

Delgado, Francisco J.

Article

On the determinants of fiscal decentralization: Evidence from the EU

Amfiteatru Economic Journal

Provided in Cooperation with:

The Bucharest University of Economic Studies

Suggested Citation: Delgado, Francisco J. (2021) : On the determinants of fiscal decentralization: Evidence from the EU, Amfiteatru Economic Journal, ISSN 2247-9104, The Bucharest University of Economic Studies, Bucharest, Vol. 23, Iss. 56, pp. 206-220, <https://doi.org/10.24818/EA/2021/56/206>

This Version is available at:

<https://hdl.handle.net/10419/281568>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<https://creativecommons.org/licenses/by/4.0/>

ON THE DETERMINANTS OF FISCAL DECENTRALIZATION: EVIDENCE FROM THE EU

Francisco J. Delgado*

University of Oviedo and GEN, Spain

Please cite this article as:

Delgado, F.J., 2021. On the Determinants of Fiscal Decentralization: Evidence From the EU. *Amfiteatru Economic*, 23(56), pp. 206-220.

DOI: 10.24818/EA/2021/56/206

Article History

Received: 18 September 2020

Revised: 28 October 2020

Accepted: 27 November 2020

Abstract

We empirically analyze the determinants of the fiscal decentralization in the European Union. Our approach consists on a quantile regression for the period 2005-2017. The results show the differences in the impact of explanatory variables on the fiscal decentralization by quantiles. Specifically, while GDP per capita or corruption are not significant in a linear modelling, both are relevant in the quantile approach with different effects along the distribution of fiscal decentralization. And other variables as population, density or inequality do not have neither the same impact among quantiles, denoting the limitations of using linear approaches for complex issues as fiscal decentralization.

Keywords: fiscal decentralization, federalism, European Union, quantile regression.

JEL Classification: H11, H77

* Contact author: fdelgado@uniovi.es

Introduction

The allocation of expenditure and revenue among the different levels of government, central and subcentral -local and regional or state in some countries-, is a major issue in Public Economics and, specifically, in Fiscal Federalism. The classical public functions of efficiency -allocation-, redistribution -equity- and stabilization (Musgrave, 1959) are permanently under the debate of the extent of fiscal decentralization, with large differences across nations, arranged as federal or unitary countries. That extent of fiscal decentralization depends on a wide array of factors, namely socioeconomic, institutional and, obviously, historical, in each territory. It should be also noted that the interest of focusing on fiscal decentralization processes is even greater in recent decades, with the need of undertaking fiscal adjustments to control the public debt, especially after the Great Recession, the integration processes as the eurozone, or the secession movements in countries as United Kingdom or Spain, among others.

Beyond the link between decentralization and economic growth, a major issue in this literature (Wasylenko, 1987; Martínez-Vázquez and McNab, 2003; Sato and Yamashige, 2005; Brueckner, 2006; Bodman, 2011; Chu and Yang, 2012; Baskaran and Feld, 2013; Yang, 2019; or Canavire-Bacarreza et al., 2020), inequality (Sepulveda and Martínez-Vázquez, 2011; Liu et al., 2017), welfare (Aslim and Neyapti, 2017), public sector efficiency (Adam et al., 2014), public sector employment (Martínez-Vázquez and Yao, 2009), government size (Cassette and Paty, 2010), tax incentives (Li, 2015), corruption (Arikan, 2004; Alfano et al., 2019) or even CO₂ emissions (Cheng et al., 2020), the determinants of fiscal decentralization have attracted limited attention in the literature*, reviewed in the next section. Due to the potentially relevant impacts of fiscal decentralization, the study of its determining factors deserves new empirical analysis with different approaches.

This paper contributes to the fiscal decentralization literature with the first study with quantile regression, to deal with potential nonlinearities and primarily to explore different impact of determining factors along the distribution of fiscal decentralization. In addition, we analyze the European case, not studied before with this aim†, especially interesting because it is an integrated economic area, although Member States enjoy a large degree of autonomy within their territories. Concretely, we consider 26 European countries and for the period 2005-2017.

The rest of the paper is organized as follows. Section 1 reviews the literature on determinants of fiscal decentralization. Section 2 describes the empirical strategy, based on quantile regression. Section 3 presents data, including a sigma convergence analysis of the fiscal decentralization measures, and main results. Finally, we offer the main conclusions and potential extensions of the work. The annex includes data for the initial and final years of the period (2005 and 2017).

* See Martínez-Vázquez et al. (2017) for a recent survey on the effects of fiscal decentralization.

† Jílek (2015) studied the tax decentralization in OECD-Europe countries and only for the local level of government, for the period 1995-2013.

1. Theoretical background and literature review

The theoretical background is based on seminal works on Fiscal Federalism and the role of levels of government, as Tiebout (1956)[‡], Oates (1972, 2005) and Zodrow and Mieszkowski (1986). Theoretically, subcentral levels of government should play a relevant role in the allocative function, basically in terms of local public goods[§] with the Decentralization Theorem (Oates, 1972) as main reference, while their function in the redistribution of income and stabilization of the economy would be less pronounced. In this manner, the optimal degree of fiscal decentralization has attracted theoretical research since those seminal works, as Janeba and Wilson (2011) or more recently Aslim and Neyapti (2017) and Bellofatto and Besfamille (2018).

