1)-GJR(1,1) - student-t	2	5	0,02	0,34	0,54	-0,056	12	19	0,08	0,1	0,67	-0,037
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	5	0,02	0,34	0,54	-0,057	12	19	0,08	0,1	0,67	-0,037
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,02	0,34	0,69	-0,058	12	21	0,02	0,051	0,74	-0,036
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,02	0,34	0,69	-0,06	12	19	0,08	0,1	0,72	-0,037
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,02	0,34	0,69	-0,06	12	18	0,13	0,12	0,92	-0,037
	ARMA(1,0)-GARCH(1,1) - norm	2	6	0,06	0,15	0,42	-0,058	12	21	0,02	0,051	0,98	-0,036
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,02	0,34	0,69	-0,059	12	18	0,13	0,12	0,92	-0,037
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,02	0,34	0,69	-0,06	12	18	0,13	0,12	0,92	-0,037
	ARMA(1,1)-GARCH(1,1) - norm	2	6	0,06	0,15	0,42	-0,058	12	20	0,04	0,07	0,99	-0,036
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,02	0,34	0,69	-0,059	12	18	0,13	0,12	0,92	-0,037
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,02	0,34	0,69	-0,06	12	18	0,13	0,12	0,92	-0,037
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,69	-0,057	12	21	0,02	0,051	0,49	-0,036
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,69	-0,058	12	21	0,02	0,051	0,49	-0,037
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,058	12	21	0,02	0,051	0,49	-0,036
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,69	-0,057	12	21	0,02	0,051	0,49	-0,036
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,69	-0,058	12	21	0,02	0,051	0,49	-0,036
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,058	12	21	0,02	0,051	0,49	-0,036
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,69	-0,057	12	21	0,02	0,051	0,49	-0,036
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,69	-0,058	12	21	0,02	0,051	0,49	-0,036
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,69	-0,058	12	21	0,02	0,051	0,49	-0,036

Table 97. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2015 using the MAX(5) identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	13	0	0	0,64	-0,032	12	21	0,02	0,051	0,69	-0,022
	ARMA(0,0)-GARCH(1,1) - student-t	2	10	0	0	0,88	-0,035	12	21	0,02	0,051	0,69	-0,022
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,039	12	17	0,22	0,13	0,51	-0,025
	ARMA(1,0)-GARCH(1,1) - norm	2	11	0	0	0,96	-0,032	12	21	0,02	0,051	0,67	-0,022
	ARMA(1,0)-GARCH(1,1) - student-t	2	10	0	0	0,82	-0,034	12	21	0,02	0,051	0,67	-0,022
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,039	12	17	0,22	0,13	0,51	-0,024
	ARMA(1,1)-GARCH(1,1) - norm	2	11	0	0	0,96	-0,032	12	21	0,02	0,051	0,27	-0,022
	ARMA(1,1)-GARCH(1,1) - student-t	2	10	0	0	0,82	-0,034	12	21	0,02	0,051	0,27	-0,022
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,039	12	18	0,13	0,12	0,93	-0,024
	ARMA(0,0)-GJR(1,1) - norm	2	13	0	0	0,64	-0,033	12	19	0,08	0,1	0,89	-0,023
	ARMA(0,0)-GJR(1,1) - student-t	2	9	0	0	0,64	-0,035	12	20	0,04	0,07	0,46	-0,023
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,63	-0,04	12	19	0,08	0,1	0,89	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	11	0	0	0,96	-0,032	12	21	0,02	0,051	0,27	-0,023
	ARMA(1,0)-GJR(1,1) - student-t	2	9	0	0	0,64	-0,034	12	21	0,02	0,051	0,27	-0,022
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,26	-0,038	12	19	0,08	0,1	0,87	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	11	0	0	0,96	-0,032	12	20	0,04	0,07	0,68	-0,023
	ARMA(1,1)-GJR(1,1) - student-t	2	9	0	0	0,64	-0,034	12	20	0,04	0,07	0,68	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,26	-0,039	12	20	0,04	0,07	0,68	-0,025
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,55	-0,041	12	19	0,08	0,1	0,68	-0,025
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,55	-0,042	12	17	0,22	0,13	0,51	-0,025
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,042	12	18	0,13	0,12	0,33	-0,025
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,55	-0,04	12	18	0,13	0,12	0,93	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,55	-0,041	12	17	0,22	0,13	0,51	-0,025
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,041	12	17	0,22	0,13	0,51	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,55	-0,039	12	18	0,13	0,12	0,93	-0,024
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,55	-0,04	12	18	0,13	0,12	0,93	-0,025
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,041	12	17	0,22	0,13	0,51	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,63	-0,04	12	19	0,08	0,1	0,89	-0,025
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,63	-0,041	12	19	0,08	0,1	0,89	-0,025
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,041	12	19	0,08	0,1	0,89	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,26	-0,038	12	20	0,04	0,07	0,68	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,26	-0,04	12	20	0,04	0,07	0,68	-0,025
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,93	-0,04	12	20	0,04	0,07	0,68	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,26	-0,038	12	19	0,08	0,1	0,83	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,26	-0,039	12	19	0,08	0,1	0,83	-0,025
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	7	0,02	0,052	0,83	-0,039	12	20	0,04	0,07	0,68	-0,025
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,55	-0,04	12	17	0,22	0,13	0,51	-0,025
	ARMA(0,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,55	-0,041	12	17	0,22	0,13	0,51	-0,025
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,041	12	17	0,22	0,13	0,51	-0,025
	ARMA(1,0)-GARCH(1,1) - norm	2	5	0,16	0,34	0,55	-0,039	12	17	0,22	0,13	0,51	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,55	-0,04	12	17	0,22	0,13	0,51	-0,025
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,04	12	17	0,22	0,13	0,51	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	5	0,16	0,34	0,55	-0,039	12	17	0,22	0,13	0,81	-0,024
	ARMA(1,1)-GARCH(1,1) - student-t	2	5	0,16	0,34	0,55	-0,04	12	18	0,13	0,12	0,93	-0,025
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	5	0,16	0,34	0,55	-0,04	12	17	0,22	0,13	0,51	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,63	-0,04	12	19	0,08	0,1	0,89	-0,025
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,63	-0,041	12	19	0,08	0,1	0,89	-0,025
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,63	-0,041	12	18	0,13	0,12	0,63	-0,025
	ARMA(1,0)-GJR(1,1) - norm	2	6	0,06	0,15	0,26	-0,039	12	20	0,04	0,07	0,68	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	6	0,06	0,15	0,26	-0,04	12	20	0,04	0,07	0,68	-0,025
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	5	0,16	0,34	0,21	-0,04	12	19	0,08	0,1	0,87	-0,025
	ARMA(1,1)-GJR(1,1) - norm	2	6	0,06	0,15	0,26	-0,039	12	19	0,08	0,1	0,83	-0,024
	ARMA(1,1)-GJR(1,1) - student-t	2	6	0,06	0,15	0,26	-0,04	12	19	0,08	0,1	0,83	-0,025
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	6	0,06	0,15	0,26	-0,04	12	20	0,04	0,07	0,68	-0,025

