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RESUMO/ABSTRACT

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The equalization effects of transfer systems has been the subject of analyses to evaluate the effectiveness of redistribution policies and of the adequacy of revenue sharing mechanisms in providing sub national governments with adequate resources to undertake their public responsibilities. Achieving vertical and horizontal equalization among municipalities is an important issue both for long-term growth and financial stability. Reducing horizontal and vertical dissimilarities and promoting efficiency and equity is a common objective of the systems set up in many countries. In this regard, Portugal is no exception having introduced several reforms in the transfer system since the final decades of the 20th Century.

Using panel data for all the municipalities, for the 1997-2010 period, this paper tests and evaluates whether there has been an equalization effect in the system of transfers to the municipalities. It also tests whether the various regulatory changes introduced improved or worsened the equalization effects.

The use of panel data models permitted the use of a larger number of observations, increasing the number of degrees of freedom and decreasing collinearity between the explanatory variables as well as a better control for unobserved heterogeneity.

The results show that on average the municipalities with the highest GDP per capita and own revenues per capita receive more transfers per capita, which suggests that the system does not contribute to equalization. It is also concluded that the successive changes of the system, namely those undertaken in 1998 and 2007, were significant in improving the equalization impact of the system.

Keywords: Equalization, Municipalities, Transfers, Panel data methodologies.

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ASSESSMENT OF EQUALIZATION EFFECTS OF GOVERNMENT TRANSFERS TO PORTUGUESE MUNICIPALITIES USING PANEL DATA METHODOLOGIES

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ABSTRACT

The equalization effects of transfer systems has been the subject of analyses to evaluate the effectiveness of redistribution policies and of the adequacy of revenue sharing mechanisms in providing sub national governments with adequate resources to undertake their public responsibilities. Achieving vertical and horizontal equalization among municipalities is an important issue both for long-term growth and financial stability. Reducing horizontal and vertical dissimilarities and promoting efficiency and equity is a common objective of the systems set up in many countries. In this regard, Portugal is no exception having introduced several reforms in the transfer system since the final decades of the 20th Century.

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1. INTRODUCTION

The issue of decentralization has attracted the attention of various researchers who approach it both on a theoretical and on an empirical perspective. The empirical results of the analysis of the effects of transfers from higher to lower levels of government shows that there is still much to be explored and much to be done to

improve existing schemes. Many countries have, in fact, introduced reforms in the way they set up transfer formulations, many times influenced by international organizations such as the World Bank and the IMF.

Frequently, intergovernmental transfers not only represent a significant source of revenue for lower level government recipients but also constitute an important component of national public finances. The way transfers are structured and implemented impacts on the efficiency and equity of public service delivery of such essential functions as education, health, infrastructure and public services in general. Fiscal decentralization, transferring expenditure responsibilities to lower levels of government might cause efficiency gains and promote regional growth (Fischer and Thiesen, 2011).

In addition, the configuration of fiscal equalization models have shown the importance of transfers for long term growth strategies since as countries tend to grow disparities seem to persist (Fischer and Thiesen, 2011).

A transfer system typically seeks to achieve some vertical and horizontal equalization to reduce fiscal capacity disparities among jurisdictions of the same level and disparities between levels of government. This objective, however, is not always achieved which leads to the continuous need to review transfer schemes.

Intergovernmental transfer schemes require the definition of the resource distribution mechanisms. These mechanisms are often based on formulas that consider not only local needs and backwardness but also their revenue generating capacity frequently assessed by the tax collection potential.

Formula based transfer schemes have been defended on the basis of their transparency and predictability, for both levels of government, and leading to better accounting and distribution of available funds (Hofmanet al. 2006).

In the final quarter of the 20th century, fiscal decentralization in Portugal occurred at two levels. On the one hand there was the establishment of two autonomous regions, Azores and Madeira, after the 4th revision of the constitution, in 1976. These regions were granted political and administrative autonomy with their own governing bodies and legislature. On the other hand, municipalities were empowered with considerable new responsibilities which led to the need for the review of transfer arrangements.