And specifically, some papers addressed theoretically the determinants of fiscal decentralization, as Panizza (1999) or Arzaghi and Henderson (2005). Concretely, Panizza (1999), in his theoretical model, concluded that the level of fiscal centralization was inversely correlated with country size, income per capita, tastes differentiation and level of democracy. Subsequently, Arzaghi and Henderson (2005) offered a theoretical model based on the proposal by Panizza (1999) and also the literature on secession, where fiscal decentralization in a country was higher with higher income, larger population, larger in spatial terms, greater degree of local democratic culture and population concentrated in the hinterland.

As stated above, the determinants of fiscal decentralization have been analyzed in relatively few empirical papers to date. Table no. 1 summarizes the papers on this topic. It should be noted that the empirical evidence, short, is some contradictory about the significance of some variables and their impact (positive or negative), reaching mixed results depending the model, determining factors, countries and period considered. We will comment on these results in Section 3 with the results of the study. Hence, our empirical evidence for the European case will help to better understand the determining factors of the distribution of expenditure and revenue among government levels.

Table no. 1: Literature review on determinants of fiscal decentralization

Paper	Data	Main results
Bahl and Nath (1986)	57 countries 1973	Positive relation with level of economic development (GDP per capita and urbanization) and population
Panizza (1999)	55 countries 1975, 1980, 1985	Negative effect of country size, income per capita, ethnic fractionalization and level of democracy
Cerniglia (2003)	OECD countries	Positive relation of area, population, degree of urbanization and income per capita

[‡] Brueckner (2004) carried out a numerical simulation to explore the fiscal decentralization in terms of Tiebout versus tax competition, taking into account the contrary postulations of both approaches. He concluded that under certain conditions, namely the curvature of the production function and the dispersion of preferences are high, the decentralization is desirable.

[§] See Besley and Coate (2003) for a political economy approach to the trade-off between centralized and decentralized provision of local public goods.

Paper	Data	Main results
Letelier (2005)	64 countries	Negative impact of urbanization and positive relationship with income per capita, being stronger for high-income countries
Treisman (2006)	66 countries 1993-1995	Territorially larger, but not necessarily more populous, countries were more fiscally decentralized; in addition, the economic development led to greater expenditure decentralization and the federal states were more decentralized
Bodman and Hodge (2010)	53 countries 1981-1998	Positive relationship with income, but for the middle- and lower- income nations, higher income is found to be associated with less decentralization
Lessmann and Markwardt (2010)	64 countries	Decentralization counteracts corruption in countries with high degrees of freedom of the press, whereas countries without effective monitoring suffer from decentralization
Wu and Wang (2013)	China 1995-2006	Negative effect of density, and non-significant impact of GDP per capita and openness
Letelier-Saavedra and Saez-Lozano (2015)	45 countries 1972-2008	Fiscal decentralization does not exhibit the same pattern across specific government functions, considering 6 functions
Canavire-Bacarreza et al. (2016)	91 countries 1960-2007	Geographical fragmentation and area are significantly and positively related to fiscal decentralization

2. Empirical strategy

We employ a quantile regression approach to capture different patterns along the distribution of fiscal decentralization. Contrary to linear regression, which summarizes the average relationship between the regressors and the dependent variable, this semiparametric approximation, proposed by Koenker and Basset (1978) and revised in Buchinsky (1998), Koenker and Hallock (2001), Koenker (2017) and Waldmann (2018), minimizes the deviations in absolute value with asymmetric weighting, instead of minimizing the squares of the errors as in Ordinary Least Squares (OLS).

In this way, in the quantile regression approach, with the 0.05, 0.25, 0.50, 0.75 and 0.95 quantiles considered, the estimated marginal effects from the estimates of β would indicate how the 5, 25, 50, 75 and 95 per cent conditional quantile would be affected at all x values.

In methodological terms, the quantile regression estimator can be more efficient than OLS if errors deviate from normality and, in addition, the quantile estimators are less sensitive to outliers. Besides, quantile regression provides a richer characterization of the data and is invariant to monotonic transformations.

Regarding the fiscal decentralization measures^{**}, we consider both the expenditure and revenue sides (FD Expenditure and FD Revenue), taking the percentage of non-central levels of government expenditure or revenue over the total government as indicators, the most employed measures in the literature of fiscal decentralization. The data have been obtained from Eurostat^{††}.

As explanatory variables, and following the literature on this topic, we consider the level of development through the GDP per capita, population, density, inequality, corruption and a dummy variable for federal versus unitary countries. The model also includes year dummies.

- GDP per capita: the literature does not predict a clear relationship with fiscal decentralization, although mostly positive: while Bahl and Nath (1986), Letelier (2005), Treisman (2006), Martinez-Vazquez and Timofeev (2009) and Bodman and Hodge (2010) found a positive relation between economic development and fiscal decentralization, Oates (1972) and Panizza (1999) concluded a negative relation, while Wu and Wang (2013) did not reach a significant impact. Source: Eurostat.