Table 98. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2015 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	12	0	0	0,97	-0,033	12	21	0,02	0,051	0,93	-0,023
	ARMA(0,0)-GARCH(1,1) - student-t	2	9	0	0	0,82	-0,036	12	21	0,02	0,051	0,93	-0,023
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,041	12	17	0,21	0,13	0,48	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	11	0	0	0,51	-0,033	12	19	0,08	0,1	0,87	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	10	0	0	0,82	-0,035	12	20	0,04	0,07	0,94	-0,023
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	4	0,38	0,64	0,63	-0,04	12	18	0,13	0,12	0,45	-0,025
	ARMA(1,1)-GARCH(1,1) - norm	2	12	0	0	0,96	-0,033	12	21	0,02	0,051	0,72	-0,023
	ARMA(1,1)-GARCH(1,1) - student-t	2	10	0	0	0,82	-0,035	12	21	0,02	0,051	0,72	-0,023
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,04	12	19	0,08	0,1	0,87	-0,025
	ARMA(0,0)-GJR(1,1) - norm	2	12	0	0	0,76	-0,034	12	20	0,04	0,07	0,94	-0,024
	ARMA(0,0)-GJR(1,1) - student-t	2	8	0,01	0,02	0,72	-0,036	12	20	0,04	0,07	0,94	-0,023
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,041	12	18	0,13	0,12	0,6	-0,026
	ARMA(1,0)-GJR(1,1) - norm	2	10	0	0	0,82	-0,033	12	21	0,02	0,051	0,72	-0,023
	ARMA(1,0)-GJR(1,1) - student-t	2	7	0,02	0,052	0,62	-0,035	12	21	0,02	0,05	0,72	-0,023
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,67	-0,04	12	19	0,08	0,1	0,87	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	9	0	0	0,64	-0,033	12	21	0,02	0,051	0,72	-0,024
	ARMA(1,1)-GJR(1,1) - student-t	2	7	0,02	0,052	0,62	-0,035	12	21	0,02	0,051	0,72	-0,023
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,67	-0,04	12	21	0,02	0,051	0,72	-0,025
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,44	-0,042	12	17	0,21	0,13	0,48	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,44	-0,043	12	17	0,21	0,13	0,48	-0,027
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,042	12	17	0,21	0,13	0,48	-0,027
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,44	-0,041	12	19	0,08	0,1	0,87	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,44	-0,042	12	18	0,13	0,12	0,45	-0,026
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,042	12	18	0,13	0,12	0,45	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,44	-0,041	12	19	0,08	0,1	0,87	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,44	-0,042	12	19	0,08	0,1	0,87	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,042	12	18	0,13	0,12	0,45	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,44	-0,041	12	20	0,04	0,07	0,94	-0,026
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,44	-0,042	12	20	0,04	0,07	0,94	-0,027
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,042	12	18	0,13	0,12	0,6	-0,027
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,67	-0,04	12	20	0,04	0,07	0,92	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,56	-0,041	12	20	0,04	0,07	0,92	-0,026
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,67	-0,041	12	19	0,08	0,1	0,87	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,67	-0,04	12	21	0,02	0,051	0,72	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,56	-0,041	12	21	0,02	0,051	0,72	-0,026
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	4	0,38	0,64	0,67	-0,041	12	21	0,02	0,051	0,72	-0,026
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,44	-0,041	12	17	0,21	0,13	0,48	-0,026
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,44	-0,043	12	17	0,21	0,13	0,48	-0,026
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,043	12	17	0,21	0,13	0,48	-0,026
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,44	-0,041	12	18	0,13	0,12	0,45	-0,025
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,44	-0,041	12	18	0,13	0,12	0,45	-0,026
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,042	12	18	0,13	0,12	0,45	-0,026
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,44	-0,04	12	19	0,08	0,1	0,87	-0,025
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,44	-0,041	12	19	0,08	0,1	0,87	-0,026
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,042	12	18	0,13	0,12	0,45	-0,026
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,44	-0,041	12	20	0,04	0,07	0,94	-0,026
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,44	-0,042	12	20	0,04	0,07	0,94	-0,026
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,44	-0,042	12	18	0,13	0,12	0,6	-0,026
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,56	-0,04	12	20	0,04	0,07	0,92	-0,025
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,56	-0,041	12	20	0,04	0,07	0,92	-0,026
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,56	-0,041	12	19	0,08	0,1	0,87	-0,026
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,56	-0,04	12	21	0,02	0,051	0,72	-0,025
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,56	-0,041	12	20	0,04	0,13	0,49	-0,026
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,56	-0,041	12	21	0,02	0,051	0,72	-0,026