This paper tests various hypotheses about the main characteristics and evolution of the Portuguese fiscal transfer system from central to municipal governments. Transfers to the regional governments are not considered here.

The paper is organized in five sections. After the introduction, the second section is devoted to a brief literature review of the issue focusing on the objectives and empirical evidence of the equalization effects of the transfer system. A third section presents the econometric model used to test the hypotheses of equalization for the full period and the impact of various reviews undertaken a long almost two decades. The fourth section presents the statistical results of the tests of equalization effects of the Portuguese transfer system to municipalities. The final section is devoted to the analysis and review of the main conclusions that can be drawn from the study as well as to the identification of limitations and leads for further research.

2. LITERATURE REVIEW

This chapter presents a literature review of the topic under study. The objective is to identify the approaches for testing to what extent the elimination of vertical and horizontal disequilibria has been achieved. It is also interesting to list the variables that have been used for this purpose.

Governments are often perceived as performing two important roles: the redistribute collected taxes and; the internalization of fiscal externalities that might occur in horizontal relations between various jurisdictions, providing a better supply of public goods and incrementing social well being (Riou, 2005). There have been many studies that look at decentralization, namely fiscal decentralization, which should be an instrument of stabilization (Algoed, 2009), reducing vertical and horizontal disequilibria that often exist between sub national jurisdictions due to heir different capacities to provide public goods (Widmer and Zweifel, 2010; Blochliger and Charbit, 2008 and Gravel and Poitevin, 2006).

These disequilibria reductions can be achieved through above the average contributions for governments with higher than average incomes and below the average contributions by governments with lower fiscal capacity.

The literature refers various possible specific objectives that governments might seek such as the elimination of vertical and horizontal differences in order to assure a national standard for certain goods and services to guarantee a national standard for certain goods and services, to assure the financing of development programs, to correct externalities and to strengthen fiscal autonomy (Martinez-Vasquez and Sepulveda, 2011; Martinez-Vazquez and Timofeev, 2007 and Friedrich et al., 2009).

Smart and Bird (1997) show that in the case of Canada's fiscal equalization system federal transfers were normally associated to higher tax rates in relatively poor regions affecting negatively investment competitiveness. The phenomenon is also stressed in Widmer and Zweifel (2010).

Bordingnon et al. (2001) and Baretti et al.(2002) undertook an analysis applied to Germany where there are high tax rates to conclude that these high rates had a negative impact in performance indicators such as economic growth and fiscal revenues, a result also found in Blochliger and Charbit(2008).

Even though the Tiebout (1956) hypothesis, also cited by Widmer e Zweifel (2010), predict a positive relation between fiscal decentralization and government performance, due to efficiency improvements, there is also a negative impact, cited in the literature, due to fiscal competition between jurisdictions through a set of local, less important, taxes applied by local governments (Riou, 2005 and Algoed, 2009) to attract activities ad people leading to tax reductions that might be undesirable (Smart, 1998; Koethenbuerger, 2006; Eichhorst, 2007; Martinez-Vazquez and Sepulveda, 2011; Breuilléet al., 2010 and Gravel and Poitevin, 2006), leading to a significant negative impact on revenues (Riou, 2005).

For Germany, more specifically in Lower Saxony, Egger et al. (2007) tried to understand how central government transfers affected local fiscal policy. They concluded that an increase in local tax rates led to a decrease in the local tax bases as these were transferred to lower tax regions.

Riou (2005), Algoed (2009) and Blochliger and Charbit, (2008) also refer this transfer effect in their studies.