- Population: although there are reasons for both a positive as a negative effect, we expect a positive relationship, according to Litvack and Oates (1971); as population grows, the rising costs of congestion at the local level of government will tend to increase the non-central government's expenditures relative to the central government's ones. Data are in millions of inhabitants. Source: Eurostat.

- Density: again, we find arguments in favor of both positive as negative impact on fiscal decentralization. Our expectation, following Letelier (2005), is a negative relationship. On one hand, a lower density will lower public spending, reducing the government's marginal benefit of centralization; on the other hand, as the median voter's marginal utility is decreasing in government expenditures, a lower government budget involves a higher marginal utility of public goods against private consumption. And the assumption is a more significant negative effect of more centralization on the median voter's demand for spending, raising the marginal cost of centralization. Source: Eurostat.

- Inequality^{‡‡}: we include the Gini coefficient, reflecting the income inequality, but not in wealth. The expected sign is negative, in line with Sepulveda and Martínez-Vázquez (2011), who distinguished direct and indirect effects of fiscal decentralization on income inequality, derived from changes in the implementation of public policies or in the behavior of relevant economic agents, and those observed after the decentralization process has interacted with the socioeconomic framework, respectively. They found empirically that

^{**} For a discussion about fiscal decentralization measures, see Stegarescu (2005), Martínez-Vázquez and Timofeev (2009), Dziobek et al. (2011) or more recently Martínez-Vázquez et al. (2017).

^{††} Government revenue, expenditure and main aggregates (gov_10a_main), available at Eurostat (2020).

^{‡‡} In a related interesting study, Sacchi and Salotti (2014) investigated the effects of fiscal decentralization on income inequality for 23 OECD countries in 1971-2000, concluding that a higher degree of tax decentralization is associated with higher household income inequality within a country. And Kyriacou et al. (2017), for a sample of 23 OECD countries for the period 1984-2005, found that fiscal decentralization, together with measures to improve the quality of government, was an effective strategy for reducing regional inequalities. But they stated that these results have been obtained for rich and advanced economies, and it would be useful to analyze the case of less developed countries.

this impact is negative if the general government represents a significant share of the economy, above 20 per cent GDP. Source: Eurostat.

- **Corruption:** we consider the Corruption Perceptions Index by Transparency International, an indicator ranging from 0 (highly corrupt) to 100 (very clean). We would expect a negative relationship with fiscal decentralization, according to the hypothesis of Arikan (2004) and Lessmann and Markwardt (2010). Arikan (2004) developed a theoretical model where, as the number of competing jurisdictions rises, the level of corrupt earnings, or tax revenue appropriated by bureaucrats, falls; and found some evidence of this negative relationship in a cross-section data set of 40 countries. In Lessmann and Markwardt (2010), they analyzed the impact of fiscal decentralization on corruption taking into account the degree of freedom of the press, and they did not identify a robust impact of decentralization on corruption, but negative in countries with an effective monitoring through a free and independent press.

- **Federal:** this dummy variable assigns value 1 to the three federal countries, Belgium, Austria, Germany, and also to Spain, with three levels of government -central, regional and local- despite it is not formally or politically a federal state, and one of the most decentralized country in the world, even including a fourth level of government represented by the provinces, with limited competences. Of course, the expected sign is positive

3. Data and results

We study the European Union, concretely 26 countries due to unavailability of data for Croatia and Romania, for the period 2005-2017. The main statistics are reported in Table no. 2. We observe a great gap in fiscal decentralization, both in expenditure as in revenue, ranging from near zero in Malta to around 72 per cent in Germany. Other few decentralized countries are Ireland and United Kingdom, with indicators under 10 per cent, and among the highly decentralized nations we must also mention France, Finland and Spain, with measures above 50 per cent^{§§}. It should be noted that these three last countries are not federal in political terms, but their degrees of fiscal decentralization are larger than federal countries as Belgium or Austria.

Table no. 2: Summary statistics

Variable	Mean	Std. Dev.	Min	Max
FD Expenditure	32.58	15.81	0.04	71.84
FD Revenue	34.52	16.10	0.22	71.94
GDPpc	25,961	15,841	4,190	84,420
Population	18.41	23.49	0.40	82.52
Density	177.10	250.20	15.49	1,457.00
Inequality	29.72	3.87	22.70	40.20
Corruption	65.36	16.41	33.00	96.00
Federal (dummy)	0.15	0.36	0.00	1.00

