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Asymmetric regional dynamics in the Portuguese economy: debt, openness and local revenues

Fernando Alexandre^a , Helder Costa^b , Miguel Portela^c  and Miguel Rodrigues^d 

ABSTRACT

Regional convergence stands out in the adjustment of the Portuguese economy that followed the international financial crisis. This outcome contrasts with increasing regional inequality in other European countries. We investigate the role of regional indebtedness, openness to trade and local fiscal autonomy in regions' economic performance. Using a novel database, we contribute to a better understanding of the linkages between macroeconomic imbalances and regional economic dynamics. Our estimates suggest that regions' indebtedness had a negative impact on economic growth. On the other hand, openness to trade and fiscal decentralization had a positive impact on economic growth.

KEYWORD

regional economic convergence; resilience; debt; openness to trade; fiscal decentralization; international financial crisis

JEL E44, H63, H71, R11

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INTRODUCTION

The international financial crisis and the Eurozone crisis affected European Union (EU) countries asymmetrically. Several studies have described the asymmetric macroeconomic impact across European countries and provided explanations for the severity of those crises (e.g., Brunnermeier et al., 2018; Tooze, 2018). Bailed-out countries, namely Portugal, Spain and Greece, went through the most severe recessions. Giannakis and Bruggeman (2017) conclude that most regions in Austria, Belgium, Luxembourg, Germany and Sweden were resilient to economic downturn, whereas most of the regions in Southern European countries (Cyprus, Greece, Portugal and Spain) were non-resilient to the crisis. Fratesi and Rodríguez-Pose (2016) and Iammarino et al. (2019) notice that countries that had larger losses in real gross domestic product (GDP) per capita also showed regional economic divergence. Several studies have concluded that regional economic inequality increased in the aftermath of the international financial crisis (e.g., Palaskas et al., 2015;


Capello et al., 2015; Organisation for Economic Co-operation and Development (OECD), 2018). Openness to trade, financial markets, institutions and the sectoral composition of countries and regions have been identified as the main determinants of the heterogeneous spatial effects of the international financial crisis (e.g., Groot et al., 2011).

In this paper, we contribute to this literature by focusing on the asymmetric regional economic dynamics of the Portuguese economy in the period 2008–16. First, Portugal stands out as the bailed-out country where regional economic disparities decreased most following the international financial crisis. This singularity makes Portugal an interesting case to study the determinants of heterogeneous special effects in that context. Second, the dismal economic performance of the metropolitan region of AM Lisboa – the worst among all regions – contrasts with the impact of the international financial crisis and of the Eurozone crisis in most countries. Third, our empirical analysis benefits from a novel and very rich database that includes local data on households and firms' indebtedness, contributing


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to a better understanding of the linkages between macroeconomic imbalances and regional economic dynamics.

Portugal belongs to the group of countries with the deepest recession, with a 12% drop in real GDP between 2008 and 2012, only surpassed by Greece (−29%) and Spain (−13%). During the recession in the Eurozone, real GDP in the EU-28 decreased by 6%. During the recovery phase, the Portuguese economy was also in the group with the slowest GDP growth among the EU-28. By 2016, real GDP was still 5% below its 2008 level. In the period 2008–16, only Greece (−33%), Spain (−7%) and Italy (−7%) had a worse performance, whereas real GDP in the EU-28 was already 2% higher than in 2008. Therefore, the period beginning with the international financial crisis of 2008 was a period of aggregate economic divergence relative to the EU-28.¹

However, the Portuguese economy divergence relative to the EU-28 coincided with significant regional real GDP per capita convergence. In fact, Portugal stands out as the only bailed-out economy that registered a strong decrease in regional income inequality.

The results of a new research avenue, on the impact of financial crises, suggest that regions with higher debt-to-income ratios are expected to suffer deeper and longer recessions and weaker expansions, due to a strong contraction in the consumption of durables (e.g., Mian & Sufi, 2016). In this paper, we evaluate how the highly asymmetric distribution of debt across Portuguese regions impacted on the regional economic dynamics that followed the international financial crisis and the Eurozone crisis.

Openness to trade and regional specialization have been identified as important determinants of the resilience of regions to external shocks (e.g., Groot et al., 2011; Crescenzi et al., 2016). In the Portuguese economy, in the period 2008–16, the strong growth of exports was an important structural change. Exports are an opportunity to diversify markets and are associated with more innovative and higher productivity firms. This may strengthen firms and make regions more resilient to external shocks. In this paper, we assess the impact of openness to trade on region's economic growth and discuss its implications for regional convergence and resilience in the context of the international financial crisis.

Portugal is a very centralized country, with a very low weight of local government expenditures on total government expenditure (10% in 2016; International Monetary Fund (IMF), 2016). In the context of idiosyncratic regional business cycles, local governments have a very small share of resources at their disposal to define and implement policies that foster the resilience of regions to shocks. In this paper we use the weight of own revenues on total revenues of municipalities to evaluate the role of regional fiscal autonomy in making regions more resilient to external shocks.

The paper is organized as follows. The next section presents a literature review on the asymmetric regional economic impact of the international financial crisis and discusses the determinants of regional resilience in that context. The third section describes the regional economic dynamics of the Portuguese economy in the period 2008–

16, using data on regions' degree of indebtedness, openness to trade and local governments' revenues. The fourth section presents the econometric strategy used to test our hypotheses and the results are discussed. Finally, the fifth section concludes.

LITERATURE REVIEW

The international financial crisis and the Eurozone crisis affected EU countries asymmetrically, affecting real convergence within the Eurozone. However, as documented in several papers (e.g., Fingleton et al., 2012; Capello et al., 2015; Sensier & Artis, 2016; Giannakis & Bruggeman, 2017), the impact of those crises was also asymmetric within countries.

Openness to trade, financial markets, institutions and the sectoral composition of countries and regions have been identified as the main determinants of the heterogeneous spatial effects of the international financial crisis (e.g., Groot et al., 2011; Crescenzi et al., 2016). In this paper, we discuss the importance of those factors to the regional dynamics of the Portuguese economy in the period that followed the international financial crisis. We evaluate the role of regional indebtedness of households, firms and municipalities, of the degree of openness to trade of regions and of local fiscal autonomy in the regional economic growth. Our analysis also contributes to a better understanding of the transmission of international and national shocks to the regional economies through interest rates and the real exchange rates.

The creation of the euro eliminated the exchange rate risk and reduced drastically the interest rate risk premium: by 2005, Portuguese 10-year bond yields were equal to Germany's treasury rates, having decreased from 15% in 1990 to 3% in 2005. Low interest rates contributed to the huge accumulation of debt and capital inflows, reflected in high current account deficits since the mid-1990s. In 2008, the negative net international investment position surpassed 100% (it reached a minimum of −119% in 2014) and total private and public debt surpassed 300% of GDP (reaching a historic maximum of 380% in 2012). The international financial crisis and the euro crisis made those imbalances unsustainable, resulting in a sudden stop and a jump in the interest rates, from 5% in 2008 to 11% in 2012. In June 2011, the Portuguese economy was bailed out by the *troika* (i.e., the IMF, European Central Bank (ECB) and the European Commission). High and increasing public debt called for austerity measures, causing a deep contraction in domestic demand. Changes in the ECB's monetary policy in 2012 – signalled by Mario Draghi's 'whatever it takes to save the Euro' speech – reduced interest rates in the Eurozone: Portugal's 10-year bond yields decreased to 2% in 2015. In a highly indebted country, those swings in the interest rate are expected to have a strong impact on households' consumption and firms' investment (e.g., Rodriguez-Palenzuela & Dees, 2016).