Another issue referred in Koethenbuerger (2006), relates to the moment in which the transfers from the central government occur. He concludes that when transfers are for reimbursement of investments already made they lead to higher expenditure levels

In a study applied to Ukraine, Thiessen (2004), maintains that a equitable redistribution of regional revenues explain why the fiscal equalization system does not exhibit adverse effects on growth. On the contrary they find evidence of positive contributions to both recipient and donor regions

Empirical Evidence

Chaparro et al. (2004) proposed the following model to test the equalization effect of a Colombian transfer system.

$$TAXTOT_{it} = \alpha_i + \delta t + \beta.TRPMit + \varepsilon_{it} \qquad (1)$$

Where $TAXTOT_{it}$ and $TRPM_{it}$ are, respectively, own revenues and transfers per capita, while αi and δt are fixed effects for municipalities and years and β measures the impact of transfers received on own revenues. Other control variables were also introduced such as population (*POP*), Gross Domestic Product (*GDP*), and index of un satisfied basic services (*NBI*), as a measure of local social need and the number of attacks by the two main guerrilla groups (*FARC* e *ELN*).

The authors collected and used panel data on 802 municipalities for the period1985-1999.The estimated value of β was negative and significantly different from zero, suggesting that meaning that higher transfers are associated to lower own revenues.

Fortuna *et al*. (2005) looked at the equalization effect in Portugal running regressions for selected years. The model tested was the following:

$$TRS_{it} = \alpha_0 + \alpha_1 OR_{it} + \alpha_2 GDP_{it} \qquad (2)$$

Where TRS represents *per capita* transfers for each municipality, OR represents *per capita* own revenues, GDP is an indicator of *per capita* output of each municipality and i and t represent municipalities and years, respectively.

The data used to estimate the model included the selected years of 1991, 1998 and 2002, comprising 304 municipalities. Panel data methodologies were used even though there isn't a continuum of years. Because of multicollinearity between the two explanatory variables the model was also estimated with each one individually. The study concluded that, with the selected years, a significant equalization effect could be detected. It was also concluded that municipalities of the Azores tended to exhibit stronger equalization effects and that the changes introduced in the transfer system in 1998 and 2002 improved the equalization tendency whereas a change of 1991 did not.

Hauptmeier (2009), analised the equalization effect in Germany, for 1990-2003, excluding smaller municipalities and using a model that stressed the expenditure. They conclude that transfers without restrictions have a positive and significant impact on local expenditures and that the results obtained suggest the presence of an equalization effect.

Huang and Chen, (2011), in an application to China, also test the presence of equalization effects in the Chinese transfer system. They used the following model

$$log(GRANT_{it}) = \beta_0 + \beta_1 log(GRANT_{i,t-1}) + \beta_2 log(NORM_{it}) + \beta_3 log(POLITICS_{it}) + \varepsilon_{it} \quad (3)$$

where, $GRANT_{it}$ is the *per capita* transfers from the central government, $GRANT_{i,t-1}$ is the one period lagged dependent variable, $NORM_{it}$ is a vector of variables associated to a normative approach to the problem, $POLITICS_{it}$ is a vector of political factors and ε_{it} is the normal error term. The model was tested for 27 provinces and three cities for the 1995-2005 period, bearing in mind that there was a system change in 2002. The authors conclude that the system does not equalize on average and that the 2002 reform did not improve this effect.

Other studies of the equalization effects include Fischer and Thiessen (2011), in an application to France, Freinkman *et al.*(2009) to Russia and Bravo (2010) to Chile.

Reviewing the various contributions to the equalization issue one can conclude that quite often what seems to be consistent the objectives of giving more transfers to those jurisdictions that are less capable of attaining certain standards on their own is not because the underlying effects do not correspond to expectations. The findings for Portugal and China are some examples among any that can be underlined.

3. THE MODEL

Having reviewed the literature the model chosen to run the tests of the equalization hypotheses was the one proposed in Fortuna et al. (2005), because of its simplicity and because it provides a basis of comparison with previous work over the same reality even if for different periods and a different database.

The model used is specified as follows:

$$TRS_{it} = \beta_0 + \beta_1 PIB_{it} + \beta_2 RP_{it} + \mu_i \qquad (4)$$

where

TRSit – is per capita transfers from the central to municipality i in period t;

β0 – is the constant term;

β_j – are coefficients to be estimated, associated to each of the explanatory variables used, where, j = 1, 2, 3,…, k

PIB_{it} – is per capita gross regional product for local government i in period t; e

RP_{it} – is per capita own revenue of local government i in period t.