Table 99. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2015 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,025	12	9	0,29	0,4	0,36	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,026	12	9	0,29	0,4	0,36	-0,017
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,97	-0,029	12	8	0,16	0,29	0,08	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,025	12	9	0,29	0,4	0,36	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,026	12	9	0,29	0,4	0,36	-0,017
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,97	-0,029	12	8	0,16	0,29	0,08	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,025	12	9	0,29	0,4	0,36	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,027	12	9	0,29	0,4	0,36	-0,017
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,97	-0,029	12	7	0,08	0,18	0,46	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,51	-0,025	12	9	0,29	0,4	0,36	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,51	-0,026	12	9	0,29	0,4	0,36	-0,017
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,15	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	4	0,38	0,64	0,51	-0,025	12	9	0,29	0,4	0,36	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	4	0,38	0,64	0,51	-0,026	12	9	0,29	0,4	0,36	-0,017
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,15	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	4	0,38	0,64	0,51	-0,025	12	9	0,29	0,4	0,36	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	4	0,38	0,64	0,51	-0,026	12	9	0,29	0,4	0,36	-0,017
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,97	-0,028	12	7	0,08	0,18	0,01	-0,018
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0,46	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,028	12	8	0,16	0,29	0,08	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,97	-0,028	12	8	0,16	0,29	0,08	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,03	12	7	0,08	0,18	0,46	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,028	12	8	0,16	0,29	0,08	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	2	0,74	0,93	0,97	-0,028	12	8	0,16	0,29	0,08	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0,46	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0,46	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0,46	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,02	-0,027	12	7	0,08	0,18	0,01	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,027	12	7	0,08	0,18	0,01	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,027	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,02	-0,027	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,027	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,02	-0,027	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,027	12	7	0,08	0,18	0,01	-0,018
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0,14	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0,14	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0,14	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0,14	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0,14	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0,14	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	6	0,04	0,1	0,58	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	6	0,04	0,1	0,58	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	6	0,04	0,1	0,58	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,02	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,15	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,15	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,02	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,15	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,15	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,15	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,15	-0,028	12	7	0,08	0,18	0,01	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	3	0,76	0,92	0,15	-0,028	12	7	0,08	0,18	0,01	-0,018