The availability of individual data on households' and firms' bank debt (large-scale microeconomic databases)

allowed the development of a new research avenue that has contributed to a better understanding of the origins, propagation and consequences of financial crises at the regional level (e.g., Mian & Sufi, 2016). Mian and Sufi (2016) used county-level data on auto sales and building permits for the United States to show that durable consumption declined earlier and more sharply in counties that had a larger increase in household leverage. Similar results were found for the UK (Bunn & Rostom, 2016) and Denmark (Andersen et al., 2016). In this paper, we follow this literature to evaluate the relevance of the asymmetric debt-to-GDP ratios across regions on economic growth and on the adjustment process following an external shock. We use a novel and very rich microeconomic database to test that hypothesis for the Portuguese economy.

Bailed-out countries, such as Portugal, Greece or Spain, went through a deep contraction in domestic demand, magnified by austerity measures. In this context, the increase in exports became a priority, both as an engine of economic growth and as a way to restore external balance. Between 2010 and 2016, the annual average real growth rate of exports was 6.1%, resulting in an increase in the exports to GDP ratio from 30% in 2010 to > 40% in 2014 (from 26% to 33% in Spain). As argued by Blanchard and Portugal (2017), the increase in the weight of tradable sectors is one of the most important structural transformations of the Portuguese economy in the last decade (e.g., Capello et al., 2016) for an analysis of structural changes in European regions resulting from the impact of the international financial crisis.

Openness to trade varies significantly across regions, reflecting differences in the sectoral specialization. Regions with a higher export-to-GDP ratio are more exposed to international competition. Exporting firms are usually more productive and innovative than the average firm of the economy. More open to trade regions also have a higher share of skilled labour and are more flexible to react to economic shocks and are, therefore, more resilient. For example, Petrakos and Psycharis (2015), analysing the impact of the financial crisis in Greece, conclude that regions specialized in export-oriented sectors were more resilient. Resilience may be defined as the ability to accommodate and adjust to external shocks and the capacity of governments to define the appropriate policies to respond to unexpected shocks (e.g., Simmie & Martin, 2010; Davies, 2011; Fratesi & Perucca, 2018). In the context of the Portuguese economy and its change towards a more tradable structure, we should also bear in mind the so-called ecological concept of resilience that refers to a region's capacity to change its structure following an economic shock.

In Portugal, the excellent performance of exports benefited from a significant real exchange rate depreciation in that period, which improved the country's competitiveness. The impact of the real effective exchange rate depends, among other factors, on the degree of openness to trade (e.g., Klein et al., 2003; Alexandre et al., 2011, 2017). Between 2008 and 2015, the Portuguese real effective exchange rate depreciated by 11%, which should have

favoured the growth of exports of regions with a higher degree of openness to trade. In this paper, we use the export-to-GDP ratio as a proxy for openness to trade. Our econometric model will be specified to evaluate how openness to trade affected regions' economic growth in the context of the international financial crisis.

Regional asymmetries in debt-to-GDP ratios and export-to-GDP ratios may lead to idiosyncratic regional business cycles (e.g., Groot et al., 2011). In this case regional policies may foster the resilience of regions to shocks (e.g., Martin et al., 2016; Bailey & Berkeley, 2014). Portugal is a very centralized country and, therefore, local governments have a very small share of resources at their disposal to define and build regionally fitted policies. Additionally, a very demanding fiscal consolidation process resulted in a strong decrease of transfers to local governments. In this context, local governments were left with the option of increasing their own revenues, that is, revenues that depend on the level of economic activity and on municipalities' policy choices. Throughout the Eurozone crisis, bailed-out countries had to implement strong fiscal consolidation measures, without a thorough assessment of its impact at the regional level. Those constraints on fiscal policy, at the national level (and of the monetary policy, at the Eurozone level), raise challenges for the insulation of regions from shocks.

The level of fiscal decentralization is an indicator of the share of responsibilities between the different levels of government (Kyriacou et al., 2017). Since the late 1960s, political economists argued that enabling local government to have more discretionary power over public expenditures could bring both economic and political improvements to their communities. In particular, decentralization allows for a better identification of the services to be provided with the needs of the community it actually aims to serve (e.g., Oates, 1999). On the other hand, regions' greater fiscal autonomy also provides local officials with greater decision-making power to design policy options that best serve their constituencies and respond to specific economic shocks. Therefore, we will also test the hypothesis that a variation in the weight of the own revenues over total revenues, an indicator of fiscal autonomy, may foster the resilience of regions to shocks.

REGIONAL ASYMMETRIES: GROWTH, DEBT, OPENNESS TO TRADE AND LOCAL REVENUES

In this section we describe the regional asymmetries in terms of GDP growth, households', firms' and local governments' indebtedness, openness to trade and fiscal decentralization. We use yearly longitudinal data for the 23 Portuguese mainland NUTS-III regions, for the period 2008–16, that will be the focus of our empirical analysis.² However, in this section, we also provide some information concerning NUTS-II regions.³ The sources of information are the Banco de Portugal, *Direcção-Geral das Autarquias Locais* (DGAL), Statistics Portugal (INE), Eurostat and

the Annual Macro-Economic database of the European Commission (AMECO).

Regional real GDP per capita convergence

In our analysis we use regional real GDP per capita growth rate to measure the impact of the international financial crisis (data are from the *Contas Regionais*, INE, in 2015 prices). Figure 1 describes the information for NUTS-III regions for the periods 2008–12, 2012–16 and 2008–16. The very heterogeneous growth patterns of regional GDP per capita stands out in both the recession and the recovery periods. Some regions had a much more severe recession than others (see Figure 1(a) for the period 2008–12). In Alentejo Litoral (–17%), Algarve (–17%) and Lisboa (–15%) real GDP per capita decreased more than the national economy (–12%). On the other hand, Douro (–2%), Alto Minho (–2%) and Ave (–4%) had much milder recessions. Regions have also shown a very heterogeneous economic dynamics in the recovery phase (see Figure 1(b) for the period 2012–16). Some regions had a much stronger recovery, with higher than average real GDP per capita growth rates: Alentejo Litoral (+29%), Ave (+20%), Alto Minho and Tâmega e Sousa (+14%). On the other hand, six regions had lower than average real GDP growth rates per capita: Alto Tâmega (10%), Viseu Dão Lafões (10%), Lezíria do Tejo (10%), Baixo Alentejo (9%), Lisboa (5%) and Beira Baixa (4%). Once again, the Lisboa region stands out as the one with the poorest performance.