Source: own elaboration from Eurostat and Transparency International

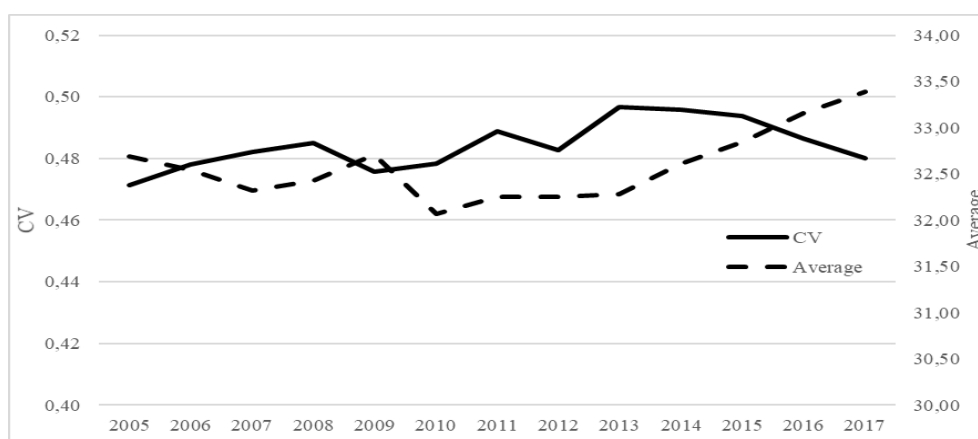
^{§§} In a recent study, Blanco et al. (2020) analyze the convergence of fiscal decentralization in the European Union. In addition, Finzgar and Oplotnik (2013) revise the fiscal decentralization systems in the EU.

With the aim at deepening the evolution of fiscal decentralization measures in the period, we carry out a sigma convergence analysis. This approach consists on the measurement of the dispersion of the variable through the coefficient of variation, evidencing a sigma convergence process if that dispersion diminishes over time, and sigma divergence if the dispersion increases. We plot this sigma convergence measure along with the average fiscal decentralization to better understand the evolution in our sample (Figure no. 1).

With regard to expenditure, we can observe a growing trend in the (unweighted) average after 2010 and, especially, after 2013. And, however, in the dispersion, we differentiate two main stages: a general growing trend until 2013, followed by a decline to end the period above the initial level of dispersion. Hence, the expenditure does not exhibit a sigma convergence process in the EU.

In relation to the revenue, the path of the average is, to some extent, contrary to the case of expenditure: a decreasing trend since 2009, broken in 2015, ending the period practically at the same level of 2005. Meanwhile, the behaviour of the dispersion is similar to the observed for the expenditure, and we can not conclude a sigma convergence neither in the revenue.

1.a. Expenditure



1.b. Revenue

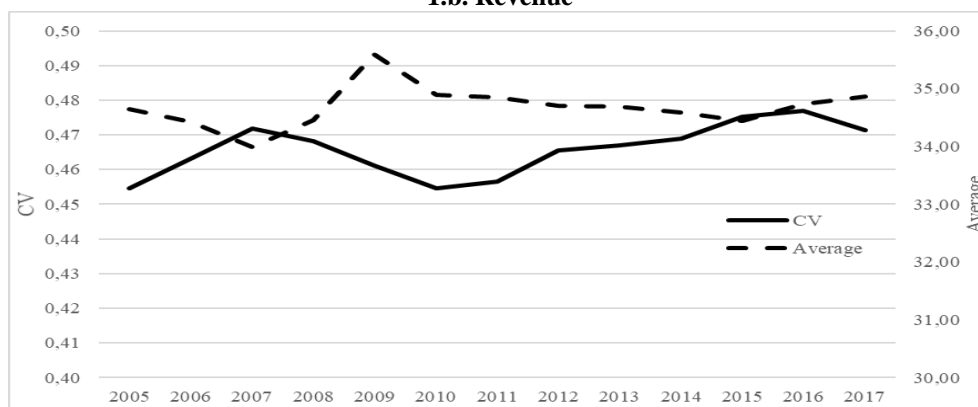


Figure no. 1: Sigma convergence of fiscal decentralization

The main results are summarized in Table no. 3, concretely 3.a for expenditure and 3.b for revenue, being the results virtually identical in both cases. Hence, we will comment only on the expenditure case. The linear results, reported only for benchmarking, show non significant results for GDP per capita nor corruption, significant and positive for population and federal, and significant and negative for density and inequality. It should be noted that most of the signs are the expected ones. But the quantile results allows a richer analysis of the impacts along the distribution of fiscal decentralization.

Regarding GDP per capita, our results show a significant and negative effect for all quantiles except 0.25, and it is stronger in the extremes of the distribution, 0.05 and 0.95, namely the lowest and highest decentralized countries. This negative impact is in line with Panizza (1999), as stated in the review reported in previous section.

For the population, we conclude a significant and positive effect on all quantiles, result in line with Bahl and Nath (1986). In this case, the impact is weaker in the extremes, 0.05 and 0.95, that is, for lowest or highest-decentralized countries.

In the case of density, the effect is negative in all quantiles, and this impact is stronger as we move forward the distribution of fiscal decentralization.

With regard to inequality, as expected, we find a negative relation with fiscal decentralization, but it is bigger in the first quantiles and finally non significant at 0.95. Hence, the negative impact of inequality is larger for low-decentralized countries, and this effect dissappears for high-decentralized cases.

With respect to corruption, the results reveal that the relationship is significant and negative at the first quantiles, low-decentralized countries, turning into significant and positive in the last ones, 0.75 and 0.95, namely high-decentralized cases.