Table 100. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2016 using the MAX identified lottery stocks and composed of value-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,024	12	11	0,66	0,55	0,052	-0,017
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,026	12	12	0,88	0,54	0,12	-0,016
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,03	-0,018
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,024	12	13	0,89	0,48	0,07	-0,017
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,025	12	14	0,67	0,4	0,12	-0,016
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,028	12	10	0,45	0,5	0,08	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,024	12	12	0,88	0,54	0,0495	-0,017
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,025	12	14	0,67	0,4	0,12	-0,016
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,028	12	10	0,45	0,5	0,06	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,15	-0,024	12	11	0,66	0,55	0,052	-0,017
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,15	-0,025	12	13	0,89	0,48	0,15	-0,016
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,028	12	9	0,29	0,4	0,01	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,02	-0,024	12	11	0,66	0,55	0,11	-0,017
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,025	12	13	0,89	0,48	0,15	-0,016
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,028	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,15	-0,024	12	11	0,66	0,55	0,11	-0,017
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,025	12	13	0,89	0,48	0,15	-0,016
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,028	12	10	0,45	0,5	0,06	-0,018
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	7	0,08	0,18	0	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	6	0,04	0,1	0	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,08	-0,019
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,08	-0,019
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,08	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	8	0,16	0,29	0,04	-0,019
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	0,74	0,93	0,02	-0,029	12	8	0,16	0,29	0,04	-0,019
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,08	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	8	0,16	0,29	0,01	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	8	0,16	0,29	0,01	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	7	0,08	0,18	0	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,028	12	11	0,66	0,55	0,11	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,028	12	11	0,66	0,55	0,11	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,028	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,028	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,028	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,028	12	10	0,45	0,5	0,06	-0,018
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,03	12	6	0,04	0,1	0	-0,019
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	6	0,04	0,1	0	-0,019
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	6	0,04	0,1	0	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,08	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,08	-0,018
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	8	0,16	0,29	0,12	-0,018
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,08	-0,018
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,01	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,01	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,029	12	9	0,29	0,4	0,01	-0,018
	ARMA(1,0)-GJR(1,1) - norm	2	2	0,74	0,93	0,02	-0,028	12	11	0,66	0,55	0,11	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,029	12	11	0,66	0,55	0,11	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,029	12	11	0,66	0,55	0,11	-0,018
	ARMA(1,1)-GJR(1,1) - norm	2	2	0,74	0,93	0,02	-0,028	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	2	0,74	0,93	0,02	-0,028	12	10	0,45	0,5	0,06	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	2	0,74	0,93	0,02	-0,029	12	10	0,45	0,5	0,06	-0,018

Table 101. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2016 using the MAX identified lottery stocks and composed of equally-weighted returns.

		1 % VaR						5 % VaR					
		Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR	Pred. Viola.	Viol.	Unconditional p-value	Conditional p-value	Independence p-value	Mean VaR
Parametric	ARMA(0,0)-GARCH(1,1) - norm	2	4	0,38	0,64	0,69	-0,026	12	11	0,66	0,54	0,13	-0,018
	ARMA(0,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,027	12	12	0,88	0,54	0,046	-0,018
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	0	-	-	1	-0,031	12	9	0,29	0,4	0,02	-0,019
	ARMA(1,0)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,026	12	11	0,66	0,54	0,13	-0,018
	ARMA(1,0)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,027	12	11	0,66	0,54	0,13	-0,018
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	11	0,66	0,54	0,13	-0,019
	ARMA(1,1)-GARCH(1,1) - norm	2	3	0,76	0,92	0,15	-0,026	12	11	0,66	0,55	0,13	-0,018
	ARMA(1,1)-GARCH(1,1) - student-t	2	3	0,76	0,92	0,15	-0,027	12	11	0,66	0,55	0,13	-0,018
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	10	0,45	0,5	0,07	-0,019
	ARMA(0,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,15	-0,026	12	11	0,66	0,55	0,13	-0,018
	ARMA(0,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,15	-0,027	12	12	0,88	0,54	0,07	-0,018
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	3	0,76	0,92	0,15	-0,026	12	12	0,88	0,54	0,25	-0,018
	ARMA(1,0)-GJR(1,1) - student-t	2	3	0,76	0,92	0,15	-0,027	12	12	0,88	0,54	0,25	-0,018
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	10	0,45	0,5	0,054	-0,019
	ARMA(1,1)-GJR(1,1) - norm	2	3	0,76	0,92	0,15	-0,026	12	11	0,66	0,55	0,13	-0,018
	ARMA(1,1)-GJR(1,1) - student-t	2	3	0,76	0,92	0,15	-0,027	12	12	0,88	0,54	0,07	-0,018
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	10	0,45	0,5	0,054	-0,019
FHS	ARMA(0,0)-GARCH(1,1) - norm	2	0	-	-	1	-0,032	12	9	0,29	0,4	0,02	-0,02
	ARMA(0,0)-GARCH(1,1) - student-t	2	0	-	-	2	-0,032	12	9	0,29	0,4	0,02	-0,02
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	0	-	-	3	-0,032	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	8	0,16	0,29	0,14	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	8	0,16	0,29	0,14	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,03	12	9	0,29	0,4	0,28	-0,02
	ARMA(1,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	9	0,29	0,4	0,28	-0,02
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	10	0,45	0,5	0,054	-0,02
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,03	12	9	0,29	0,4	0,28	-0,02
	ARMA(1,1)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,03	12	9	0,29	0,4	0,28	-0,02
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,03	12	10	0,45	0,5	0,054	-0,02
EVT	ARMA(0,0)-GARCH(1,1) - norm	2	0	-	-	1	-0,032	12	9	0,29	0,4	0,02	-0,02
	ARMA(0,0)-GARCH(1,1) - student-t	2	0	-	-	1	-0,032	12	9	0,29	0,4	0,02	-0,02
	ARMA(0,0)-GARCH(1,1) - skewed student-t	2	0	-	-	1	-0,032	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,0)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,07	-0,02
	ARMA(1,0)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	11	0,66	0,54	0,13	-0,02
	ARMA(1,0)-GARCH(1,1) - skewed student-t	2	0	-	-	1	-0,031	12	10	0,45	0,5	0,07	-0,02
	ARMA(1,1)-GARCH(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,07	-0,02
	ARMA(1,1)-GARCH(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,07	-0,02
	ARMA(1,1)-GARCH(1,1) - skewed student-t	2	0	-	-	1	-0,031	12	10	0,45	0,5	0,07	-0,02
	ARMA(0,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(0,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,054	-0,02
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	0	-	-	1	-0,031	12	9	0,29	0,4	0,02	-0,02
	ARMA(1,0)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,03	12	10	0,45	0,5	0,054	-0,019
	ARMA(1,0)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,054	-0,019
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,054	-0,019
	ARMA(1,1)-GJR(1,1) - norm	2	1	0,28	0,55	1	-0,03	12	10	0,45	0,5	0,054	-0,019
	ARMA(1,1)-GJR(1,1) - student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,054	-0,019
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	1	0,28	0,55	1	-0,031	12	10	0,45	0,5	0,054	-0,019