Overall, regions with a lower decrease in GDP and a stronger recovery are located in NUTS-II regions Norte and Centro (Figure 1(c)). Between 2008 and 2016, GDP per capita of regions NUTS-II Centro and Norte increased, respectively, from 84% to 87% and from 80% to 85% of the national average GDP per capita.

In 2016 there were five NUTS-III regions with a lower real GDP per capita than in 2008: Porto (–2%), Oeste (–2%), Algarve (–3%), Lezíria do Tejo (–6%) and Lisboa (–10%). On the other hand, the highest GDP growth per capita was in the regions of Ave (15%), Douro (12%) and Alto Minho (11%).

The Lisboa region, the richest Portuguese region, stands out as one with the worst economic performance in the period 2008–16. In fact, along with Lezíria do Tejo, the AM Lisboa region is the only region in the worst-performing category, described with the lighter shade, in all three periods. As a result of that disappointing performance, real GDP per capita of the Lisboa region decreased from 143% of the national average, in 2008, to 132%, in 2016.

The dismal performance of the metropolitan area of Lisboa, the capital of Portugal, was somewhat unexpected. In fact, several studies have concluded that large metropolitan areas are more resilient to economic shocks (e.g., Capello et al., 2015; Fratesi & Perucca, 2018; OECD, 2018). The greater resilience of metropolitan or more urban areas has been related to the existence of better infrastructures, a higher concentration of skilled workers, a higher share of innovative firms, access to information

and knowledge or a greater integration in the international economy. Capello et al. (2015, 2016) assess the long-run impact of the crisis and conclude that innovative and rich capital regions are expected to be less affected in the long-run. These authors conclude that although urban areas with a high concentration of financial services were more affected by the international financial crisis, they were able to recover more rapidly. Again, the poor economic performance of the region of Lisboa does not corroborate those results. It seems that the region was unduly endowed with territorial capital (see Fratesi & Perucca, 2018, for a definition) to counteract the negative impact of the financial and banking crisis. In the fifth section, we argue that this result may be related to the change in the structure of the Portuguese economy towards a more open to trade economy.

To assess the outcome in terms of regional convergence of the asymmetric regional dynamics described above, we compute the coefficient of variation, using NUTS-III regions real GDP per capita (see Table A1 in Appendix A in the supplemental data online). The results show a strong decrease in regional income inequality for Portugal (–12%). On the other hand, Greece (1%), Spain (7%) and Italy (4%) have all increased the dispersion of income across regions. The computation of the coefficient of variation for the EU-28 countries, in the period 2008–15, shows that Portugal had the highest decrease in the coefficient of variation (see Table A1).⁴ These results show that divergence in real GDP per capita at the aggregate level, following the international financial crisis and the sovereign debt crisis, coincided with significant regional convergence. In the fourth section, we will use our econometric model to evaluate β -convergence.

Regions' indebtedness

We use a microeconomic database from the Central Credit Responsibility Database (CCRD), collected and made available by the Banco de Portugal, to describe the regional distribution of debt and the asymmetries in debt-to-GDP ratios. The CCRD has detailed information on the indebtedness of borrowers (including collective persons, individual entrepreneurs and private persons) as reported by credit-granting institutions. To the best of our knowledge, this is the first paper to use these micro-data at the regional level.⁵ Additionally, we also consider the debt of municipalities aggregated by NUTS-III regions from the *Anuários Estatísticos Regionais*, INE. We use these data to build aggregate debt-to-GDP ratios at the regional level, which allow us to describe the regional distribution of households and firms' debt and its weight on the GDP of each region.

Portugal reveals a high concentration of aggregate private and local governments' debt in the NUTS-III Lisboa and Porto regions (61% of total debt in 2009). Figure 2 shows the debt-to-GDP ratio for NUTS-III regions. Except for Terras de Trás-os-Montes, all regions had a significant reduction in their debt-to-GDP ratio between 2009 and 2016. The debt data show that, in 2009, all regions had a debt-to-GDP ratio > 100%. However, there was a great variation in the debt-to-GDP ratios

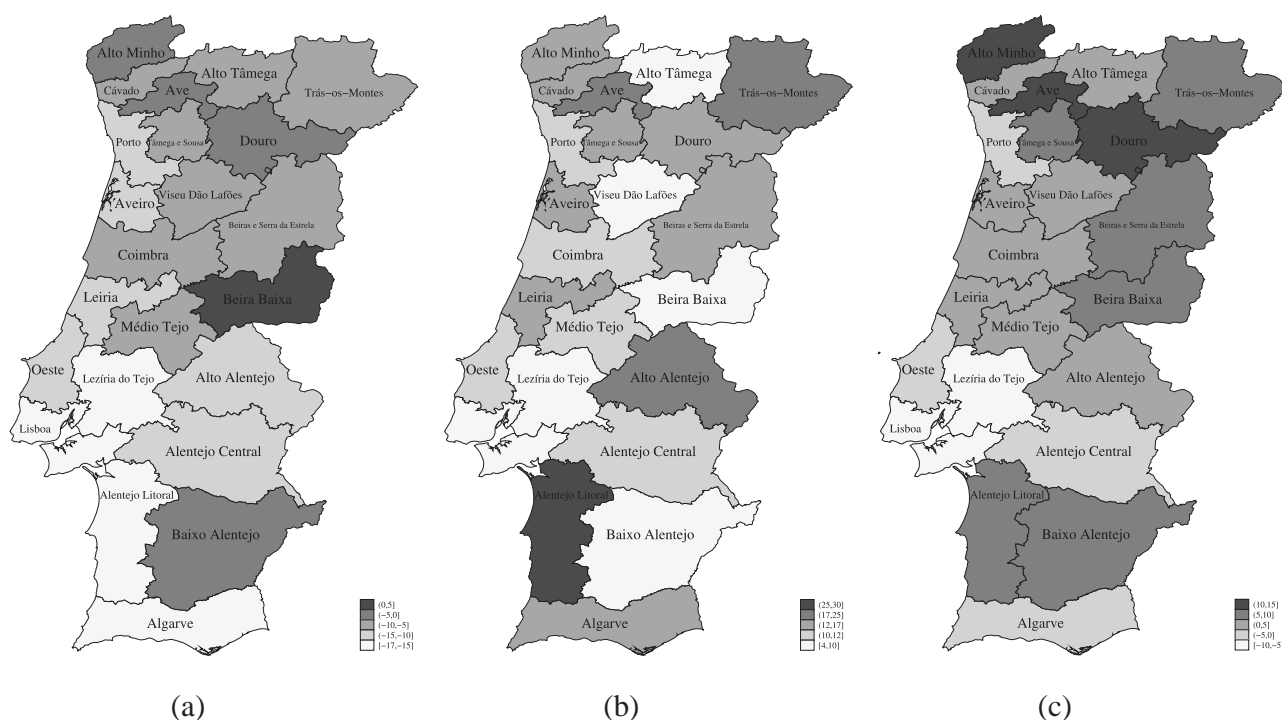


Figure 1. Gross domestic product (GDP) per capita growth rate, NUTS-III (2015 prices) (top-performing regions are represented in darker shades).

