

## **The Tiebout Hypothesis and Local Governments Specialization: The Case of Greater Porto.**

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### **Abstract**

According to the model of “voting with the feet” households tend to move to jurisdictions where public and merit goods offered best correspond to their preferences. An important implication of this model is that we should be able to observe an increasing homogeneity of households concerning their preferences for local public/merit goods as well as a progressive specialization of local governments concerning the goods they provide. The Portuguese case is especially interesting because local governments only after 1974 had the possibility to differentiate the combination of local public goods and local merit goods they provide. Because the learning process by local governments and households takes time, it is expectable that differentiation of local jurisdictions is a progressive process. To determine if there is empirical evidence of this progressive specialization is the major motivation of this study. To this purpose, we test for the municipalities of Greater Porto if there is evidence supporting the voting with the feet hypothesis.

### **1. Introduction**

It is abundant the literature on the model of revelation of preferences for local public goods developed by Tiebout in 1956. A major implication of this model is the homogeneity of preferences for public goods within local government jurisdictions and the heterogeneity of preferences for public goods among local jurisdictions.

Many empirical studies on the Tiebout hypothesis have been published. However, for the Portuguese case we have knowledge of just one study (Caleiro, 2005) where the author tries to identify if the migratory movements between Portuguese regions reveal

“voting with the feet” behavior, but the homogeneity of public goods offered by local governments is not analyzed.

The Portuguese case is especially interesting because local governments only after 1974 had the possibility to differentiate the combination of local public goods and local merit goods they provide. Because the learning process by local governments and households takes time, it is expectable that differentiation of local jurisdictions is a progressive process. Therefore, to study this subject for Portuguese local governments fills a gap in the Portuguese literature but, above all, it is a contribution for the international debate on the subject considering that local governments in Portugal are a good case study to observe if there is “voting with the feet” behavior.

In this paper, we do a brief overview of the Tiebout model and of the major issues subject to empirical test. In the following section we present the methodology used to test empirically if there is specialization of the municipalities in Great Porto. In section 4 we analyze the results obtained and finally in the last section we formulate several conclusions.

## **2. Empirical Studies on the Tiebout’s Hypothesis**

Tiebout represents the voter-consumer as an individual who chooses de jurisdiction which better satisfies his preferences for local public goods and services. The voter-consumer reveals his preferences for local public goods and services by moving from one jurisdiction to another (voting with the feet). He compares the burden of local taxes with local public goods and services available in each local jurisdiction.

The model proposed by Tiebout relies on strong assumptions: voters-consumers have no costs to move from one jurisdiction to another and choose the jurisdiction that offers the best combination of local taxes and local public goods and services; voters-consumers have complete information on local government receipts and local government expenditures; there is a large number of local jurisdictions to choose from; voters-consumers only have income from dividends; local public goods are produced with constant returns to scale; the combination of local public goods is defined to meet local voters preferences; the optimum size of each jurisdiction is determined by fixed land

resources and by local households demand; jurisdictions below optimum size desire to growth and jurisdictions above optimum size to maintain their population.

According to this model, the larger the number of jurisdictions the greater the competition among them and the greater the satisfaction of voters-consumers. When the number of local jurisdictions increases they become more homogeneous concerning household preferences for local public goods and services.

As we saw, the assumptions of Tiebout's model are quite strong. As a matter of fact, voters-consumers have costs to move from one jurisdiction to another because of institutional restrictions and lack of housing and jobs. Furthermore, displacement of voters-household may be determined by job opportunities rather than preferences for local public goods and services (Sytyuk, 2001) and potential movers do not observe easily the pattern of local government receipts and local government expenditures.

A subject in the empirical literature on the Tiebout's hypothesis concerns the efficiency/equity trade-off. Some authors stress the competition and sorting effect with the offer of a mix of local public goods and services contributing to efficiency gains (Rhode e Strumpf, 2001). Others see fragmentation of local jurisdictions as increasing competition among local governments and consequently inducing efficiency gains (Dawkins, 2005; Dowding and Mergoupis, 2003). With an opposite view, some authors stress the equity effect with sorting contributing for more social stratification (Neiman et al., 1976). Oates (1969) takes a more moderate view pointing out the need to compare the marginal benefit from creating a new local government with the marginal cost of creating a new local jurisdiction (spillovers and segregation costs as well as loss of scale economies).

Another issue in the literature is the evaluation of the relationship between the dispersion of preferences of voters-consumers on local public goods and size of local jurisdictions. We would expect that dispersion of satisfaction of local voters-consumers would be higher for larger local jurisdictions. This expectation is not confirmed by Kelleher and Lowery (2002) who found that voters are more satisfied in consolidated local jurisdictions than in fragmented local jurisdictions.

Several studies address the relationship between voting with the feet and the optimum size of local jurisdictions in a metropolitan area. Zimmerman (1970)<sup>1</sup> and Freiseman (1972)<sup>2</sup> argue that larger jurisdictions are more efficient because of scale economies. With an opposite view Bish (1971, 1979, 1987)<sup>3</sup> concludes that efficiency is higher in smaller local jurisdictions.