This model was estimated using panel data methodologies (see Chaparroet al., 2004; Hauptmeier, 2009 and Huang and Chen, 2011).

The choice of panel data methodologies is justified not only because of its increasing popularity as revealed by the literature but also due to its statistical attributes.

Panel data models have various advantages over cross section models: they allow for the control of heterogeneity of the data; they use more observations increasing the degrees of freedom and decreasing collinearity between explanatory variables and; can identify and measure effects that are not measurable in cross sections or time series alone.

To test the model and the hypotheses data was collected for 304 municipalities for the 1977-2010 period, amounting to 4256 observations. The main variables were central government transfers, own revenues of municipalities and local gross regional product.

The depend variable, *per capita* transfers received each year from the national budget, was obtained from the sum of the components of the three financing sources: municipal funds, autonomous funds and services and other government transfers[4].

The municipal funds are, in turn divided into the Financial Equilibrium Fund, the Social Municipal Fund and a variable 5% share of personal income taxes.

Own revenues were the sum of own fiscal revenues and other revenues[5].

The gross regional product for each municipality was calculated multiplying the national GDP *per capita*[6] for each year by the municipal *per capita* purchasing power index,[7] a percentage of the national *per capita* purchasing power (Fortuna *et al*., 2005). Since the municipal purchasing power index does not exist for 1998, 1999, 2001, 2003, 2006, 2008 and 2010, the indicator for these years was calculated to be the arithmetic average between the immediate higher and lower values. The value for 2010 was assumed to be equal to that of 2009.

Three municipalities, Odivelas, Trofa and Vizela, were excluded because they were created in 1988, after the beginning of the database period. The municipality of Corvo was also excluded because in only has about 400 inhabitants and creates a statistical outlier when we consider per capita values.

[4]Direção Geral das Autarquias Locais. Contas de Gerências dos Municípios de 1997 a 2010.

[5]Direção Geral das Autarquias Locais. Contas de Gerências dos Municípios de 1997 a 2010.

[6]Instituto Nacional de Estatística. Contas Nacionais Anuais Definitivas de 1997 a 2010.

[7]Instituto Nacional de Estatística. Estudo sobre o Poder de Compra Concelhio de 1997, 2000, 2002, 2004, 2005, 2007, e 2009.

To make all variables comparable they were all divided by the population to obtain per capita values for each year (see Fortuna *et al*., 2005; Eichhorst, 2007; Huang and Chen, 2011 and Martinez-Vasquez and Boex, 2001).

All variables were expressed in 1977 prices.

Before proceeding to use the database assembled, since it is composed of panel data, it was necessary to test for the presence of random or fixed effects using the Hausman test which according to Greene (2003) and Wooldridge (2002) verifies if coefficients with fixed effects and random effects are systematically different.

The test is specified as follows:

H_0: $Cov\ (\mu_i, x_{it}) = 0$

H_1: $Cov\ (\mu_i, x_{it}) \neq 0$, *with* $i = 1,\ldots, p$

where x_{it} stand for the explanatory variables of the model

Under the null hypothesis of no endogeneity, the estimators of the model with random effects are consistent and efficient while under the alternative hypothesis, with endogeneity, the random effects estimators are not consistent while the fixed effects estimators are.

Multicollinearity is, in turn, another common regression problem when explanatory variables are strongly correlated. For this reason correlation coefficients were calculated for each pair of explanatory variables.

Yet another test consisted in the analysis of the individual significance of each explanatory variable used in the model. The hypothesis tested was:

H_0: $\beta_i = 0$

H_1: $\beta_i \neq 0$, *with* $i = 1,\ldots, p$

The rule is to reject H_0 if p-value $\leq \alpha$, where α is the probability of accepting a false hypothesis.

The R^2 statistic (coefficient of determination) was used to test the overall explanatory power of the model.