Table 102. VaR estimation results of the portfolio when corrected for outliers.

Portfolio created in 2016 using the MAX(5) identified lottery stocks and composed of equally-weighted returns.

Appendix F. Total number of null hypotheses rejections per combination of method and filter for the corrected portfolios.

Table 103.Total number of null hypotheses rejections per combination of method and filter for the portfolios created with the MAX(5) identified stocks and composed of equally-weighted returns.

In this table, N 1 corresponds to the number of times the null hypothesis of unconditional coverage was rejected per combination of method and filter. Similarly, N 2 corresponds to the number of times the null hypothesis of conditional coverage was rejected, and N 3 corresponds to the number of times the null hypothesis of independence was rejected per combination of method and filter. A significance level of 5% was used.

		1 % VaR			5 % VaR		
		N 1	N 2	N 3	N 1	N 2	N 3
Parametric	ARMA(0,0)-GARCH(1,1) - norm	5	4	1	4	1	1
	ARMA(0,0)-GARCH(1,1) - student-t	5	4	1	4	2	2
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	1
	ARMA(1,0)-GARCH(1,1) - norm	4	4	1	2	1	1
	ARMA(1,0)-GARCH(1,1) - student-t	3	2	1	3	1	1
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	1	1	1	1
	ARMA(1,1)-GARCH(1,1) - norm	6	3	1	2	1	2
	ARMA(1,1)-GARCH(1,1) - student-t	5	2	1	3	1	2
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	1	1	1	2
	ARMA(0,0)-GJR(1,1) - norm	5	4	1	3	1	1
	ARMA(0,0)-GJR(1,1) - student-t	5	4	1	4	1	1
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	2	1	1	2
	ARMA(1,0)-GJR(1,1) - norm	5	4	1	2	1	1
	ARMA(1,0)-GJR(1,1) - student-t	4	1	1	2	1	1
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	1	1	1	1
	ARMA(1,1)-GJR(1,1) - norm	6	5	1	2	2	2
	ARMA(1,1)-GJR(1,1) - student-t	4	3	1	3	2	2
	ARMA(1,1)-GJR(1,1) - skewed student-t	1	0	0	2	2	2
FHS	ARMA(0,0)-GARCH(1,1) - norm	1	0	2	1	1	1
	ARMA(0,0)-GARCH(1,1) - student-t	1	0	2	1	1	1
	ARMA(0,0)-GARCH(1,1) - skewed student-t	1	0	2	1	1	1
	ARMA(1,0)-GARCH(1,1) - norm	0	0	2	1	1	2
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	2	1	1	2
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	2
	ARMA(1,1)-GARCH(1,1) - norm	0	0	2	1	1	3
	ARMA(1,1)-GARCH(1,1) - student-t	0	0	1	1	1	3
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	2	1	1	3
	ARMA(0,0)-GJR(1,1) - norm	1	0	1	2	1	1
	ARMA(0,0)-GJR(1,1) - student-t	1	0	1	2	1	1
	ARMA(0,0)-GJR(1,1) - skewed student-t	1	0	2	1	1	2
	ARMA(1,0)-GJR(1,1) - norm	0	0	2	2	1	1
	ARMA(1,0)-GJR(1,1) - student-t	0	0	1	2	1	2
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	1	1	1	2
	ARMA(1,1)-GJR(1,1) - norm	1	0	0	2	2	2
	ARMA(1,1)-GJR(1,1) - student-t	1	0	0	2	2	2
	ARMA(1,1)-GJR(1,1) - skewed student-t	1	0	0	2	2	2
EVT	ARMA(0,0)-GARCH(1,1) - norm	0	0	2	1	1	2
	ARMA(0,0)-GARCH(1,1) - student-t	0	0	2	1	1	2
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	1
	ARMA(1,0)-GARCH(1,1) - norm	0	0	2	1	1	1
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	2	1	1	1
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	1
	ARMA(1,1)-GARCH(1,1) - norm	0	0	1	1	1	2
	ARMA(1,1)-GARCH(1,1) - student-t	0	0	1	1	1	2
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	1	1	1	2
	ARMA(0,0)-GJR(1,1) - norm	0	0	2	2	1	2
	ARMA(0,0)-GJR(1,1) - student-t	0	0	1	2	1	1
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	2	1	1	2
	ARMA(1,0)-GJR(1,1) - norm	0	0	1	2	1	1
	ARMA(1,0)-GJR(1,1) - student-t	0	0	1	2	1	2
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	1	1	1	1
	ARMA(1,1)-GJR(1,1) - norm	1	0	0	2	2	2
	ARMA(1,1)-GJR(1,1) - student-t	1	0	0	2	2	2
	ARMA(1,1)-GJR(1,1) - skewed student-t	1	0	0	2	2	2