Source: Authors' own computations using data from Eurostat and Statistics Portugal (INE).

across regions, ranging from > 180% in the regions of Algarve and Lisboa to 102% in Alentejo Litoral. Between 2009 and 2016, the variation in debt-to-GDP ratio was also very heterogeneous across regions. The Algarve has had the highest absolute decrease in this ratio (−61 percentage points), followed by Porto, Ave, Cávado and Tâmega e Sousa, all with a decrease of around 50 percentage points. In terms of NUTS-II regions, in Norte and Centro, between 2009 and 2016, the debt-to-GDP ratio decreased by 48 and 26 percentage points, respectively, to approximately 112%.

Regions' openness to trade

The degree of openness to trade is a measure of the specialization of regions. As discussed in the second section, the growth of exports was the main engine of economic growth and resulted in an important structural transformation of the Portuguese economy. Regions' more open to international trade are expected to have performed better than regions that were more dependent on domestic demand. The increase in the weight of tradables on the sectoral composition of regions may reflect a move towards new specialization of the economy that may result in a higher growth rate of the potential GDP. In this sense, openness to trade or a specialization in exports may enhance the resilience of regions to economic shocks.

The regions' degree of openness to trade is measured by the export-to-GDP ratio, using data from the *Anuários Estatísticos Regionais*, INE. Given the availability of data, our measure of openness only considers the exports of goods. Figure 3 shows export-to-GDP ratios for NUTS-

III regions, for 2008 and 2016. The data show an increase in openness to trade in most regions and a wide variation across regions, varying from a maximum in 2016 of 107% in Beira Baixa to almost 0% in regions such as Alto Tâmega, Douro and Algarve. The average export-to-GDP ratio increased from 17% in 2009 to > 30% in 2016 (see Table A2 in Appendix A in the supplemental data online). For NUTS-II regions, in 2016, Norte and Centro show the highest export-to-GDP ratios, 38% and 31%, respectively. Between 2009 and 2016, the export-to-GDP ratio increased around 12 percentage points.

Local governments' revenues

In order to assess the differences of specific policies that local authorities were able to gather and implement, we analyse the revenues of local governments. We focus on the total level of revenues, its composition and variation across regions. As discussed above, the very low share of local government expenditure suggests that local and regional administration have limited resources to counter the effects of strong aggregate shocks.⁶ The data in this section are collected at a municipal level and then aggregated at a regional level.

In the period 2008–14, local governments' total revenues declined by 11.5%. In 2016, total revenues had recovered by 4.6%. The revenues of the local administration can be broadly divided into transfers from the central government and own revenues. Transfers from the central government are made through the Financial Equilibrium Fund (FEF), which is the main instrument of financial transfers from central to local governments. It is grounded on 19.5%

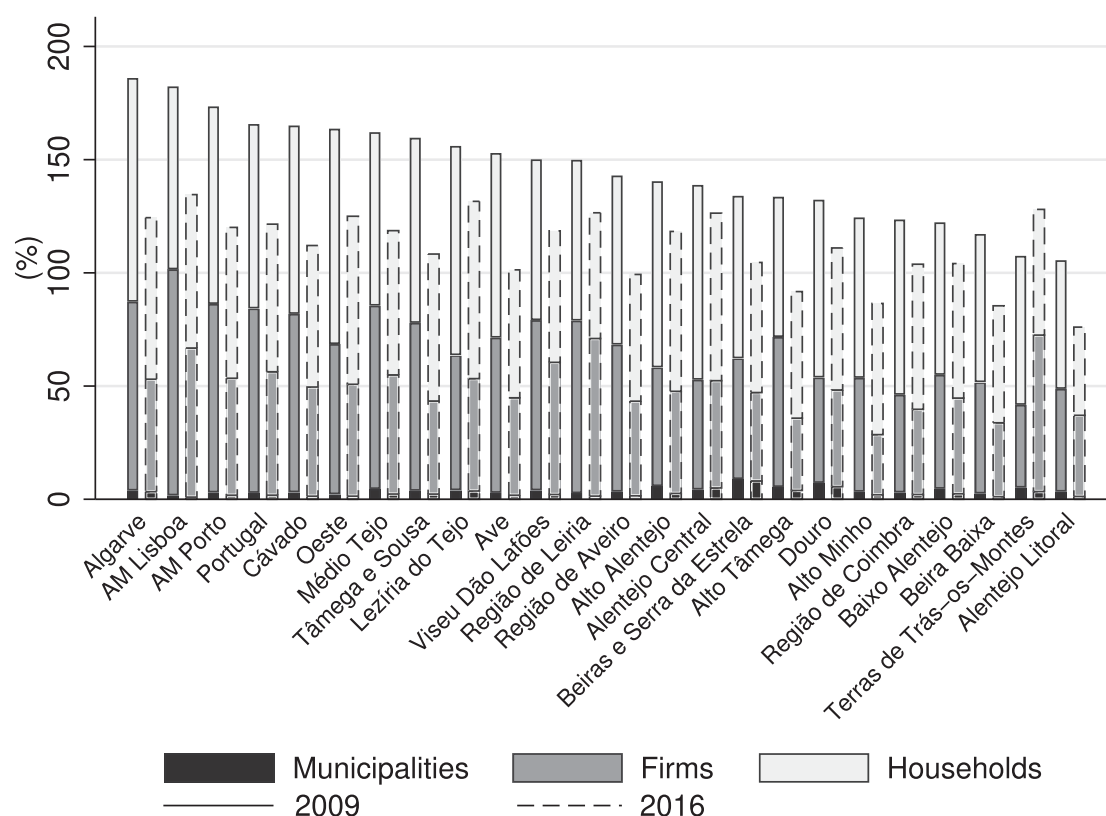


Figure 2. Debt-to-gross domestic product (GDP) ratio, NUTS-III regions, 2009 and 2016.

Source: Authors' own computations using data from the Central Credit Responsibility Database (CCRD), Banco de Portugal and *Anuários Regionais*, Statistics Portugal (INE).

of the tax revenues over consumption, individual and corporate revenues collected at a central level.⁷

As local governments faced a substantial reduction in the resources transferred from the central government, they had to focus on their own capabilities to raise revenues

(Figure 4). Own revenues of local governments depend both on the economic characteristics of the regions and on their policy choices. Own revenues components include: (1) the sales of goods and services supplied locally, where municipalities define the price; (2) revenues from the