Having performed the preliminary tests, regressions were run to test the various hypotheses considered. The first is that the coefficient of the regressor gross regional product *per capita* is negative, meaning that the higher the income the lower the transfers received. This is the main equalization hypothesis. A variant of this hypothesis uses own *per capita* revenue as a regressor instead of the income indicator. It is, similarly, expected that the sign be negative. These two regressors are highly correlated.

A third hypothesis is that the revision of the transfers law of 1998 had a significant impact in the equalization effect. The test consists of looking at the significance of the coefficient of a dummy variable that assumes the value zero up to 1998 and one times *per capita* gross regional product or *per capita* own revenue in the other years. A significant effect will change the coefficient. If it is negative the equalization effect is strengthened and if it is positive it is weakened.

A fourth test undertakes the same exercise for the revision of the transfer law undertaken in 2007.

Four other tests were performed using dummy variables. They were designed to assess if richer municipalities got less transfers *per capita*; if poorer municipalities got more transfers *per capita*; if municipalities located in the Azores get more transfers *per capita*; if municipalities located in Madeira get more transfers *per capita.*

4. ESTIMATION RESULTS

The Hausman test, as in Greene (2003) and Wooldridge (2002), was used to test which model is more adequate, the random effects or the fixed effects. The results were inconclusive since the model applied to the data set did not satisfy the asymptotic assumptions.

Consequently , as suggested by Greene (2003), for these cases, the Breusch and Pagan test was used. This test is based on the Lagrange multiplier and tests the following hypotheses:

$H_0: \sigma_u^2 = 0$

$H_1: \sigma_u^2 \neq 0$

where, σ_u^2 is the variance of u assuming that the model can be written as

$$TRS_{it} = \beta_0 + \beta_1 PIB_{it} + \beta_2 RPit + u_i + \varepsilon_{it} \qquad (4)$$

The test led to the non rejection of the null hypothesis and, therefore to the indication that the fixed effects model should be used.

Given this preliminary test, 18 regressions were selected to test each of the hypotheses specified.

From the regressions that were run we can arrive at robust conclusions. Two potential problems should however be referred.

The first one is associated to the simultaneous use of *per capita* regional product and *per capita* own revenue. It was, a priori, expected that the two variables would be highly correlated, which might imply the presence of multicolinearity. Given that the correlation turned out to be 0,6 we end up in a range of uncertainty. For this reason regressions were run with the two regressors separately.

Another result to stress is the significance of the regressions. They all turned out to be significant as evaluated by the Fisher test but all revealed a low coefficient of determination, which is common in regressions using panel data.

Having alerted to these "caveats" we can proceed to present the regression results using the fixed effects model. They are presented in table 1.