An important implication of the model developed by Tiebout is that more competition among local governments generates more homogeneous local jurisdictions since there is smaller distance between the preferences of voters and the mix of local public goods offered by local governments (sorting process). Concerning the sorting process Bickers and Egstrom (2004) organize the empirical studies into four categories: sorting according to race (Smith, 1991; Fischer, 2003; St. John, 2002<sup>4</sup>); sorting according to income and wealth (Pack e Pack, 1977; Miller, 1981; Grubb, 1982; Stein, 1987<sup>5</sup>); sorting according to demographic characteristics; sorting according to fiscal conditions and local public goods provided (Ottensmann, 1982; Stein, 1987<sup>6</sup>).

Concerning the sorting process an important research question it to know to what extent the distribution of residents is determined by their knowledge of both fiscal conditions and public goods provided by local governments (Lowery et al., 1995; Teskes et al., 1995<sup>7</sup>). But, other questions arise: is there specialization at a municipal scale considering the supply of public goods and services? Can we find a causal relationship between location preferences and type of government? Or is it racial and economic segregation that most influence the sorting of population?

The debate on these issues is far from being conclusive. Some authors argue that few people have complete information on fiscal conditions and public goods offered by local governments (Dowding et al., 1994). A counter-argument is that some people are able to identify local jurisdictions that offer public goods and services they prefer and consequently choose them as residential location (Teske et al., 1993<sup>8</sup>), and that others use

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<sup>1</sup> in Dowding e John (1994)

<sup>2</sup> in Dowding e John (1994)

<sup>3</sup> in Dowding e John (1994)

<sup>4</sup> in Bickers e Egstrom (2004)

<sup>5</sup> in Bickers e Egstrom (2004)

<sup>6</sup> in Bickers e Egstrom (2004)

<sup>7</sup> in Bickers e Egstrom (2004)

<sup>8</sup> in Bickers e Egstrom (2004)

heuristic methods to identify correctly certain public goods and services (Bickers e Stein, 1998<sup>9</sup>).

Rhode and Strumpf (2001) evaluate the Tiebout's effects comparing them with other determinants of household mobility (namely job availability and social interaction). When costs of mobility diminish along time we would expect heterogeneity to increase. The empirical results obtained by the authors for a sample of counties in the metropolitan area of Boston for the period 1870-1990 and for all the counties in USA for the period 1850-1990 do not support such prediction.

Bickers and Egstrom (2004) argue that there is racial and ethnic sorting because smaller local jurisdictions have smaller diversity than larger local jurisdictions and that local jurisdictions in more decentralized metropolitan areas have smaller diversity than local jurisdictions in more consolidated metropolitan areas. Their results indicate that the level of sorting is determined by the existence of different races and ethnic groups rather than by local public goods and services offered or public policies.

Other studies addressing the same issue try to verify if there is a causal relationship between race and preferences for local public goods (Dawkins, 2005). The results at a metropolitan scale suggest a moderate causal relationship between local jurisdictions fragmentation and racial segregation.

Several authors found that there is no strong empirical evidence that local jurisdictions fragmentation contribute to racial segregation. Instead, it is the persistent differences in income and wealth between races (more generally, cultural and social and economic differences) combined with the contribution of local jurisdiction fragmentation according to income differences that contribute to racial segregation (Burstein, 1980; Henderson, 1985; Ross e Yinger, 1999; Wheaton, 1993; Yinger, 1995<sup>10</sup>). In these studies the Tiebout effects seem not to be dominant.

### 3. Methodology

A large majority of studies analyze the Tiebout effects at a metropolitan scale. If we follow that orientation we would pick one of the two metropolitan areas (Lisbon or

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<sup>9</sup> in Bickers e Egstrom (2004)

<sup>10</sup> in Dawkins (2005)

Porto). In our case it would be the Porto Metropolitan Area because of our research interests. But instead of that choice we opt to study the Tiebout effects for the Greater Porto. Greater Porto includes six central municipalities of the metropolitan area of Porto (Porto, Gaia, Matosinhos, Maia, Gondomar, and Valongo). For Greater Porto the functional relationships are more intense and we believe that the problems derived from the assumption of perfect mobility are minimized. The problem with this choice is that we may restrict the diversity of municipalities concerning their fiscal receipts and the public goods and services they offer to local residents.

The most common methodology to characterize sorting is the estimation of homogeneity indexes (Schneider, 1987; Pack e Pack 1977) using variables such as education, occupation, age, income, etc. Some studies analyze the household choices by estimating multiple regression equations as a way to capture the influence of diverse factors such as local taxes and local public goods and services on those preferences. Other studies simulate the household's choice process to study for pseudo jurisdictions the level of homogeneity of residents (Bickers and Egstrom, 2004). In our case, we choose the estimation of sorting indexes because we are restricted by the available data for Great Porto.

As Pack and Pack (1977) argue, a good index should be able to consider both quantitative and qualitative variables. It has to assume the value one for maximum homogeneity and zero for maximum heterogeneity. Because it is meaningless to define cardinal distances between different categories of variables, the distance is expressed as a ranking.