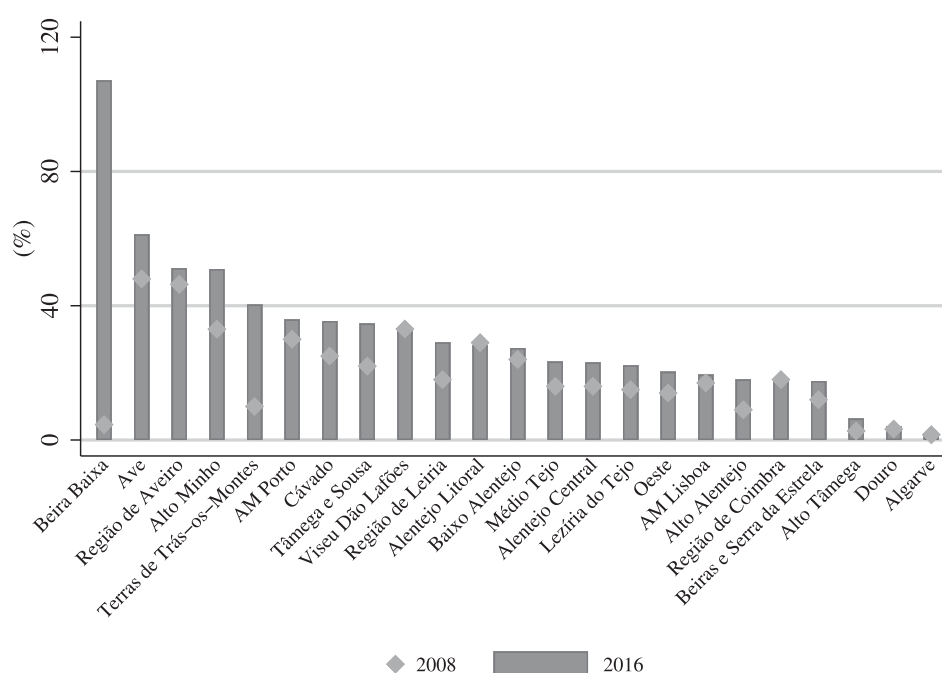


Figure 3. Exports to gross domestic product (GDP) ratio, NUTS-III regions, 2008 and 2016.

Source: Authors' own computations using data from Statistics Portugal (INE).

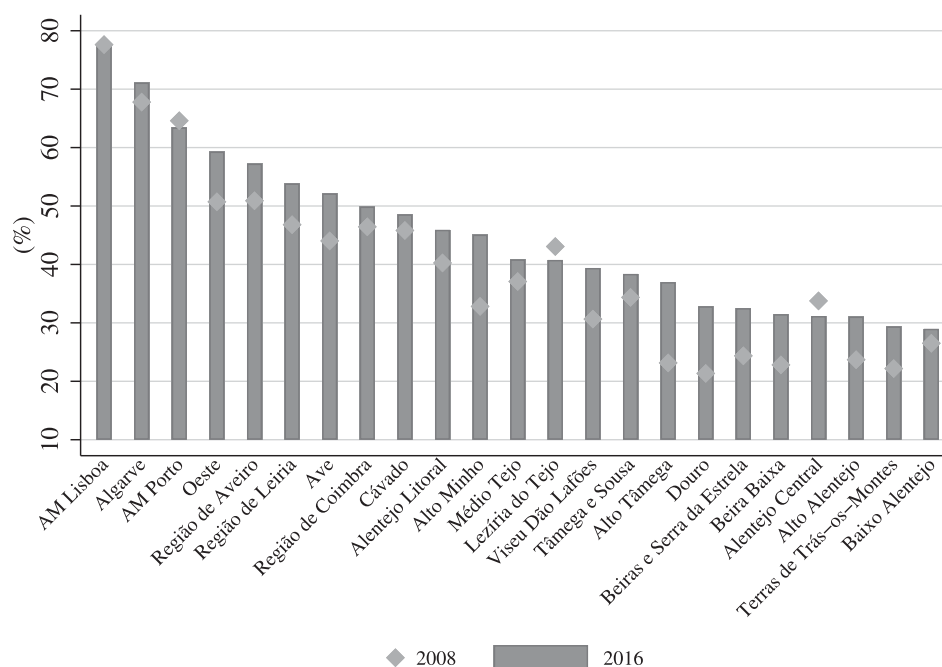


Figure 4. Share of own revenues by NUTS-III regions, 2008 and 2016.
Sources: *Direcção-Geral das Autarquias Locais* (DGAL) and Statistics Portugal (INE).

personal income tax (IRS), where local entities define the tax rate, bounded between 0% and 5%; (3) the revenues over the firms' profits (*derrama*), which may reach a maximum tax rate from 0% to 1.5%; (4) the revenues from real estate property, where the tax rate may be settled between 0.30% and 0.45%; and (5) additionally, local governments obtain revenues from taxes on both sales of real estate and the use of motor vehicles; in both cases tax rates are set by the central government.

Figure 4 shows the weight of own revenues over total revenues for NUTS-III regions, for 2008 and 2016. That ratio was computed as an average of the ratio of own revenues to total revenues of the municipalities that belong to each NUTS-III region. The great majority of the regions display an increase in the weight of their own revenues. Only the regions of Porto, Lezíria do Tejo and Alentejo Central have experienced a minor drop in the weight of own revenues. Regions show a wide range of weights on total revenues, from a maximum of 78% in the Lisboa region to a minimum of 29% in Baixo Alentejo. We can also highlight the fact that, besides the regions of Lisboa, Algarve and Porto, which kept their shares of own revenues at the same level, almost all other regions were able to increase their own revenues to balance the reduction in the FEF. In the next section, we will test whether the ability of local governments to increase the share of own revenues had a positive impact in the regions' economic growth.

EMPIRICAL ANALYSIS

In the second section, we discussed the linkages between macroeconomic imbalances and the asymmetric regional economic dynamics of the Portuguese economy. The Portuguese crisis was a debt crisis. On the other hand, in the context of

a strong contraction of domestic demand, following austerity measures, exports were an important driver of economic growth since 2010. In this section, we define an econometric model that aims to identify the role of indebtedness and exports in regional economic growth. Furthermore, our econometric specification evaluates how interest rate and exchange rate variations, which are determined by national and international conditions, impact on regions' economic growth given their indebtedness and openness to trade. The econometric specification allows us to test our four hypotheses:

- Was there convergence in GDP per capita across regions?
- Did regions with a higher debt-to-GDP ratio go through a severe recession?
- Did regions with a higher degree of openness to trade benefit more from the real exchange rate depreciation?
- Was there a role for fiscal decentralization, namely through local governments' own revenues, on regions' resilience?

To evaluate the impact of those determinants on regions' economic growth, we build on Durlauf et al. (2009) and specify the following econometric model:

$$\begin{aligned}
 \ln(GDP_{pc})_{i,t} = & \alpha \ln(GDP_{pc})_{i,t-1} + \beta_1 \ln(Investment)_{i,t-1} \\
 & + \beta_2 \ln(\Delta Employment)_{i,t} \\
 & + \beta_3 \ln(Debt_{ratio})_{i,t} + \beta_4 \ln(Debt_{ratio})_{i,t} \\
 & \times InterestRate_t + \beta_5 \ln(Exports_{ratio})_{i,t} \\
 & + \beta_6 \ln(Exports_{ratio})_{i,t} \times ExchangeRate_t \\
 & + \gamma X_{i,t} + \eta_i + \varepsilon_{i,t},
 \end{aligned} \tag{1}$$

where $\ln(GDP_{pc})_{i,t}$ is region i 's log real GDP per capita in year t .