Table1. Results Using the Fixed Effects Model

Dependent Variable	Per capita transfers from national budget									
Independent variables	1	2	3	4	5	6	7	8	9	10
Intercept	**46,7494 *****	**72,2351 *****	**104,4896 *****	**129,4168 *****	**79,8937 *****	**100,5083 *****	**132,8878 *****	**178,8595 *****	**253,4544 *****	**260,0582 *****
	(10,5547)	(10,2334)	(9,1219)	(9,6814)	(10,1932)	(9,0155)	(9,6615)	(6,3340)	(3,6579)	(3,7292)
Gross Regional Product per capita (GRPpc)	**0,0387 *****	**0,0276 *****	**0,0317 *****	**0,0212 *****	**0,0299 *****	**0,0341 *****	**0,0221 *****			
	(0,0023)	(0,0018)	(0,0019)	(0,0015)	(0,0015)	(0,0017)	(0,0015)			
Own Revenue per capita (Rpc)	**0,1237 ****	**0,1675 *****	**0,0787 *****	**0,0649 *****				**0,7102 *****	**0,2004 *****	**0,1067 *****
	(0,0574)	(0,0566)	(0,0249)	(0,0186)				(0,0427)	(0,0242)	(0,0187)
DummyLaw1998	**108,376 *****	**158,7079 *****	**53,1707 *****	**68,8451 *****	**155,6177 *****	**52,8821 *****	**71,0644 *****	**146,7808 *****	**93,0992 *****	**96,7508 *****
	(7,7627)	(7,4195)	(3,6053)	(3,7278)	(7,4415)	(3,5643)	(3,6895)	(5,6985)	(3,2108)	(3,2885)
DummyLaw2007	**26,2803 *****	**79,7833 *****	**-9,2472 *****	4,0393	**84,5908 *****	**-7,6046 *****	**6,1940 ****	**55,3490 *****	**13,1377 *****	**20,1862 *****
	(7,8155)	(7,4344)	(2,6552)	(2,7534)	(7,4357)	(2,6018)	(2,6862)	(4,2049)	(2,5654)	(2,5901)
DummyLaw1998 x GRPpc	**-0,0082 *****	**-0,0129 *****			**-0,0122 *****					
	(0,0014)	(0,0014)			(0,0010)					
DummyLaw2007 x GRPpc	**-0,0020 ****	**-0,0063 *****			**-0,0085 *****					
	(0,0010)	(0,0010)			(0,0008)					
DummyLaw1998 x Rpc	-0,0097	-0,0151						**-0,4398 *****		
	(0,0498)	(0,0508)						(0,0356)		
DummyLaw2007 x Rpc	**-0,0701 *****	**-0,0828 *****						**-0,1846 *****		
	(0,0194)	(0,0200)						(0,0169)		
DummyBig xGRPpc	**-0,0264 *****		**-0,0313 *****			**-0,0342 *****				
	(0,0024)		(0,0023)			(0,0021)				
DummyBig x Rpc	0,0028		**-0,1004 *****						**-0,3046 *****	
	(0,0352)		(0,0346)						(0,0334)	
DummySmall x GRPpc	**0,0276 *****		**0,0319 *****			**0,0353 *****				
	(0,0037)		(0,0035)			(0,0028)				
DummySmall x Rpc	0,1162		0,1151 *						**0,5186 *****	
	(0,0723)		(0,0655)						(0,0555)	
DummyAzores x GRPpc	-0,0055			0,0013			0,0004			
	(0,0042)			(0,0043)			(0,0036)			
DummyAzoresx Rpc	-0,1393			-0,0264						0,0943
	(0,1047)			(0,1001)						(0,0865)
DummyMadeira xGRPpc	**-0,0248 *****			-0,0059			**-0,0167 *****			
	(0,0046)			(0,0049)			(0,0033)			
DummyMadeira x Rpc	0,0740			**-0,3781 *****						**-0,2321 *****
	(0,1171)			(0,1237)						(0,0836)
R^2	0,1373	0,0531	0,1937	0,0969	0,0567	0,1878	0,0964	0,0000	0,2044	0,0079
F	138,24	135,77	135,45	124,04	136,04	140,41	125,81	164,75	128,60	151,91
Significance	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000

Remark 1: * significant at a 1% level, ** significant at a 5% level, *** significant at a 10% level.

Remark 2: figures in bold are significant at a 5% significance level.

Remark 3: The figures in parenthesis are the standard errors

Table1. Results Using the Fixed Effects Model (cont.)