Finally, the federal dummy presents a significant and positive coefficient in all quantiles, as expected.

The data and results achieved in this paper bring to light a huge variety of degrees of fiscal decentralization across European countries and their determining factors, with impacts varying along the distribution of fiscal decentralization, namely, the effects are not uniform for low, medium or high-decentralized countries. It should be also noted that, among the most decentralized European countries, we find federal and unitary cases, denoting also the relevance of historical issues to explain fiscal decentralization in Europe. We must also take into account that the integration^{***} and harmonization processes in the European Union do not include rules or recommendations about the fiscal decentralization within the Member States. In another perspective, it should be remarked that the proper European Union, as a whole, faces the centralization versus descentralization issue, in terms of fiscal policy, fiscal discipline and structural reforms (Wyplosz, 2015).

^{***} In a related topic, Ermini and Santolini (2014) studied the effects of globalization on fiscal decentralization for OECD countries, concluding a positive impact of the overall index of globalization, concretely the KOF Globalisation Index, on both tax revenue and expenditure decentralization.

Table no. 3: Results from the quantile regression

3.a. Expenditure

	Linear	Quantiles				
		0.05	0.25	0.50	0.75	0.95
GDPpc	-0.00008 (0.00006)	-0.00036*** (0.00004)	-0.00009 (0.00006)	-0.00008*** (0.00003)	-0.00021*** (0.00003)	-0.00029*** (0.00004)
Population	0.28755*** (0.02742)	0.13272*** (0.01763)	0.38226*** (0.02712)	0.33659*** (0.01507)	0.32694*** (0.01500)	0.28469*** (0.02173)
Density	-0.02405*** (0.00242)	-0.01747*** (0.00155)	-0.01739*** (0.00239)	-0.02370*** (0.00133)	-0.02437*** (0.00132)	-0.02512*** (0.00192)
Inequality	-1.18137*** (0.17731)	-1.33762*** (0.11398)	-0.91074*** (0.17532)	-1.03553*** (0.09744)	-0.55402*** (0.09700)	0.02353 (0.14048)
Corruption	-0.01038 (0.05695)	-0.27420*** (0.03661)	-0.15590*** (0.05631)	0.13449*** (0.03129)	0.37579*** (0.03116)	0.41299*** (0.04512)
Federal	14.7996*** (1.78230)	23.3013*** (1.14573)	14.8889*** (1.76237)	13.6451*** (0.97944)	9.30624*** (0.97511)	9.40833*** (1.41207)

3.b. Revenue

	Linear	Quantiles				
		0.05	0.25	0.50	0.75	0.95
GDPpc	-0.00004 (0.00001)	-0.00023*** (0.00001)	0.00010 (0.00006)	-0.00001 (0.00004)	-0.00015*** (0.00002)	-0.00026*** (0.00002)
Population	0.29508*** (0.02824)	0.11778*** (0.00733)	0.35496*** (0.03043)	0.37330*** (0.01791)	0.31689*** (0.01092)	0.30110*** (0.00907)
Density	-0.02597*** (0.00249)	-0.01831*** (0.00064)	-0.02071*** (0.00269)	-0.02507*** (0.00158)	-0.02806*** (0.00096)	-0.02991*** (0.00080)
Inequality	-1.24355*** (0.18260)	-1.06082*** (0.04744)	-1.20627*** (0.19674)	-0.92315*** (0.11581)	-0.73916*** (0.07062)	0.03652 (0.05864)
Corruption	-0.08135 (0.05865)	-0.35670*** (0.01524)	-0.20084*** (0.06319)	0.05146 (0.03720)	0.28492*** (0.02268)	0.40426*** (0.01883)
Federal	14.16920*** (1.83550)	21.7734*** (0.47690)	15.6258*** (1.97762)	11.0865*** (1.16414)	9.38635*** (0.70994)	7.88633*** (0.58948)

Notes: ***, **, * denotes statistical significance at the 1 per cent, 5 per cent and 10 per cent levels, respectively. Standard errors in parentheses.

Conclusions

Fiscal decentralization, in the expenditure and revenue sides, have attracted researchers in the last decades to investigate issues as the relationship with economic growth, inequality, public efficiency or government size, but few papers have addressed the determinants of fiscal decentralization to date.

In this paper, we study the determining factors of fiscal decentralization in the European Union for the period 2005-2017, considering 26 Member States due to data unavailability for Croatia and Romania. Specifically, and in order to deal with potential nonlinearities and to enrich the analysis along the distribution of fiscal decentralization, we employ a quantile regression approach.

The results show a positive relationship between fiscal decentralization and population. In addition, the impact is negative for GDP per capita, density -with larger negative impact in high-decentralized countries relative to low-decentralized nations- and inequality -although the impact is non-significant in high-decentralization countries. Finally, the evidence for corruption is mixed, being negative for the low-decentralized countries and positive in high-decentralized cases. Hence, we observe how the effects vary at different parts of the

fiscal decentralization distribution. It should be also noted that other factors, mainly historical issues, help to explain the variety in the degree of fiscal decentralization in the European Union Member States, taking into account that the integration and harmonization processes do not contain rules or recommendations about fiscal decentralization, prevailing the autonomy of the countries in this matter.