The index proposed by Leik (1966) denominated *index C* has all those properties.

$$C = 1 - \left[ \frac{2 \sum d_i}{(n-1)} \right]$$

$d_i = CF_i$ , if  $CF_i \leq 1/2$  and  $d_i = 1 - CF_i$ , if  $CF_i > 1/2$ ;  $CF_i = 1/N \sum f_i$  (accumulated relative frequency);  $N$  = number of observations;  $n$  = number of classes or categories).

The value of  $C$  is a function not only of the number of categories  $n$  but also of the relationship between them.  $C$  for heterogeneity  $C_{het}$  is a function of  $n$  and tends to 0.5 when  $n$  tends to infinity. When there is maximum homogeneity we have only one category and therefore the index takes the value 1.

To compare different values of  $C$  when we are in the presence of a different number of categories we estimate  $C^*$  which does not depend of  $n$ .

$$C^* = \frac{C - C_{het}}{1 - C_{het}}, \text{ for } C \geq C_{het}$$

To estimate  $C$  we consider two types of variables: variables capturing the variety of public goods and services offered by local governments; other variables capturing heterogeneity of local jurisdictions.

The index  $C$  is estimated for each municipality for the years 1981, 1991 and 2001. For capital expenditures we estimate the index for the period 1986- 2006.

To compare with Greater Porto we estimate a deviation index  $AD_i$  (mean absolute deviation index for Greater Porto).

$$AD_i = \frac{\sum_k |\hat{C}_{i,k}^* - \hat{C}_i^*|}{n}$$

Where  $\hat{C}_i^*$  and  $\hat{C}_{i,k}^*$  correspond to the homogeneity index for the variable  $i$  respectively for Greater Porto and each municipality.

**Table 1: Variables Used to Estimate C**

Variable	Categories
Municipal Capital Expenditures	Land Acquisition Housing Other Type of Buildings Infrastructure Other
Age	0-24 25-64 >65
Employed inhabitants by sector of activity.	Primary sector Secondary sector Tertiary sector
Level of Instruction of Residents	Without instruction Elementary education Middle education Secondary instruction Intermediate or university degree
Occupation of inhabitants	Professionals, technicians Intermediate technicians Sales, services and clerical workers Farmers, fishermen operatives, blue collar workers Without qualification and other
Source of Income	Work and Property Temporary Subsidies Dependent on Family Retirement Pension Social Support Other
Municipal facilities	Sports Culture Health care Elderly care Parks and other environmental related Other



## 4. Empirical Results

### 4.1. Capital Expenditures

The analysis of the values of  $C$  and  $C^*$  (henceforth referred to as specialization scores), derived from the capital expenditures, was carried out for the period 1986 to 2006. The values of the scores are presented in Tables 2 and 3.

The results show that, despite the oscillation of the scores of municipal specialization over these two decades, the scores have decreased for most of the municipalities.

The municipalities with lower specialization scores were Porto and Vila Nova de Gaia, where most of Greater Porto's population is concentrated. In particular, throughout this period the municipality of Porto has exhibited lower scores than those found for Greater Porto.

Furthermore, assuming that for every specialization score greater than  $1/2$  a municipality is closer to homogeneity than to heterogeneity, it is possible to see that Porto and Vila Nova de Gaia have been following a strategy of municipal investment which stands closer to heterogeneity.

On the contrary, the municipalities with higher specialization scores were Matosinhos, Maia, Valongo and Gondomar. Throughout the 1980s and early 1990s, Maia and Gondomar have exhibited high levels of specialization. Its scores of specialization approached closer homogeneity than heterogeneity. The values of the scores were related with a municipal focus of investment in infrastructures, such as road infrastructures, those for the collection, distribution and treatment of freshwater, and those for the collection and treatment of wastes. In the late 1990s and beyond, the abovementioned municipalities scored closer to heterogeneity, even though the values of the scores were higher than those found for Greater Porto.

Furthermore, an analysis of the evolution of the specialization scores of Matosinhos, Maia and Gondomar over the last 20 years, shows that the municipal focus of investment has shifted from infrastructures to housing and other buildings. In Valongo, however, the focus of municipal investment has remained mainly tied to the construction of infrastructures.