Dependent Variable	Per capita transfers from national budget							
Independent variables	11	12	13	14	15	16	17	18
Intercept	**52,3662 *****	**186,1988 *****	**142,7596 *****	**144,6249 *****	**260,4702 *****	**86,6444 *****	**82,9220 *****	**303,5287 *****
	(10,1838)	(6,3944)	(9,3579)	(9,3444)	(3,7272)	(8,3618)	(8,3691)	(3,6512)
Gross Regional Product per capita (GRPpc)	**0,0405 *****		**0,0191 *****	**0,0199 *****		**0,0327 *****	**0,0356 *****	
	(0,0019)		(0,0014)	(0,0014)		(0,0012)	(0,0010)	
Own Revenue per capita (Rpc)		**0,6778 *****	**0,0525 *****		**0,1012 *****	**0,1042 *****		**0,3381 *****
		(0,0444)	(0,0181)		(0,0182)	(0,0183)		(0,0179)
DummyLaw1998	**104,2677 *****	**136,2479 *****	**71,1451 *****	**72,7239 *****	**96,7001 *****			
	(7,7083)	(5,7909)	(3,7212)	(3,6844)	(3,2910)			
DummyLaw2007	**29,9565 *****	**44,8719 *****	5,3473 *	**7,1377 *****	**20,2211 *****			
	(7,7277)	(4,2900)	(2,7557)	(2,6879)	(2,5901)			
DummyLaw1998 x GRPpc	**-0,0074 *****							
	(0,0010)							
DummyLaw2007 x GRPpc	**-0,0039 *****							
	(0,0008)							
DummyLaw1998 x Rpc		**-0,3680 *****						
		(0,0364)						
DummyLaw2007 x Rpc		**-0,1538 *****						
		(0,0169)						
DummyBig xGRPpc	**-0,0273 *****							
	(0,0022)							
DummyBig x Rpc		**-0,1782 *****						
		(0,0340)						
DummySmall x GRPpc	**0,0311 *****							
	(0,0029)							
DummySmall x Rpc		**0,4795 *****						
		(0,0582)						
DummyAzores x GRPpc	**-0,0077 ****							
	(0,0034)							
DummyAzoresx Rpc		**-0,3800 *****						
		(0,0878)						
DummyMadeira xGRPpc	**-0,0222 *****							
	(0,0031)							
DummyMadeira x Rpc		**-0,2834 *****						
		(0,0806)						
R^2	0,1422	0,0845	0,0912	0,0929	0,0080	0,1692	0,1809	0,0268
F	144,36	135,56	124,27	125,42	152,27	123,99	125,11	124,59
Significance	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000

Remark 1: * significant at a 1% level, ** significant at a 5% level, *** significant at a 10% level.

Remark 2: figures in bold are significant at a 5% significance level.

Remark 3: The figures in parenthesis are the standard errors

The simplest versions of the regressions are those numbered 16 to 18, where we test the existence of an equalization effect for the full period, for all municipalities, through the coefficients of the regressors *per capita* gross regional product and *per capita* own revenue.

For all these cases the coefficients of the explanatory variables are not only positive but all significant at the 1% level. This means that, on average, the municipalities with higher income and higher own revenue *per capita* get more transfers on a *per capita* basis. This leads to the conclusion that in Portugal the transfer system to municipalities is not equalizing.

A second group of hypotheses tries to evaluate whether the 1998 and 2007 changes of the transfer system introduced significant changes as far as equalization is concerned. To this effect dummy variables were used to test intercept and slope changes. With respect to the intercept, it is concluded, through regressions 13 to 14, that there was a significant increase in both reviews of the system, with all coefficients significant at the 1% significance level. Only one regression, 13, produces a coefficient that is only

significant at the 5% significance level. This is a robust conclusion since all regressions show results in the same direction of change.

The exceptions are only found in regressions 3 and 6 which include other formulations of the model.

The test for changes in the slope coefficients were run in regressions 2, 5 and 11. They lead to the conclusion that the changes introduced in 1998 and 2007 improved equalization since all coefficients are negative and significant at the 1% significance level, with the exception of one, which is insignificant.

Given that there is a great disparity in the size of municipalities the sample was divided in three groups including the biggest 20%, the smallest20% and those in the middle. Dummy variables were used to test the differences among groups. The reference group consists of the municipalities in the middle consisting of 60% of the sample. The dummies captured differences relative to the reference group.

In all situations where this test was run it was possible to arrive at the conclusion that the smaller group receives higher *per capita* transfers and the bigger municipalities receive lower *per capita* transfers. This leads to the conclusion that the system does give more to the smaller municipalities and less to the bigger but is not, on average, equalizing.