Following standard growth regression analysis, equation (1) includes logs of a region's investment rate, $\ln(Investment)_{i,t-1}$, and of percentage change in a region's employment, $\ln(\Delta Employment)_{i,t}$, which are available from the *Anuários Estatísticos Regionais*, INE. Table A2 in Appendix A in the supplemental data online reports descriptive statistics for the variables used in our estimates for Portugal's mainland regions.

The key variables in our specification are the debt-to-GDP ratio, $\ln(Debt_{ratio})_{i,t}$, the exports to GDP ratio, $\ln(Exports_{ratio})_{i,t}$ and local governments' revenues included in vector $X_{i,t}$. The specification accounts for the possibility that the effect of debt-to-GDP ratio on GDP is conditional on the interest rate at the country level. Therefore, we include an interaction between the debt-to-GDP ratio and the long-term government bond yields (10 years) interest rate, $InterestRate_t$. Likewise, we include an interaction term between the exports-to-GDP ratio and the real effective exchange rate for the Portuguese economy, $ExchangeRate_t$. These two variables are retrieved from Eurostat and AMECO, respectively.

The vector $X_{i,t}$ stands for $\ln(TotalRevenue_{pc})_{i,t}$ in model 1; it includes the variables $\ln(OwnRevenue_{pc})_{i,t}$ and $\ln(FEF_{pc})_{i,t}$ in model 2; corresponds to $\ln(OwnRevenue_{ratio})_{i,t}$ in model 3; and finally represents $\ln(FEF_{ratio})_{i,t}$ in model 4. Finally, in order to control for NUTS-III regions unobserved heterogeneity, we consider a region-specific effect, η_i , and a white noise error term, $\varepsilon_{i,t}$.

We apply panel data estimation procedures to the longitudinal data described above to obtain estimates for equation (1). To address endogeneity issues we follow Arellano and Bover (1995) and Blundell and Bond (1998) and apply the system-generalized method of moments (GMM) estimator to the dynamic panel data model specified in equation (1). The variables $InterestRate$ and $ExchangeRate$ are treated as exogenous (the remaining variables are treated as endogenous). Given the short number of observations, we use second and third lags of the endogenous variables as instruments for the first-difference equation. For the level equation we applied the usual lagged first-differenced variables as instruments. In the computation of the variance-covariance matrix we use the two-step estimation with the finite-sample correction proposed by Windmeijer (2005). The statistics reported in Table 1 are robust to errors' heteroskedasticity and serial correlation. Finally, we report the Hansen consistent test for over-identifying restrictions.

The results of our estimations are presented in Table 1. Appendix A in the supplemental data online provides additional information on the validity of the model. Regional β -convergence is confirmed in models 1–4. The estimated α is < 1 and bounded between 0.62 and 0.75 and is always statistically significant at the 1% level.

Concerning the three remaining hypotheses of this paper, our findings are as follows. We found that the debt-to-GDP ratio has a negative effect on the region's

economic growth. Using the results of model 3, the combination of the parameters associated with the debt-to-GDP ratio, β_3 and β_4 , in equation (1), shows that a 10 percentage point increase in the $Debt_{ratio}$ leads to a 0.4% decrease in GDP.⁸ Furthermore, a 1 percentage point increase in the interest rate magnifies this immediate effect by about 0.01 percentage points (statistically significant at 1%). Our results corroborate the hypothesis that regions with a higher debt-to-GDP ratio had a higher GDP growth loss.

Our results also show that openness to trade, measured by the export-to-GDP ratio, has a positive impact on regional GDP growth. That effect is magnified by an exchange rate depreciation, as shown in the coefficient of the interaction term between the exports ratio and the real effective exchange rate. This parameter is always negative (an increase in the exchange rate represents an appreciation of the domestic currency) and highly statistically significant at the 1% level in model 3 and at the 5% level in the other models. The estimates reported in model 3 imply that a 1 percentage point depreciation in the exchange rate increases the immediate effect on GDP per capita growth by approximately 0.06 percentage points (statistically significant at 1%). These estimates are consistent with the view that regions with degree of openness to trade are more resilient to external shocks.

Finally, our results show that local governments' total revenues have a negative, and statistically significant at the 1% level, impact on regions' economic growth (model 1). This somewhat surprising result suggests that total revenues may be ill-conceived. Therefore, we investigate further the role of local government's revenues by looking at the effects of its two main components: own revenues and the FEF. Model 2 shows that own revenues are positive, but statistically not significant, while FEF has a negative, and statistically significant at the 1% level, impact on economic growth. These results reinforce the need for further investigation on the design and effectiveness of local governments' revenues, namely in the context of a severe economic crisis.

Models 3 and 4 evaluate the impact of increasing the fiscal scope for municipalities, measured by the weight of own revenues in their total revenues. Our results suggest that local governments with a higher weight of own revenues have a better economic performance: a 1 percentage point increase in the weight of own revenues is associated with a 0.22% increase in GDP (statistically significant at 1%). Reinforcing this result, estimates of model 4 show that a higher weight of central government's transfers (FEF) have a negative, and statistically significant at the 1% level, effect on the regions' economic growth: a 1 percentage point increase in weight of FEF over total revenues is associated with a 0.14% decrease in GDP (statistically significant at 1%). These results suggest that increasing the fiscal scope of regions to implement specific policies might enhance their resilience to external shocks.

Given the weight of the AM Lisboa region on the economy, we excluded it from our estimates as a robustness check. We concluded that the results were highly stable in terms of sign, magnitude and validity. Additionally, we run

Table 1. Estimation results.

	Model 1	Model 2	Model 3	Model 4
$\ln(\text{GDP}_{pc})_{i,t-1}$	0.7483*** (0.0453)	0.7450*** (0.0239)	0.6212*** (0.0536)	0.7502*** (0.0350)
$\ln(\text{Debt}_{ratio})_{i,t}$	-0.0174 (0.0311)	-0.0243 (0.0198)	-0.0372 (0.0231)	-0.0308 (0.0222)
$\ln(\text{Debt}_{ratio})_{i,t} \times \text{InterestRate}_t$	-0.0019*** (0.0001)	-0.0019*** (0.0001)	-0.0015*** (0.0001)	-0.0018*** (0.0001)
$\ln(\text{Exports}_{ratio})_{i,t}$	0.1414* (0.0740)	0.0675 (0.0409)	0.2124** (0.0789)	0.0714** (0.0282)
$\ln(\text{Exports}_{ratio})_{i,t} \times \text{ExchangeRate}_t$	-0.0015** (0.0007)	-0.0008** (0.0004)	-0.0022*** (0.0007)	-0.0008*** (0.0002)
$\ln(\text{TotalRevenue}_{pc})_{i,t}$	-0.0853*** (0.0224)			
$\ln(\text{OwnRevenue}_{pc})_{i,t}$		0.0119 (0.0294)		
$\ln(\text{FEF}_{pc})_{i,t}$		-0.0432*** (0.0066)		
$\ln(\text{OwnRevenue}_{ratio})_{i,t}$			0.0996*** (0.0259)	
$\ln(\text{FEF}_{ratio})_{i,t}$				-0.0553*** (0.0090)
AR(1)	-1.709	-1.882	-2.026	-2.019
AR(1) – pv	0.087	0.060	0.043	0.044
AR(2)	-1.417	-1.602	-1.488	-1.519
AR(2) – pv	0.156	0.109	0.137	0.129
Hansen χ^2	17.223	19.664	18.079	18.888
Hansen (d.f.)	12	14	12	12
Hansen, p-value	0.141	0.141	0.113	0.091