**Table 2.** Estimations of C for Capital Expenditures

Year	Porto	Matosinhos	Maia	Valongo	Gondomar	V. N. Gaia	Greater Porto
1986	0,45	0,64	0,86	0,71	0,73	0,73	<b>0,57</b>
1987	0,52	0,67	0,77	0,59	0,71	0,49	<b>0,60</b>
1988	0,52	0,71	0,76	0,59	0,73	0,45	<b>0,59</b>
1989	0,48	0,75	0,73	0,64	0,75	0,58	<b>0,55</b>
1990	0,51	0,53	0,71	0,77	0,73	0,58	<b>0,55</b>
1991	0,53	0,61	0,71	0,77	0,71	0,56	<b>0,58</b>
1992	0,45	0,71	0,68	0,73	0,76	0,55	<b>0,52</b>
1993	0,46	0,62	0,66	0,77	0,58	0,51	<b>0,51</b>
1994	0,48	0,61	0,74	0,91	0,72	0,49	<b>0,55</b>
1995	0,51	0,66	0,64	0,71	0,58	0,56	<b>0,52</b>
1996	0,55	0,73	0,59	0,79	0,61	0,67	<b>0,57</b>
1997	0,54	0,56	0,66	0,66	0,85	0,57	<b>0,55</b>
1998	0,48	0,50	0,62	0,58	0,69	0,46	<b>0,51</b>
1999	0,51	0,40	0,52	0,71	0,55	0,50	<b>0,45</b>
2000	0,49	0,51	0,50	0,75	0,54	0,40	<b>0,47</b>
2001	0,49	0,56	0,55	0,78	0,69	0,62	<b>0,52</b>
2002	0,45	0,69	0,51	0,79	0,66	0,51	<b>0,50</b>
2003	0,50	0,74	0,68	0,58	0,76	0,44	<b>0,50</b>
2004	0,40	0,70	0,54	0,57	0,71	0,45	<b>0,45</b>
2005	0,48	0,68	0,76	0,77	0,67	0,70	<b>0,55</b>
2006	0,40	0,56	0,40	0,76	0,66	0,59	<b>0,49</b>



**Table 3:** Estimations of C\* for Capital Expenditures

Year	Porto	Matosinhos	Maia	Valongo	Gondomar	V.N. Gaia	Greater Porto
1986	0,08	0,40	0,76	0,52	0,55	0,56	<b>0,29</b>
1987	0,20	0,46	0,62	0,32	0,52	0,14	<b>0,33</b>
1988	0,20	0,52	0,59	0,31	0,55	0,09	<b>0,31</b>
1989	0,14	0,58	0,55	0,39	0,58	0,30	<b>0,24</b>
1990	0,19	0,22	0,51	0,61	0,56	0,31	<b>0,25</b>
1991	0,22	0,35	0,52	0,61	0,52	0,26	<b>0,30</b>
1992	0,09	0,51	0,46	0,55	0,60	0,25	<b>0,21</b>
1993	0,10	0,36	0,43	0,62	0,30	0,18	<b>0,18</b>
1994	0,13	0,35	0,56	0,85	0,54	0,15	<b>0,26</b>
1995	0,18	0,43	0,39	0,52	0,30	0,27	<b>0,21</b>
1996	0,26	0,56	0,32	0,65	0,35	0,45	<b>0,28</b>
1997	0,24	0,27	0,43	0,43	0,75	0,28	<b>0,25</b>
1998	0,13	0,16	0,37	0,30	0,48	0,10	<b>0,19</b>
1999	0,18	0,00	0,20	0,52	0,26	0,17	<b>0,09</b>
2000	0,15	0,19	0,16	0,58	0,23	0,01	<b>0,12</b>
2001	0,16	0,27	0,25	0,64	0,48	0,37	<b>0,20</b>
2002	0,08	0,49	0,18	0,65	0,43	0,18	<b>0,17</b>
2003	0,16	0,56	0,47	0,31	0,60	0,07	<b>0,17</b>
2004	0,00	0,51	0,23	0,28	0,51	0,09	<b>0,08</b>
2005	0,13	0,46	0,60	0,62	0,45	0,50	<b>0,24</b>
2006	0,00	0,27	0,00	0,60	0,44	0,32	<b>0,16</b>

## **4.2. Socioeconomic Indicators**

The examination of the scores of municipal specialization in Greater Porto with respect to a set of socioeconomic variables has been carried out for the census years 1981, 1991 and 2001. The full array of variables employed in the analysis were the age of inhabitants, the level of instruction, the sector of activity of employed inhabitants, the occupancy and the source of income. The results are presented in Tables 4 and 5.

Concerning the variable “age of inhabitants”, the results show no evidence of sorting by age. However, despite these low levels of specialization, the results show that municipal specialization has come to increase over the years. In the case of Matosinhos, Maia, Valongo, Gondomar and Vila Nova de Gaia, the increase of the specialization scores is related with the increase of the ratio of population between 25 and 64 years old, resulting from the attraction of young people and working-age adults by the periphery of Greater Porto. In the case of Porto, the increase of the ratio of the eldest population, coupled with the decrease of young and working-age population, seems to explain the increase of the specialization scores over the years.

There’s also no evidence of municipal specialization with regard to the levels of instruction of the population. In fact, in spite of the increase of the levels of instruction of population over the census years, the municipalities have registered a decreasing trend of specialization. Nevertheless, the municipalities of Matosinhos, Maia, Valongo, Gondomar and Vila Nova de Gaia have registered higher scores of specialization than those found for Greater Porto. The structural factors explaining these scores appears to have shifted over the years: from a higher ratio of people without education and with elementary education in 1981; to a higher ratio of people with elementary education in 1991; to a higher ration of people with elementary and middle education in 2001.