A last set of *hypotheses* tested sought to evaluate if municipalities in Madeira and in the Azores got transfers that were, own average different from the rest. Dummy variables were, once again, used. The results varied with the regression used and were consequently inconclusive.

Regression 1 tests all the *hypotheses* jointly and supports the following conclusions:

- On average, the municipalities with higher *per capita* income or own *per capita* receive higher *per capita* transfers given that the estimated coefficients are positive and significant at the 1% or 5% significance level.

- The changes introduced in 1998 and 2007 led to a significant increase in the base transfers as assessed by *the* change in the intercept. The coefficients are significant at the 1% level for both regressors. Analysing the slope effects they turn out to be negative in both changes of the system which suggests that the equalization effect of the system has improved in each case. Only one coefficient is not significant at the 1% or 5% level.

- Using dummy variables which categorize municipalities by size (regional product) it is possible to conclude that the poorer ones get more per capita transfers than the middle income municipalities. *Analyzing* the results for the higher income group

produces inconclusive results given their variability. Only two coefficients were significant at the 1% level.

Lastly, the test of differences of the municipalities of the regions of the Azores and Madeira, the *conclusion* is that for the first there is no significant difference while for the second only one coefficient is significant at the 1% level.

It is also possible to compare the results obtained with the data set compiled with the results of Fortuna et al. (2005), which used a more limited number of years. For that purpose the same regressions were run with the new data, using the 1998 and 2002 observations.

Table 2 presents the results and establishes the comparisons.

Table 2. Estimation Comparison with Fortuna *et al*. (2005).

Year	Variable	Fortuna *et al. (2005)*	Recalculation
1998	Intercept (t)	47,253 (19,2)	362,965 (19,5)
	Own Revenue(pc) (t)	-0,522 (-5,4)	-0,573 (-5,1)
	Intercept (t)	62,106 (21,9)	456,377 (20,8)
	GRPpc (t)	-0,223 (10,9)	-0,026 (8,7)
2002	Intercept (t)	56,36 (19,6)	535,618 (21,7)
	Own Revenue(pc) (t)	-0,561 (-5,9)	-0,784 (-6,5)

One concludes that there are no significant differences either for the estimated coefficients or for the t statistics in both studies.

The results obtained in both studies confirm the same conclusions for the same periods.

5. CONCLUSIONS

The literature on fiscal equalization now includes many contributions of the analysis of different systems in use and of their contribution to the final supposed final objective of eliminating vertical and horizontal inequalities.

The literature lays out the main principles for obtaining vertical and horizontal equalization but it is not always straight forward what results specific schemes will produce.

The current study meant to analyze how the system adopted in Portugal contributed to equalization both in its basic configuration and in the successive alterations that were introduced with time.

It was concluded that the Portuguese system of distribution of funds among municipalities is not, on average, equalizing in the sense that the higher the *per capita* income the higher are *per capita* transfers. This suggests that even though there might be cohesion components in the transfer formulas they are not sufficient to, on average, produce an equalizing result. However, it is also concluded that the changes introduced in the system in 1998 and 2007 led to an improvement of the equalization characteristics of the transfer system.

By dividing the sample according to average *per capita* income it is concluded that poorer 20% do get more transfer son average than the median 60% while the richer 20% get less. The effects assessed through regression analysis for the full sample do not provide evidence of equalization.

When testing for the hypothesis that the effects on the municipalities in the two autonomous regions – Azores and Madeira – no unequivocal conclusion could be drawn since the significance and the sight of the variations were not consistent.

In conclusion, no equalization effect was found, on average, in the system that transfers funds to municipalities in Portugal even though two changes introduced in 1998 and 2007, contributed to improve its equalization characteristics.

Some shortcomings of the current study can be associated to the fact that some variables, namely local income had to be constructed based on municipal consumption indices that only exist for some years. To the extent that these values might diverge from the real ones introduces some fragility to the study.

Looking forward towards other research possibilities, other formulations of the equalization effect might be tested as might the use of other variable or better constructed variables.

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