Table 104.Total number of null hypotheses rejections per combination of method and filter for the portfolios created with the MAX(5) identified stocks and composed of value-weighted returns.

In this table, N 1 corresponds to the number of times the null hypothesis of unconditional coverage was rejected per combination of method and filter. Similarly, N 2 corresponds to the number of times the null hypothesis of conditional coverage was rejected, and N 3 corresponds to the number of times the null hypothesis of independence was rejected per combination of method and filter. A significance level of 5% was used.

		1 % VaR			5 % VaR		
		N 1	N 2	N 3	N 1	N 2	N 3
Parametric	ARMA(0,0)-GARCH(1,1) - norm	3	2	2	2	2	0
	ARMA(0,0)-GARCH(1,1) - student-t	2	1	3	3	2	0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	2	2	1	0
	ARMA(1,0)-GARCH(1,1) - norm	2	1	2	3	2	0
	ARMA(1,0)-GARCH(1,1) - student-t	1	1	2	3	2	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	2	2	1	0
	ARMA(1,1)-GARCH(1,1) - norm	2	1	2	3	2	0
	ARMA(1,1)-GARCH(1,1) - student-t	1	1	1	3	3	0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	2	2	1	0
	ARMA(0,0)-GJR(1,1) - norm	4	1	1	4	0	0
	ARMA(0,0)-GJR(1,1) - student-t	3	0	1	4	0	0
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	1	3	0	0
	ARMA(1,0)-GJR(1,1) - norm	5	0	2	4	1	0
	ARMA(1,0)-GJR(1,1) - student-t	4	0	2	4	1	0
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	1	3	1	0
	ARMA(1,1)-GJR(1,1) - norm	5	0	2	4	1	0
	ARMA(1,1)-GJR(1,1) - student-t	2	0	1	4	1	0
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	1	3	1	0
FHS	ARMA(0,0)-GARCH(1,1) - norm	1	0	3	1	1	0
	ARMA(0,0)-GARCH(1,1) - student-t	0	0	2	1	1	0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	0
	ARMA(1,0)-GARCH(1,1) - norm	1	0	1	2	1	0
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	1	2	1	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	0	2	1	0
	ARMA(1,1)-GARCH(1,1) - norm	1	0	1	1	1	0
	ARMA(1,1)-GARCH(1,1) - student-t	1	0	1	2	1	0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	1	2	1	0
	ARMA(0,0)-GJR(1,1) - norm	1	0	1	3	1	0
	ARMA(0,0)-GJR(1,1) - student-t	2	1	1	3	0	0
	ARMA(0,0)-GJR(1,1) - skewed student-t	2	0	1	3	1	0
	ARMA(1,0)-GJR(1,1) - norm	2	0	1	3	1	0
	ARMA(1,0)-GJR(1,1) - student-t	2	0	0	2	1	0
	ARMA(1,0)-GJR(1,1) - skewed student-t	2	0	0	2	1	0
	ARMA(1,1)-GJR(1,1) - norm	3	0	1	3	1	0
	ARMA(1,1)-GJR(1,1) - student-t	2	0	0	2	1	0
	ARMA(1,1)-GJR(1,1) - skewed student-t	2	0	1	2	1	0
EVT	ARMA(0,0)-GARCH(1,1) - norm	1	0	1	2	1	0
	ARMA(0,0)-GARCH(1,1) - student-t	1	0	1	1	1	0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	1	0	1	1	1	0
	ARMA(1,0)-GARCH(1,1) - norm	0	0	1	3	1	0
	ARMA(1,0)-GARCH(1,1) - student-t	1	0	1	2	1	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	1	0	1	2	1	0
	ARMA(1,1)-GARCH(1,1) - norm	0	0	1	2	1	0
	ARMA(1,1)-GARCH(1,1) - student-t	1	0	1	2	1	0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	1	0	0	2	1	0
	ARMA(0,0)-GJR(1,1) - norm	1	0	1	4	1	0
	ARMA(0,0)-GJR(1,1) - student-t	0	0	0	3	0	0
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	0	3	0	0
	ARMA(1,0)-GJR(1,1) - norm	1	0	1	3	1	0
	ARMA(1,0)-GJR(1,1) - student-t	0	0	0	3	1	0
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	0	3	1	0
	ARMA(1,1)-GJR(1,1) - norm	1	0	1	3	1	0
	ARMA(1,1)-GJR(1,1) - student-t	0	0	0	3	1	0
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	1	3	1	0