Concerning the sector of activity of the employed inhabitants, Porto has registered the highest scores of specialization. These scores have increased over the last two decades. They seem to be mainly attributed to the service sector, revealing the increasing tertiarisation of Porto’s economy.

In the remaining municipalities, an analysis of the evolution of the specialization scores shows a shift from mainly industrial-based economies to service-led economies. This

transition somehow explains the decrease of the level of the specialization between 1981 and 1991, followed by an increase between 1991 and 2001.

Concerning the variable “occupancy”, there’s no evidence of sorting by type of professional activity. From the one side, the scores of specialization are closer to heterogeneity than to homogeneity; from the other side, these scores have decreased over the last two decades. Once again, the municipalities of Matosinhos, Maia, Valongo, Gondomar and Vila Nova de Gaia have registered higher scores of specialization than those found for Greater Porto. In 1981, these scores could be mainly attributed to a higher ratio of farmers, fishermen, operatives or labourers, whereas in 2001 they were mainly associated with a higher ratio of people working in sales, services and clerical occupations.

Finally, there’s also no evidence of sorting by source of income. Nevertheless, the scores of specialization have increased over the last two decades as a result of the increase of the ratio of people whose income is derived from work and property. Moreover, the municipalities of Matosinhos, Maia, Valongo, Gondomar and Vila Nova de Gaia appear to be more specialized than Greater Porto.

#### **4.3. Other Indicators: Municipal Facilities**

The estimation of the municipal scores of specialization with respect to the municipal facilities has been carried out for 2003. The results are presented in Tables 4 and 5.

The scores estimated for Porto, Matosinhos, Valongo e Gondomar are closer homogeneity than heterogeneity. Porto and Valongo have registered the highest levels of specialization. The remaining municipalities have scored closer to heterogeneity. Moreover, whereas Porto and Matosinhos seem to be more specialized in cultural facilities, Valongo and Gondomar seem to be more specialized sports facilities.

**Table 4:** Estimations of C by Socioeconomic Variable

Variable		Porto	Matosinhos	Maia	Valongo	Gondomar	V. N. Gaia	Greater Porto
Urban-Related Land Uses								
	(2003)	0,80	0,57	0,66	0,72	0,76	0,86	<b>0,74</b>
Municipal Facilities								
	(2003)	0,84	0,72	0,57	0,88	0,75	0,60	<b>0,64</b>
Age of Inhabitants								
	(1981)	0,49	0,48	0,47	0,45	0,46	0,47	<b>0,54</b>
	(1991)	0,52	0,54	0,52	0,52	0,53	0,53	<b>0,52</b>
	(2001)	0,53	0,57	0,58	0,57	0,57	0,57	<b>0,56</b>
Level of Instruction								
	(1981)	0,53	0,62	0,64	0,65	0,64	0,63	<b>0,60</b>
	(1991)	0,46	0,53	0,56	0,59	0,58	0,56	<b>0,51</b>
	(2001)	0,45	0,49	0,48	0,54	0,53	0,51	<b>0,49</b>
Employed Inhabitants by Sector of Activity								
	(1981)	0,66	0,55	0,64	0,57	0,54	0,54	<b>0,54</b>
	(1991)	0,70	0,51	0,56	0,51	0,53	0,49	<b>0,55</b>
	(2001)	0,78	0,66	0,60	0,56	0,63	0,60	<b>0,65</b>
Occupation								
	(1981)	0,50	0,54	0,57	0,56	0,55	0,53	<b>0,47</b>
	(1991)	0,49	0,53	0,58	0,61	0,60	0,56	<b>0,51</b>
	(2001)	0,42	0,48	0,48	0,51	0,51	0,48	<b>0,47</b>
Source of Income								
	(1981)	0,54	0,58	0,60	0,58	0,55	0,56	<b>0,56</b>
	(1991)	0,49	0,55	0,57	0,54	0,54	0,54	<b>0,53</b>
	(2001)	0,57	0,65	0,71	0,69	0,68	0,68	<b>0,65</b>

**Table 5:** Estimations of C by Socioeconomic Variable

Variable		Porto	Matosinhos	Maia	Valongo	Gondomar	V. N. Gaia	Greater Porto
Urban-Related Land Uses								
	(2003)	0,69	0,36	0,49	0,57	0,64	0,79	<b>0,61</b>
Municipal Facilities								
	(2003)	0,74	0,54	0,28	0,80	0,58	0,33	<b>0,40</b>
Age of Inhabitants								
	(1981)	0,23	0,23	0,20	0,18	0,19	0,20	<b>0,30</b>
	(1991)	0,28	0,31	0,29	0,28	0,29	0,29	<b>0,29</b>
	(2001)	0,30	0,36	0,37	0,36	0,36	0,35	<b>0,35</b>
Level of Instruction								
	(1981)	0,22	0,37	0,39	0,41	0,40	0,38	<b>0,33</b>
	(1991)	0,09	0,22	0,27	0,31	0,30	0,26	<b>0,19</b>
	(2001)	0,09	0,15	0,14	0,23	0,22	0,18	<b>0,14</b>
Employed Inhabitants by Sector of Activity								
	(1981)	0,49	0,33	0,46	0,36	0,31	0,31	<b>0,31</b>
	(1991)	0,55	0,26	0,33	0,26	0,30	0,23	<b>0,32</b>
	(2001)	0,67	0,49	0,40	0,35	0,44	0,39	<b>0,47</b>
Occupation								
	(1981)	0,17	0,23	0,29	0,27	0,25	0,22	<b>0,11</b>
	(1991)	0,15	0,22	0,30	0,35	0,33	0,27	<b>0,18</b>
	(2001)	0,04	0,14	0,13	0,18	0,18	0,14	<b>0,12</b>
Source of Income								
	(1981)	0,24	0,31	0,33	0,30	0,25	0,26	<b>0,26</b>
	(1991)	0,15	0,26	0,29	0,23	0,24	0,24	<b>0,22</b>
	(2001)	0,28	0,42	0,52	0,48	0,46	0,47	<b>0,42</b>