Regarding possible extensions of our study, we could extend the analysis for alternative measures of fiscal decentralization, beyond the two most commonly used in the literature followed in this work, as the Regional Authority Index -although this is available only for some years-, or with some disaggregation in those measures. In addition, it should be interesting to explore the effects of Great Recession on the degree of fiscal decentralization. And finally, to investigate the merging of this literature of fiscal decentralization determinants with club convergence analysis to explain the composition of clusters.

Acknowledgements

I gratefully acknowledge the funding from the Spanish Ministry of Economy, Industry and Competitiveness, project CSO2017-85024-C2-2-P.

References

- Adam, A., Delis, M.D. and Kammas, P., 2014. Fiscal decentralization and public sector efficiency: evidence from OECD countries. *Economics of Governance*, 15(1), pp. 17-49.
- Alfano, M.R., Baraldi, A.L. and Cantabene, C., 2019. The effect of fiscal decentralization on corruption: a non- linear hypothesis. *German Economic Review*, 20(1), pp. 105-128.
- Arikan, G.G., 2004. Fiscal decentralization: a remedy for corruption? *International Tax and Public Finance*, 11(2), pp. 175-195.
- Arzaghi, M. and Henderson, J.V., 2005. Why countries are fiscally decentralizing. *Journal of Public Economics*, 89(7), pp. 1157-1189.
- Aslim, E.G. and Neyapti, B., 2017. Optimal fiscal decentralization: redistribution and welfare implications. *Economic Modelling*, 61, pp. 224-234.
- Bahl, R.W. and Nath, S., 1986. Public expenditure decentralization in developing countries. *Environment and Planning C: Government and Policy*, 4(4), pp. 405-418.
- Baskaran, T. and Feld, L.P., 2013. Fiscal decentralization and economic growth in OECD countries: is there a relationship?. *Public Finance Review*, 41(4), pp. 421-445.
- Bellofatto, A.A. and Besfamille, M., 2018. Regional state capacity and the optimal degree of fiscal decentralization. *Journal of Public Economics*, 159, pp. 225-243.
- Besley, T. and Coate, S., 2003. Centralized versus decentralized provision of local public goods: a political economy approach. *Journal of Public Economics*, 87(12), pp. 2611-2637.
- Blanco, F.A., Delgado, F.J. and Presno, M.J., 2020. Fiscal decentralization policies in the EU: a comparative analysis through a club convergence analysis. *Journal of Comparative Policy Analysis: Research and Practice*, 22(3), pp. 226-249.
- Bodman, P., 2011. Fiscal decentralization and economic growth in the OECD. *Applied Economics*, 43(23), pp. 3021-3035.

- Bodman, P. and Hodge, A., 2010. What drives fiscal decentralisation? Further assessing the role of income. *Fiscal Studies*, 31(3), pp. 373-404.
- Brueckner, J.K., 2004. Fiscal decentralization with distortionary taxation: Tiebout vs. tax competition. *International Tax and Public Finance*, 11(2), pp. 133-153.
- Brueckner, J.K., 2006. Fiscal federalism and economic growth. *Journal of Public Economics*, 90, pp. 2107-2120.
- Buchinsky, M., 1998. Recent advances in quantile regression models: a practical guideline for empirical research. *Journal of Human Resources*, 33(1), pp. 88-126.
- Canavire-Bacarreza, G., Martinez-Vazquez, J. and Yedgenov, B., 2016. Reexamining the determinants of fiscal decentralization: what is the role of geography? *Journal of Economic Geography*, 17(6), pp. 1209-1249.
- Canavire-Bacarreza, G., Martinez-Vazquez, J. and Yedgenov, B., 2020. Identifying and disentangling the impact of fiscal decentralization on economic growth. *World Development*, [e-journal] 127. <https://doi.org/10.1016/j.worlddev.2019.104742>
- Cassette, A. and Paty, S., 2010. Fiscal decentralization and the size of government: a European country empirical analysis. *Public Choice*, 143, pp. 173-189.
- Cerniglia, F., 2003. Decentralization in the public sector: quantitative aspects in federal and unitary countries. *Journal of Policy Modeling*, 25(8), pp. 749-776.
- Cheng, S., Fan, W., Chen, J., Meng, F., Liu, G., Song, M. and Yang, Z., 2020. The impact of fiscal decentralization on CO2 emissions in China. *Energy*, [e-journal] 192. DOI: 10.1016/j.energy.2019.116685.
- Chu, A.C. and Yang, C.C., 2012. Fiscal centralization versus decentralization: Growth and welfare effects of spillovers, Leviathan taxation, and capital mobility. *Journal of Urban Economics*, 71(2), pp. 177-188.
- Dziobek, C., Gutierrez, C. and Kufa, P., 2011. *Measuring fiscal decentralization – Exploring the IMF's databases*. IMF Working Paper 11/126.
- Ermini, B. and Santolini, R., 2014. Does globalization matter on fiscal decentralization? New evidence from the OECD. *Global Economic Review*, 43(2), pp. 153-183.
- Eurostat, 2020. *Government revenue, expenditure and main aggregates*. [online] Available at: < https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=gov_10a_main&lang=en> [Accessed 25 November 2020].
- Finzgar, M. and Oplotnik, Z.J., 2013. Comparison of fiscal decentralization systems in EU-27 according to selected criteria. *Lex Localis*, 11(3), pp. 651-672.
- Janeba, E. and Wilson, J.D., 2011. Optimal fiscal federalism in the presence of tax competition. *Journal of Public Economics*, 95(11-12), pp. 1302-1311.
- Jilek, M., 2015. Factors of tax decentralization in OECD-Europe countries. *European Financial and Accounting Journal*, 10(2), pp. 33-49.
- Koenker, R., 2017. Quantile regression: 40 years on. *Annual Review of Economics*, 9, pp. 155-176.
- Koenker, R. and Basset, G., 1978. Regression quantiles. *Econometrica*, 46(1), pp. 33-50.
- Koenker, R. and Hallock, K.F., 2001. Quantile regression. An introduction. *Journal of Economic Perspectives*, 15(4), pp. 143-156.