Note: The dependent variable is $\ln(\text{GDP}_{pc})_{i,t}$. All models are estimated by system-generalized method of moments (GMM) (all models include as control variables $\ln(\text{Investment})_{i,t-1}$ and $\ln(\Delta\text{Employment})_{i,t}$ – see equation 1). Robust standard errors shown in parentheses are clustered at the NUTS-III level. Significance: ***1%, **5% and *10%. Sample size: 184 observations, 23 NUTS-III and eight time periods. AR(1) and AR(2) are the Arellano–Bond tests for first- and second-order autocorrelation in the first differences of the idiosyncratic disturbance term, $\Delta\epsilon_{i,t}$; pv, p-value; d.f., degrees of freedom. Hansen refers to the test for joint validity of the instruments. Descriptive statistics are reported in Table A2 in Appendix A in the supplemental data online. See the discussion in the main text and notes in Table A2 for further information.

a second robustness check to deal with a possible source of endogeneity on own revenues, not entirely solved within the system-GMM estimation strategy. We have considered own revenues excluding income based taxes, IRS and *derrama*, and re-estimated equation (1). The estimates do not reject the validity of the main results reported in Table 1.⁹

CONCLUSIONS

In the context of the impact of the international financial crisis, we explored the relation between regional economic dynamics and two important economic drivers of the national economy: debt and exports. Our results show that these two important determinants of macroeconomic performance at the national level affected the regional economies asymmetrically. On the one hand, our estimates corroborate the hypothesis that regions with a higher debt-to-GDP ratio suffered a stronger negative impact on

economic growth. This impact was magnified by variations in the interest rates. Our results show that highly indebted regions are more vulnerable to external shocks, namely financial shocks.

On the other hand, our estimates corroborate the hypothesis that regions more open to international trade had a better economic performance in terms of GDP per capita growth. The Portuguese crisis has been associated to a high weight of non-tradable sectors due to a strong growth in sectors such as construction, real estate, retail services and government services (e.g., Reis, 2013). The region of Lisboa, the richest in the country, showed a very high weight of non-tradables sectors and a high dependence on government services, making it very exposed to the strong contraction in domestic demand following the bailout by the *troika*. On the other hand, regions specialized in export-oriented sectors adjusted better to the crisis and contributed to an increase in the weight of exports on GDP and to eliminate current account deficits.

In fact, the recovery of the Portuguese economy was based on the strong growth of exports. Therefore, the recession and recovery have been associated with a structural change in its sectoral composition and to a change in the contribution of different regions to aggregate GDP. This change towards a more tradable economy is expected to generate an increase in the growth rate of real potential GDP. In this sense, our results suggest that openness to trade was both a determinant of regional convergence and a factor of regional resilience, enhancing their ability to deal with future shocks.

Furthermore, our estimates indicate that the weight of own revenues on total revenues may enhance the regions' economic growth and resilience. Transfers from central government are determined by a set of legally established conditions that are not directly related to the economic situation of the territorial units. Their negative impact may result from the fact that they depend on last three years' fiscal revenues average. Therefore, they seem to be procyclical, deepening regional recessions. Our results suggest that own revenues, which depend on the fiscal options made by local powers, may work as an instrument to protect regions from idiosyncratic regional business cycles.

These results, by establishing a relation between regions' resilience and their capacity to raise own revenues, may support the case for more fiscal decentralization. The reallocation of responsibilities, allowing a bigger share of expenditures to be decided at a local level, may improve the matching between public policies and the economic needs of each region without increasing the fiscal effort of constituents. Our analysis also suggests that a more decentralized structure of governance, based on own revenues, should be conditional on a stringent control of public and private debt.

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NOTES

1. Table A1 in Appendix A in the supplemental data online presents the data for real GDP growth rates in European Union (EU-28) countries for the periods 2008–12 and 2008–16. According to the Centre for Economic Policy Research (CEPR) business cycle dating for the euro area, the first quarter of 2008 marks the peak of the business cycle before the international financial crisis and the first quarter of 2013 marks the trough of the business cycle after the recession originated by the euro sovereign debt crisis.
2. Portugal is subdivided into 25 NUTS-III regions. Each region aggregates several municipalities. We exclude the archipelagos of Madeira and Azores from our analysis because these regions are highly specialized as a result of their geographical position and have regional governments with political, financial and budgetary autonomy.
3. Portugal is subdivided into seven NUTS-II regions: AM Lisboa, Algarve and the archipelagos of Madeira and Azores coincide with NUTS-III regions. The other regions are Norte, Centro and Alentejo.
4. Weighted-by-population coefficient of variation computations yielded similar results. Computations for the Gini index confirm the results from the coefficient of variation.
5. Dentinho and Fortuna (2019), using macro-data for public debt in the region of Azores, in the period of the international financial crisis, conclude that it had a strong negative impact on employment.
6. In Portugal, local governments are composed of 278 municipalities in the continent and by two regional governments in the archipelagos of Azores (which includes 19 municipalities) and Madeira (which includes 11 municipalities).
7. Regime Jurídico das Autarquias Locais, Lei 75/2013 12 de setembro de 2013. Retrieved from http://www.pgdlisboa.pt/leis/lei_mostra_articulado.php?artigo_id=selected&nid=1990&tabela=leis&pagina=1&ficha=1&nversao=/.
8. The marginal effect is evaluated at the interest rate and average debt ratio in 2016, 3.2% and 110, respectively, and is statistically significant at the 10% level. Its standard error, computed by the delta method, is 0.002.
9. Given its extension, these robustness checks are not reported in Table 1. They are available in Appendix A in the supplemental data online.