## 5. Conclusion

In the previous section we have seen that:

- i) Concerning the capital expenditures, the specialization scores have decreased throughout the last two decades. Porto and Vila Nova de Gaia showed no evidence of specialization with respect to municipal investments. In the remaining municipalities, throughout the 1980s and early 1990s municipal investment has apparently been focused in the construction of infrastructures, whereas from the late 1990s onwards it has shifted to the construction of housing and other buildings;
- ii) There's no evidence of specialization with respect to the socioeconomic variables. However, for variables such as the "age of inhabitants", "sector of activity of employed inhabitants" and "source of income", the specialization scores have increased over the last two decades;
- iii) Regarding municipal facilities, Porto and Matosinhos seem to be specialized in cultural facilities, whereas Valongo and Gondomar seem to be specialized in sports facilities.

The analysis shows that the most consolidated municipalities have opted to follow an undifferentiated strategy of municipal investment. Conversely, the growing urban periphery of Greater Porto, and its associated municipalities, has witnessed a stronger investment in infrastructures which has followed perhaps the high rates of urbanization in these municipalities over the last decades, portrayed by an increase in population levels and in the housing stock. From the late 1990s onwards, there's a shift in the focus of municipal investment, which may be related with the slowdown of the dynamics of urbanization in the peripheral municipalities of Greater Porto.

One could further hypothesize that the overall decreasing trend in the levels of municipal specialization may be related with the decrease in the pace of urbanization over the years.

Furthermore, despite the existence of municipal specialization with respect to the variable "capital expenditures", in particular for the urban periphery of Greater Porto, there's no evidence of differentiation of local jurisdictions as far as their investments are



concerned. Most of them there have followed a pattern of investment which was initially focused in the construction of infrastructures and that has later shifted to housing and the construction of other buildings.

Regarding the socioeconomic variables, in spite of the lack of municipal specialization, there's the general perception that socioeconomic structure of the different municipalities has been changing throughout the years. From the one side, there appears to be trend of concentration of the eldest people in Porto, whereas the municipalities in the urban periphery of Greater Porto seem to be concentrating the young and working-age population. From the other side, we observe a trend towards an increasing tertiarisation of Greater Porto's economy. And finally, the ratio of people whose income is derived from work and property has increased for all the municipalities of Greater Porto.

Once again, despite the overall transformation of the socioeconomic structure of Greater Porto, there's no evidence of differentiation of local municipalities with respect to the set of socioeconomic variables under study.

A question that can be raised is whether there's a relation between the pattern of municipal investment and the socioeconomic structure that has evolved over the years in the municipalities of Greater Porto. In other words, has a spatially undifferentiated socio-economic structure been instigated by an undifferentiated strategy of municipal investment? Or is it solely a result of the overall process of suburbanization in the Metropolitan Area of Porto?

With the analysis that has been carried out in this paper it is not possible to address this question. This is the main shortcoming of the paper. In the future, it is our aim to run an econometric model in order to determine whether or not there's a causal relation between the type of municipal investment and the socioeconomic structure of the municipalities of Greater Porto, and to portray its evolution over time.

## 6. References

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## 7. Appendix

### 7.1. Analysis of the Estimations of $C^*$ for Capital Expenditures

#### Porto

Year	$C^* > 0,5?$	Type of Specialization	$C^*_i > C^*_{\text{Greater Porto}}?$
1986	No	-	No
1987	No	-	No
1988	No	-	No
1989	No	-	No
1990	No	-	No
1991	No	-	No
1992	No	-	No
1993	No	-	No
1994	No	-	No
1995	No	-	No
1996	No	-	No
1997	No	-	No
1998	No	-	No
1999	No	-	<b>Yes</b>
2000	No	-	<b>Yes</b>
2001	No	-	No
2002	No	-	No
2003	No	-	No
2004	No	-	No
2005	No	-	No
2006	No	-	No