- Kyriacou, A.P., Muinelo-Gallo, L. and Roca-Sagalés, O., 2017. Regional inequalities, fiscal decentralization and government quality. *Regional Studies*, 51(6), pp. 945-957.
- Lessmann, C. and Markwardt, G., 2010. One size fits all? Decentralization, corruption, and the monitoring of bureaucrats. *World Development*, 38(4), pp. 631-646.
- Letelier, L., 2005. Explaining fiscal decentralization. *Public Finance Review*, 33(2), pp. 155-183.
- Letelier-Saavedra, L. and Saez-Lozano, J.L., 2015. Fiscal decentralization in specific areas of government: an empirical evaluation using country panel data. *Environment and Planning C: Politics and Space*, 33(6), pp. 1344-1360.
- Li, Q., 2015. Fiscal decentralization and tax incentives in the developing world. *Review of International Political Economy*, 23(2), pp. 232-260.
- Litvack, J. and Oates, W., 1971. Group size and the output of public goods: theory and application to state-local finance in the United States. *Public Finance*, 25(2), pp. 42-58.
- Liu, Y., Martinez-Vazquez, J. and Wu, A.M., 2017. Fiscal decentralization, equalization, and intra-provincial inequality in China. *International Tax and Public Finance*, 24, pp. 248-281.
- Martínez-Vázquez, J., Lago-Peñas, S. and Sacchi, A., 2017. The impact of fiscal decentralization: a survey. *Journal of Economic Surveys*, 31(4), pp. 1095-1129.
- Martínez-Vázquez, J. and McNab, R.M., 2003. Fiscal decentralization and economic growth. *World Development*, 31(9), pp. 1597-1616.
- Martínez-Vázquez, J. and Timofeev, A., 2009. *Decentralization measures revisited*. Working Paper 09-13. Georgia State University.
- Martínez-Vázquez, J. and Yao, M., 2009. Fiscal decentralization and public sector employment. *Public Finance Review*, 37(5), pp. 539-571.
- Mullen, J.K., 1980. The role of income in explaining state-local fiscal decentralization. *Public Finance*, 35(2), pp. 300-308.
- Musgrave, R.A., 1959. *The Theory of Public Finance*. New York: McGraw-Hill.
- Oates, W.E., 1972. *Fiscal Federalism*. New York: Harcourt Brace Jovanovich.
- Oates, W.E., 2005. Toward a second-generation theory of fiscal federalism. *International Tax and Public Finance*, 12, pp. 349-373.
- Panizza, U., 1999. On the determinants of fiscal centralization: Theory and evidence. *Journal of Public Economics*, 74(1), pp. 97-139.
- Sacchi, A. and Salotti, S., 2014. The effects of fiscal decentralization on household income inequality: some empirical evidence. *Spatial Economic Analysis*, 9(2), pp. 202-222.
- Sato, M. and Yamashige, S., 2005. Decentralization and economic development: an evolutionary approach. *Journal of Public Economic Theory*, 7(3), pp. 497-520.
- Sepulveda, C.F. and Martínez-Vázquez, J., 2011. The consequences of fiscal decentralization on poverty and income equality. *Environment and Planning C: Politics and Space*, 29(2), pp. 321-343.
- Stegarescu, D., 2005. Public sector decentralisation: measurement concepts and recent international trends. *Fiscal Studies*, 26(3), pp. 301-333.
- Tiebout, C.M., 1956. A pure theory of local expenditures. *Journal of Political Economy*, 64(5), pp. 416-424.