Table 105.Total number of null hypotheses rejections per combination of method and filter for the portfolios created with the MAX identified stocks and composed of value-weighted returns.

In this table, N 1 corresponds to the number of times the null hypothesis of unconditional coverage was rejected per combination of method and filter. Similarly, N 2 corresponds to the number of times the null hypothesis of conditional coverage was rejected, and N 3 corresponds to the number of times the null hypothesis of independence was rejected per combination of method and filter. A significance level of 5% was used.

		1 % VaR			5 % VaR		
		N 1	N 2	N 3	N 1	N 2	N 3
Parametric	ARMA(0,0)-GARCH(1,1) - norm	1	1	2	2	2	0
	ARMA(0,0)-GARCH(1,1) - student-t	1	1	1	3	2	0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	1	1	1	0
	ARMA(1,0)-GARCH(1,1) - norm	1	1	2	2	2	0
	ARMA(1,0)-GARCH(1,1) - student-t	1	1	2	2	2	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	0	2	1	0
	ARMA(1,1)-GARCH(1,1) - norm	1	1	2	2	2	0
	ARMA(1,1)-GARCH(1,1) - student-t	1	1	1	2	2	0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	0	2	2	0
	ARMA(0,0)-GJR(1,1) - norm	2	1	0	1	0	0
	ARMA(0,0)-GJR(1,1) - student-t	0	0	0	1	0	0
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	1	0	0	1
	ARMA(1,0)-GJR(1,1) - norm	1	1	1	1	1	0
	ARMA(1,0)-GJR(1,1) - student-t	1	0	1	1	2	0
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	1	0	0	1
	ARMA(1,1)-GJR(1,1) - norm	1	1	0	1	0	0
	ARMA(1,1)-GJR(1,1) - student-t	1	0	0	1	2	0
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	0	1	1	1
FHS	ARMA(0,0)-GARCH(1,1) - norm	1	0	0	0	1	0
	ARMA(0,0)-GARCH(1,1) - student-t	1	0	0	0	1	0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	1	0	0	0	1	0
	ARMA(1,0)-GARCH(1,1) - norm	1	0	1	1	1	0
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	1	1	1	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	1	0	1	1	1	0
	ARMA(1,1)-GARCH(1,1) - norm	1	0	1	1	1	0
	ARMA(1,1)-GARCH(1,1) - student-t	1	0	1	1	1	0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	1	0	1	1	1	0
	ARMA(0,0)-GJR(1,1) - norm	0	0	1	0	2	1
	ARMA(0,0)-GJR(1,1) - student-t	0	0	2	0	0	1
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	2	0	0	1
	ARMA(1,0)-GJR(1,1) - norm	0	0	2	0	1	1
	ARMA(1,0)-GJR(1,1) - student-t	0	0	2	0	1	1
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	2	0	1	1
	ARMA(1,1)-GJR(1,1) - norm	0	0	1	0	0	1
	ARMA(1,1)-GJR(1,1) - student-t	0	0	1	1	1	1
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	1	0	1	1
EVT	ARMA(0,0)-GARCH(1,1) - norm	0	0	0	1	1	0
	ARMA(0,0)-GARCH(1,1) - student-t	0	0	0	1	1	0
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	0	1	1	0
	ARMA(1,0)-GARCH(1,1) - norm	0	0	0	1	1	0
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	0	1	1	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	0	1	1	0
	ARMA(1,1)-GARCH(1,1) - norm	0	0	0	2	1	0
	ARMA(1,1)-GARCH(1,1) - student-t	0	0	0	2	1	0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	0	2	1	0
	ARMA(0,0)-GJR(1,1) - norm	0	0	2	2	1	1
	ARMA(0,0)-GJR(1,1) - student-t	0	0	2	0	1	1
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	2	0	1	1
	ARMA(1,0)-GJR(1,1) - norm	0	0	3	1	1	1
	ARMA(1,0)-GJR(1,1) - student-t	0	0	2	1	1	1
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	2	0	1	1
	ARMA(1,1)-GJR(1,1) - norm	0	0	0	1	2	1
	ARMA(1,1)-GJR(1,1) - student-t	0	0	1	1	1	1
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	1	0	1	1

Table 106.Total number of null hypotheses rejections per combination of method and filter for the portfolios created with the MAX identified stocks and composed of equally-weighted returns.