#### Matosinhos

Year	$C^* > 0,5?$	Type of Specialization	$C^*_i > C^*_{\text{Greater Porto}}?$
1986	No	-	<b>Yes</b>
1987	No	-	<b>Yes</b>
1988	<b>Yes</b>	Infrastructure	<b>Yes</b>
1989	<b>Yes</b>	Infrastructure	<b>Yes</b>
1990	No	-	No
1991	No	-	<b>Yes</b>
1992	<b>Yes</b>	Infrastructure	<b>Yes</b>
1993	No	-	<b>Yes</b>
1994	No	-	<b>Yes</b>
1995	No	-	<b>Yes</b>
1996	<b>Yes</b>	Infrastructure	<b>Yes</b>
1997	No	-	<b>Yes</b>
1998	No	-	No
1999	No	-	No
2000	No	-	<b>Yes</b>
2001	No	-	<b>Yes</b>
2002	No	-	<b>Yes</b>
2003	<b>Yes</b>	Other Type of Buildings	<b>Yes</b>
2004	<b>Yes</b>	Housing	<b>Yes</b>
2005	No	-	<b>Yes</b>
2006	No	-	<b>Yes</b>

# Maia

Year	C*>0,5?	Type of Specialization	C* <sub>i</sub> >C* <sub>Greater Porto</sub> ?
1986	Yes	Infrastructure	Yes
1987	Yes	Infrastructure	Yes
1988	Yes	Infrastructure	Yes
1989	Yes	Infrastructure/Other Type of Buildings	Yes
1990	Yes	Infrastructure	Yes
1991	Yes	Other Type of Buildings	Yes
1992	No	-	Yes
1993	No	-	Yes
1994	Yes	Infrastructure	Yes
1995	No	-	Yes
1996	No	-	Yes
1997	No	-	Yes
1998	No	-	Yes
1999	No	-	Yes
2000	No	-	Yes
2001	No	-	Yes
2002	No	-	Yes
2003	No	-	Yes
2004	No	-	Yes
2005	Yes	Housing	Yes
2006	No	-	No

# Valongo

Year	C*>0,5?	Type of Specialization	C* <sub>i</sub> >C* <sub>Greater Porto</sub> ?
1986	Yes	Infrastructure	Yes
1987	No	-	No
1988	No	-	No
1989	No	-	Yes
1990	Yes	Infrastructure/Other	Yes
1991	Yes	Infrastructure	Yes
1992	Yes	Infrastructure/Other Type of Buildings	Yes
1993	Yes	Infrastructure	Yes
1994	Yes	Infrastructure	Yes
1995	Yes	Infrastructure	Yes
1996	Yes	Infrastructure	Yes
1997	No	-	Yes
1998	No	-	Yes
1999	Yes	Infrastructure/Other	Yes
2000	Yes	Infrastructure	Yes
2001	Yes	Infrastructure	Yes
2002	Yes	Infrastructure	Yes
2003	No	-	Yes
2004	No	-	Yes
2005	Yes	Infrastructure	Yes
2006	Yes	Infrastructure	Yes

### Gondomar

Year	C*>0,5?	Type of Specialization	C* <sub>i</sub> >C* <sub>Greater Porto</sub> ?
1986	Yes	Infrastructure	Yes
1987	Yes	Infrastructure	Yes
1988	Yes	Infrastructure	Yes
1989	Yes	Infrastructure	Yes
1990	Yes	Infrastructure	Yes
1991	Yes	Infrastructure	Yes
1992	Yes	Infrastructure	Yes
1993	No	-	Yes
1994	Yes	Infrastructure	Yes
1995	No	-	Yes
1996	No	-	Yes
1997	Yes	Housing	Yes
1998	No	-	Yes
1999	No	-	Yes
2000	No	-	Yes
2001	No	-	Yes
2002	No	-	Yes
2003	Yes	Housing	Yes
2004	Yes	Other Type of Buildings	Yes
2005	No	-	Yes
2006	No	-	Yes

### Vila Nova de Gaia

Year	C*>0,5?	Type of Specialization	C* <sub>i</sub> >C* <sub>Greater Porto</sub> ?
1986	Yes	Other Type of Buildings	Yes
1987	No	-	No
1988	No	-	No
1989	No	-	Yes
1990	No	-	Yes
1991	No	-	No
1992	No	-	Yes
1993	No	-	No
1994	No	-	No
1995	No	-	Yes
1996	No	-	Yes
1997	No	-	Yes
1998	No	-	No
1999	No	-	Yes
2000	No	-	No
2001	No	-	Yes
2002	No	-	Yes
2003	No	-	No
2004	No	-	Yes
2005	Yes	Infrastructure	Yes
2006	No	-	Yes

## 7.2. Analysis of the Estimations of C\* by Socioeconomic Variable

### Porto

	C*> 0,5?	Type of Specialization	C* <sub>i</sub> >C*Greater Porto?
Age of Inhabitants (1981) (1991) (2001)	No No No	- - -	No No No
Level of Instruction (1981) (1991) (2001)	No No No	- - -	No No No
Employed Inhabitants by Sector of Activity (1981) (1991) (2001)	No <b>Yes</b> <b>Yes</b>	- Tertiary Tertiary	<b>Yes</b> <b>Yes</b> <b>Yes</b>
Occupation (1981) (1991) (2001)	No No No	- - -	<b>Yes</b> No No
Source of Income (1981) (1991) (2001)	No No No	- - -	No No No
Municipal Facilities (2003)	<b>Yes</b>	Culture	<b>Yes</b>