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REFERENCES

- Alexandre, F., Bação, P., Cerejeira, J., & Portela, M. (2011). Employment and exchange rates: The role of openness and technology. *Open Economies Review*, 22(5), 969–984. <https://doi.org/10.1007/s11079-010-9191-z>
- Alexandre, F., Bação, P., Cerejeira, J., & Portela, M. (2017). Exchange rates, employment and labour market rigidity. *World Economy*, 40(5), 993–1011. <https://doi.org/10.1111/twec.12376>
- Andersen, A., Duus, C., & Jensen, T. (2016). Household debt and spending during the financial crisis: Evidence from Danish micro data. *European Economic Review*, 89, 96–115. <https://doi.org/10.1016/j.euroecorev.2016.06.006>
- Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, 68(1), 29–51. [https://doi.org/10.1016/0304-4076\(94\)01642-D](https://doi.org/10.1016/0304-4076(94)01642-D)
- Bailey, D., & Berkeley, N. (2014). Regional responses to recession: The role of the West Midlands Regional Taskforce. *Regional Studies*, 48(11), 1797–1812. <https://doi.org/10.1080/00343404.2014.893056>
- Blanchard, O., & Portugal, P. (2017). Boom, slump, sudden stops, recovery, and policy options. Portugal and the euro. *Portuguese Economic Journal*, 16(3), 149–168. <https://doi.org/10.1007/s10258-017-0139-8>
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115–143. [https://doi.org/10.1016/S0304-4076\(98\)00009-8](https://doi.org/10.1016/S0304-4076(98)00009-8)
- Brunnermeier, M. K., James, H., & Landau, J.-P. (2018). *The euro and the battle of ideas*. Princeton University Press.
- Bunn, P., & Rostom, M. (2016). Household debt and spending in the United Kingdom. In J. S. Chadha, A. Crystal, J. Pearlman, P. Smith, & S. Wright (Eds.), *The UK economy in the long expansion and its aftermath* (pp. 244–293). Cambridge University Press.
- Capello, R., Caragliu, A., & Fratesi, U. (2015). Spatial heterogeneity in the costs of the economic crisis in Europe: Are cities sources of regional resilience? *Journal of Economic Geography*, 15(5), 951–972. <https://doi.org/10.1093/jeg/lbu053>
- Capello, R., Caragliu, A., & Fratesi, U. (2016). The costs of the economic crisis: Which scenario for the European regions? *Environment and Planning C: Government and Policy*, 34(1), 113–130. <https://doi.org/10.1177/0263774X15614471>
- Crescenzi, R., Luca, D., & Milio, S. (2016). The geography of the economic crisis in Europe: National macroeconomic conditions, regional structural factors and short-term economic performance. *Cambridge Journal of Regions, Economy and Society*, 9(1), 13–32. <https://doi.org/10.1093/cjres/rsv031>
- Davies, S. (2011). Regional resilience in the 2008–2010 downturn: Comparative evidence from European countries. *Cambridge Journal of Regions, Economy and Society*, 4(3), 369–382. <https://doi.org/10.1093/cjres/rsr019>
- Dentinho, T. P., & Fortuna, M. A. (2019). How regional governance constrains regional development. Evidences from an econometric base model for the Azores. *Revista Portuguesa de Estudos Regionais*, 52, 25–35.
- Durlauf, S. N., Johnson, P. A., & Temple, J. R. (2009). The methods of growth econometrics. In T. C. Mills & K. Patterson (Eds.), *Handbook of econometrics*, Vol. 2: *Applied Econometrics* (pp. 1119–1179). Palgrave.
- Fingleton, B., Garretsen, H., & Martin, R. (2012). Recessionary shocks and regional employment: Evidence on the resilience of UK regions. *Journal of Regional Science*, 52(1), 109–133. <https://doi.org/10.1111/j.1467-9787.2011.00755.x>
- Fratesi, U., & Perucca, G. (2018). Territorial capital and the resilience of European regions. *Annals of Regional Science*, 60(2), 241–264. <https://doi.org/10.1007/s00168-017-0828-3>
- Fratesi, U., & Rodríguez-Pose, A. (2016). The crisis and regional employment in Europe: What role for sheltered economies? *Cambridge Journal of Regions, Economy and Society*, 9(1), 33–57. <https://doi.org/10.1093/cjres/rsv032>
- Giannakis, E., & Bruggeman, A. (2017). Economic crisis and regional resilience: Evidence from Greece. *Papers in Regional Science*, 96(3), 451–476. <https://doi.org/10.1111/pirs.12206>
- Groot, S. P., Möhlmann, J. L., Garretsen, J., & de Groot, H. L. (2011). The crisis sensitivity of European countries and regions: Stylized facts and spatial heterogeneity. *Cambridge Journal of Regions, Economy and Society*, 4(3), 437–456. <https://doi.org/10.1093/cjres/rsr024>
- Iammarino, S., Rodríguez-Pose, A., & Storper, M. (2019). Regional inequality in Europe: Evidence, theory and policy implications. *Journal of Economic Geography*, 19(2), 273–298. <https://doi.org/10.1093/jeg/lby021>
- International Monetary Fund (IMF). (2016). *Government finance statistics yearbook 2016*. IMF.
- Klein, M. W., Schuh, S., & Triest, R. K. (2003). Job creation, job destruction, and the real exchange rate. *Journal of International Economics*, 59(2), 239–265. [https://doi.org/10.1016/S0022-1996\(02\)00022-3](https://doi.org/10.1016/S0022-1996(02)00022-3)
- Kyriacou, A. P., Muínelo-Gallo, L., & Roca-Sagales, O. (2017). Regional inequalities, fiscal decentralization and government quality. *Regional Studies*, 51(6), 945–957. <https://doi.org/10.1080/00343404.2016.1150992>
- Martin, R., Sunley, P., Gardiner, B., & Tyler, P. (2016). How regions react to recessions: Resilience and the role of economic structure. *Regional Studies*, 50(4), 561–585. <https://doi.org/10.1080/00343404.2015.1136410>
- Mian, A., & Sufi, A. (2016). Who bears the cost of recessions? The role of house prices and household debt. In J. Taylor & H. Uhlig (Eds.), *Handbook of macroeconomics*, Vol. 2A (pp. 255–296). Elsevier.
- Oates, W. E. (1999). An essay on fiscal federalism. *Journal of Economic Literature*, 37(3), 1120–1149. <https://doi.org/10.1257/jel.37.3.1120>
- Organisation for Economic Co-operation and Development (OECD). (2018). *OECD regions and cities at a glance 2018*. OECD Publ.
- Palaskas, T., Psycharis, Y., Rovolis, A., & Stoforos, C. (2015). The asymmetrical impact of the economic crisis on unemployment and welfare in Greek urban economies. *Journal of Economic Geography*, 15(5), 973–1007. <https://doi.org/10.1093/jeg/lbv027>
- Petrakos, G., & Psycharis, Y. (2016). The spatial aspects of economic crisis in Greece. *Cambridge Journal of Regions, Economy and Society*, 9(1), 137–152. <https://doi.org/10.1093/cjres/rsv028>
- Reis, R. (2013). The Portuguese slump and crash and the euro crisis. *Brookings Papers on Economic Activity*, 46(1), 143–210.
- Rodríguez-Palenzuela, D., & Dees, S. (2016). *Savings and investment behaviour in the euro area*. Occasional Paper No. 167. European Central Bank.
- Sensier, M., & Artis, M. (2016). *The resilience of UK regional employment cycles*. Technical Report, Economics. University of Manchester.
- Simmie, J., & Martin, R. (2010). The economic resilience of regions: Towards an evolutionary approach. *Cambridge Journal of Regions, Economy and Society*, 3(1), 27–43. <https://doi.org/10.1093/cjres/rsp029>
- Tooze, A. (2018). *Crashed: How a decade of financial crises changed the world*. Penguin.
- Windmeijer, F. (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics*, 126(1), 25–51. <https://doi.org/10.1016/j.jeconom.2004.02.005>