In this table, N 1 corresponds to the number of times the null hypothesis of unconditional coverage was rejected per combination of method and filter. Similarly, N 2 corresponds to the number of times the null hypothesis of conditional coverage was rejected, and N 3 corresponds to the number of times the null hypothesis of independence was rejected per combination of method and filter. A significance level of 5% was used.

		1 % VaR			5 % VaR		
		N 1	N 2	N 3	N 1	N 2	N 3
Parametric	ARMA(0,0)-GARCH(1,1) - norm	4	3	1	4	1	1
	ARMA(0,0)-GARCH(1,1) - student-t	3	2	1	3	2	1
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	1	1	1	1
	ARMA(1,0)-GARCH(1,1) - norm	5	3	1	3	1	1
	ARMA(1,0)-GARCH(1,1) - student-t	3	2	1	3	2	2
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	1	1	1	0
	ARMA(1,1)-GARCH(1,1) - norm	4	2	1	4	1	1
	ARMA(1,1)-GARCH(1,1) - student-t	2	2	1	4	2	0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	1	1	1	0
	ARMA(0,0)-GJR(1,1) - norm	3	3	1	3	1	1
	ARMA(0,0)-GJR(1,1) - student-t	3	3	1	4	1	1
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	1	1	1	1
	ARMA(1,0)-GJR(1,1) - norm	4	4	2	2	1	0
	ARMA(1,0)-GJR(1,1) - student-t	1	1	2	3	1	1
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	2	1	1	0
	ARMA(1,1)-GJR(1,1) - norm	3	2	2	2	2	1
	ARMA(1,1)-GJR(1,1) - student-t	3	2	3	2	1	2
	ARMA(1,1)-GJR(1,1) - skewed student-t	1	0	3	2	1	1
FHS	ARMA(0,0)-GARCH(1,1) - norm	0	0	1	1	1	1
	ARMA(0,0)-GARCH(1,1) - student-t	0	0	1	1	1	1
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	2	2	1	1
	ARMA(1,0)-GARCH(1,1) - norm	0	0	1	1	1	0
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	1	1	1	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	1	1	1	0
	ARMA(1,1)-GARCH(1,1) - norm	0	0	2	1	1	1
	ARMA(1,1)-GARCH(1,1) - student-t	0	0	2	1	1	1
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	1	1	1	0
	ARMA(0,0)-GJR(1,1) - norm	0	0	1	1	1	1
	ARMA(0,0)-GJR(1,1) - student-t	0	0	1	1	1	2
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	1	1	1	1
	ARMA(1,0)-GJR(1,1) - norm	0	0	1	2	1	0
	ARMA(1,0)-GJR(1,1) - student-t	0	0	1	2	1	0
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	2	2	1	0
	ARMA(1,1)-GJR(1,1) - norm	0	0	1	1	1	1
	ARMA(1,1)-GJR(1,1) - student-t	0	0	2	1	1	1
	ARMA(1,1)-GJR(1,1) - skewed student-t	1	0	2	2	1	1
EVT	ARMA(0,0)-GARCH(1,1) - norm	0	0	3	2	1	2
	ARMA(0,0)-GARCH(1,1) - student-t	0	0	2	2	1	2
	ARMA(0,0)-GARCH(1,1) - skewed student-t	0	0	3	2	1	1
	ARMA(1,0)-GARCH(1,1) - norm	0	0	2	1	1	0
	ARMA(1,0)-GARCH(1,1) - student-t	0	0	2	1	1	0
	ARMA(1,0)-GARCH(1,1) - skewed student-t	0	0	2	1	1	0
	ARMA(1,1)-GARCH(1,1) - norm	0	0	2	1	1	0
	ARMA(1,1)-GARCH(1,1) - student-t	0	0	2	1	1	0
	ARMA(1,1)-GARCH(1,1) - skewed student-t	0	0	2	1	1	0
	ARMA(0,0)-GJR(1,1) - norm	0	0	2	1	1	1
	ARMA(0,0)-GJR(1,1) - student-t	0	0	2	1	1	1
	ARMA(0,0)-GJR(1,1) - skewed student-t	0	0	2	1	1	1
	ARMA(1,0)-GJR(1,1) - norm	0	0	3	2	1	0
	ARMA(1,0)-GJR(1,1) - student-t	0	0	3	2	1	1
	ARMA(1,0)-GJR(1,1) - skewed student-t	0	0	3	1	1	0
	ARMA(1,1)-GJR(1,1) - norm	1	0	3	1	1	1
	ARMA(1,1)-GJR(1,1) - student-t	0	0	3	1	1	1
	ARMA(1,1)-GJR(1,1) - skewed student-t	0	0	3	2	1	1