### Matosinhos

	C*> 0,5?	Type of Specialization	C* <sub>i</sub> >C*Greater Porto?
Age of Inhabitants (1981) (1991) (2001)	No No No	- - -	No <b>Yes</b> <b>Yes</b>
Level of Instruction (1981) (1991) (2001)	No No No	- - -	<b>Yes</b> <b>Yes</b> <b>Yes</b>
Employed Inhabitants by Sector of Activity (1981) (1991) (2001)	No No No	- - -	<b>Yes</b> No <b>Yes</b>
Occupation (1981) (1991) (2001)	No No No	- - -	<b>Yes</b> <b>Yes</b> <b>Yes</b>
Source of Income (1981) (1991) (2001)	No No No	- - -	<b>Yes</b> <b>Yes</b> <b>Yes</b>
Municipal Facilities (2003)	<b>Yes</b>	Culture	<b>Yes</b>

## Maia

		<b>C* &gt; 0,5?</b>	<b>Type of Specialization</b>	<b>C*<sub>i</sub> &gt; C* Greater Porto?</b>
Age of Inhabitants	(1981) No (1991) No (2001) No	No No No	- - -	No No <b>Yes</b>
Level of Instruction	(1981) No (1991) No (2001) No	No No No	- - -	<b>Yes</b> <b>Yes</b> No
Employed Inhabitants by Sector of Activity	(1981) No (1991) No (2001) No	No No No	- - -	<b>Yes</b> <b>Yes</b> No
Occupation	(1981) No (1991) No (2001) No	No No No	- - -	<b>Yes</b> <b>Yes</b> <b>Yes</b>
Source of Income	(1981) No (1991) No (2001) <b>Yes</b>	No No <b>Yes</b>	- - Work and Property	<b>Yes</b> <b>Yes</b> <b>Yes</b>
Municipal Facilities	(2003) No	No	-	No

## Valongo

		<b>C* &gt; 0,5?</b>	<b>Type of Specialization</b>	<b>C*<sub>i</sub> &gt; C* Greater Porto?</b>
Age of Inhabitants	(1981) No (1991) No (2001) No	No No No	- - -	No No <b>Yes</b>
Level of Instruction	(1981) No (1991) No (2001) No	No No No	- - -	<b>Yes</b> <b>Yes</b> <b>Yes</b>
Employed Inhabitants by Sector of Activity	(1981) No (1991) No (2001) No	No No No	- - -	<b>Yes</b> No No
Occupation	(1981) No (1991) No (2001) No	No No No	- - -	<b>Yes</b> <b>Yes</b> <b>Yes</b>
Source of Income	(1981) No (1991) No (2001) No	No No No	- - -	<b>Yes</b> <b>Yes</b> <b>Yes</b>
Municipal Facilities	(2003) <b>Yes</b>	<b>Yes</b>	Sports	<b>Yes</b>

### Gondomar

		<b>C*&gt; 0,5?</b>	<b>Type of Specialization</b>	<b>C*<sub>i</sub>&gt;C*Greater Porto?</b>
Age of Inhabitants	(1981) No (1991) No (2001) No	No No No	- - -	No <b>Yes</b> <b>Yes</b>
Level of Instruction	(1981) No (1991) No (2001) No	No No No	- - -	<b>Yes</b> <b>Yes</b> <b>Yes</b>
Employed Inhabitants by Sector of Activity	(1981) No (1991) No (2001) No	No No No	- - -	No No No
Occupation	(1981) No (1991) No (2001) No	No No No	- - -	<b>Yes</b> <b>Yes</b> <b>Yes</b>
Source of Income	(1981) No (1991) No (2001) No	No No No	- - -	No <b>Yes</b> <b>Yes</b>
Municipal Facilities	(2003)	<b>Yes</b>	Sports	<b>Yes</b>

### Vila Nova de Gaia

		<b>C*&gt; 0,5?</b>	<b>Type of Specialization</b>	<b>C*<sub>i</sub>&gt;C*Greater Porto?</b>
Age of Inhabitants	(1981) No (1991) No (2001) No	No No No	- - -	No <b>Yes</b> <b>Yes</b>
Level of Instruction	(1981) No (1991) No (2001) No	No No No	- - -	<b>Yes</b> <b>Yes</b> <b>Yes</b>
Employed Inhabitants by Sector of Activity	(1981) No (1991) No (2001) No	No No No	- - -	No No No
Occupation	(1981) No (1991) No (2001) No	No No No	- - -	<b>Yes</b> <b>Yes</b> <b>Yes</b>
Source of Income	(1981) No (1991) No (2001) No	No No No	- - -	No <b>Yes</b> <b>Yes</b>
Municipal Facilities	(2003)	No	-	No