- Treisman, D., 2006. Explaining fiscal decentralisation: geography, colonial history, economic development, and political institutions. *Commonwealth & Comparative Politics*, 44(3), pp. 289-325.
- Waldmann, E., 2018. Quantile regression: a short story on how and why. *Statistical Modelling*, 18(3-4), pp. 203-218.
- Wasylenko, M., 1987. Fiscal decentralization and economic development. *Public Budgeting & Finance*, 7(4), pp. 57-71.
- Wu, A.M. and Wang, W., 2013. Determinants of expenditure decentralization: evidence from China. *World Development*, 46, pp. 176-184.
- Wyplosz, C., 2015. *The centralization-decentralization issue*. Discussion Paper 014. European Commission.
- Yang, S., 2019. Fiscal decentralization or centralization: diverging paths of Chinese cities. *China & World Economy*, 27(3), pp. 102-125.
- Zodrow, G. and Mieszkowski, P., 1986. Pigou, Tiebout, property taxation, and the underprovision of local public goods. *Journal of Urban Economics*, 19(3), pp. 356-370.

Annex

Table A.1: Data - 2005

Country	FD Exp	FD Rev	GDPpc	Popul	Density	Ineq.	Corrup.
Belgium	48.68	50.42	35,250	11.35	371.85	26.0	75
Bulgaria	30.94	30.48	6,310	7.10	64.03	40.2	43
Czechia	27.15	28.56	17,200	10.58	134.14	24.5	57
Denmark	26.22	25.83	47,360	5.75	133.40	27.6	88
Germany	71.36	71.59	35,420	82.52	231.13	29.1	81
Estonia	14.53	14.79	14,440	1.32	29.09	31.6	71
Ireland	4.69	5.00	54,240	4.78	68.08	30.6	74
Greece	24.09	27.68	17,410	10.77	81.61	33.4	48
Spain	54.41	55.54	24,410	46.53	92.17	34.1	57
France	58.75	62.36	32,370	66.81	121.65	28.8	70
Italy	37.62	40.30	26,490	60.59	201.07	32.7	50
Cyprus	23.00	24.63	23,120	0.85	149.02	30.8	57
Latvia	40.41	41.54	11,560	1.95	30.19	34.5	58
Lithuania	34.30	35.82	12,720	2.85	43.61	37.6	59
Luxembourg	27.71	31.19	82,550	0.59	227.44	30.9	82
Hungary	27.41	28.79	11,930	9.80	105.32	28.1	45
Malta	0.04	0.22	20,910	0.46	1456.64	28.2	56
Netherlands	40.28	39.76	40,730	17.08	411.34	27.1	82
Austria	34.53	35.28	37,090	8.77	104.61	27.9	75
Poland	39.29	46.17	11,820	37.97	121.44	29.2	60
Portugal	24.67	29.48	17,650	10.31	112.07	33.5	63
Slovenia	40.02	40.39	19,430	2.07	101.90	23.7	61
Slovakia	38.31	40.04	14,970	5.44	111.28	23.2	50
Finland	50.96	53.70	36,310	5.50	16.27	25.3	85
Sweden	40.33	38.81	43,350	10.00	24.09	28.0	84
United Kingdom	8.56	8.07	32,460	65.84	268.95	33.1	82

Table A.2: Data - 2017

Country	FD Exp	FD Rev	GDPpc	Popul	Density	Ineq.	Corrup.
Belgium	42.40	44.83	32,200	10.45	342.17	28.0	74
Bulgaria	33.62	31.73	4,190	7.69	69.32	31.2	40
Czechia	26.36	28.14	13,570	10.20	129.32	26.0	43
Denmark	32.60	29.18	44,400	5.41	125.58	23.9	95
Germany	69.59	71.94	29,730	82.50	231.07	26.1	82
Estonia	14.43	14.27	11,110	1.36	30.05	34.1	64
Ireland	7.60	7.82	39,470	4.11	58.50	31.9	74
Greece	23.54	29.93	20,910	10.97	83.14	33.2	43
Spain	54.06	54.23	23,420	43.30	85.77	32.2	70
France	55.51	57.99	30,320	62.77	114.30	27.7	75
Italy	41.55	44.43	28,090	57.87	192.06	32.7	50
Cyprus	14.64	22.52	23,050	0.73	127.80	28.7	57
Latvia	39.15	42.76	8,170	2.25	34.83	36.2	42
Lithuania	26.72	28.54	7,950	3.36	51.38	36.3	48
Luxembourg	28.20	30.77	76,460	0.46	177.60	26.5	85
Hungary	34.60	39.32	9,910	10.10	108.54	27.6	50
Malta	0.27	0.35	14,790	0.40	1274.27	27.0	66
Netherlands	40.30	39.64	36,570	16.31	392.66	26.9	86
Austria	31.95	33.39	33,710	8.20	97.80	26.3	87
Poland	42.31	46.73	7,510	38.17	122.08	35.6	34
Portugal	24.30	27.87	16,600	10.49	114.08	38.1	65
Slovenia	35.53	38.12	16,570	2.00	98.53	23.8	61
Slovakia	35.20	37.24	9,960	5.37	109.99	26.2	43
Finland	47.87	50.46	34,250	5.24	15.49	26.0	96
Sweden	39.27	40.43	37,770	9.01	21.72	23.4	92
United Kingdom	8.43	8.05	30,160	60.18	245.82	34.6	86