Project B7:

The effect of effective tax rate differentials and clustering on investment in Belgium.

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maart 2012
K.U.Leuven

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Abstract

This paper looks at the effect of agglomeration economies on the tax sensitivity of investments in Belgian firms using detailed firm-level data. We find a negative effect of taxation on investment. However, this is dampened by the presence of agglomeration externalities. Our results hint to the importance of local labor market and supplying industries for firm investment decisions and follow the more nuanced view on tax competition of the New Economic Geography models.

1. Introduction and literature overview

In this paper we address the effect of corporate taxation on investment within Belgium. The view that taxation can influence the investment decision of firms is generally accepted in the economic literature. Traditionally, the effect of the corporate income tax on the level of capital has been measured through the cost of capital –defined as the pre-tax real required rate of return on an investment project (Devereux et al., 2002). This method dates back to at least Hall and Jorgenson (1967) and was advanced by King (1977) and King and Fullerton (1984) among others. It assumes that firms will invest in projects until the marginal product of capital just equals the cost of capital. In that case, the project just breaks even. A higher tax rate drives up the cost of capital and consequently reduces the inflow of capital. The effect is largely confirmed by empirical evidence. For an application on foreign direct investment we refer to the meta-study by de Mooij and Ederveen (2003). Combining 25 studies on the tax sensitivity of FDI, they find an average negative semi-elasticity of -3.3. The authors also note that the literature is quite heterogeneous, with only for recent years a focus on disaggregated, non US data. This result opens the possibility of increased tax competition or, in other words, a race to the bottom of taxation rates[1]. As capital becomes increasingly more mobile, firms will be more likely to invest in the location with the lowest tax burden and regions might start competing over setting the lowest taxation rate.

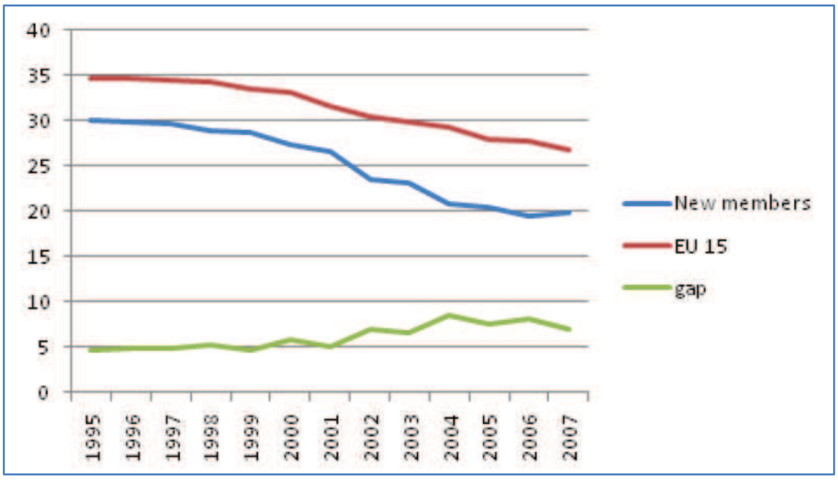

Figure 1: Evolution corporate tax rates between the old EU and the new member states

The recent enlargement of the European Union has exacerbated this fear of increased tax competition. Figure 1 plots the average statutory tax rates of the EU 15 countries and the new member states. The declining trend in corporate tax rates does suggest fiercer competition, which is an argument for more

[1] See e.g. the tax competition literature pioneered by Zodrow and Mieszkowski (1986).

tax harmonization at the European level. However, the gap between old and new countries has not decreased, but rather increased slightly. Which factors are the drivers of these tax differences?

The answer is that other factors affect the investment decision of firms as well and accordingly, a more nuanced view on tax competition has recently emerged with the New Economic Geography literature (see e.g. Baldwin and Krugman; 2004). As regional clusters of economic activity offer positive externalities to firms, they have a potential dampening effect on the tax sensitivity of the firm's location decision. Evidence of the effect of agglomeration economies on the entry decision of firms is presented in e.g. Crabbé and De Bruyne (2010) or Brülhart et al. (2007). Charlot and Paty (2007) and Coulibaly (2008) study the tax setting behavior of regions and find that the agglomeration rent can be taxed. A more general literature on the clustering of economic activity looks at the effect of agglomeration on firm productivity (see e.g. Konings and Torfs (2011) and Shimer and Smith (2000)). In this paper we further investigate the effect of agglomeration economies on the tax sensitivity of firm's investment decisions within Belgium. We do not look at the location decision of firms, but focus on the size of the investment, measured by the change in tangible fixed assets. We provide additional information on our data and methodology in the next section. In the third section we present our results. The fourth section concludes.

2. Data and Methodology

2.1 Investments

The firm level information needed for this research is obtained from the Belfirst database This is a commercial database made available by Bureau van Dijk. It contains company accounts and balance sheet data supplied by the National Bank of Belgium. As all Belgian firms are required by law to report their yearly financial statements Belfirst has a good coverage level. We follow the approach from Desai et al. (2001; 2004) in measuring the tax sensitivity of investments. We add in our analysis detailed measures of agglomeration to investigate the dampening effect of economic clustering on the tax sensitivity of firms. We do this by including an interaction between the measure of the tax burden and the economic clustering variable. With *N* the natural logarithm of tangible fixed assets, *ETR* the effective taxation rate, *AGGLOM* a measure of agglomeration economies and for firm *j* at time *t* in region *r* this becomes:

$$N_{jrt} = \alpha j \ + \beta ETR_{jrt} + \gamma AGGLOM_{rt} + \delta(ETR_{rt} \times AGGLOM_{rt}) + \varepsilon_{jrt.}$$

We expect to find a negative effect of taxation and a positive coefficient on the interaction variable: a higher tax burden deters new investments, but this effect is than mitigated in more agglomerated regions.

2.2 Effective Tax Rate

We now turn to the calculation of the tax burden within Belgium. We use the same approach as Vandenbussche et al. (2008), Vandenbussche and Crabbé (2005) or Crabbé and De Bruyne (2010) in that we look at the effective tax burden within Belgium. We need to make an important observation here: the corporate tax rate is in fact a federal matter The statutory taxation rates are set by the Belgian government and are the same across all Belgian districts. However, differences between regions and districts are possible due to changes in tax rulings, efficiency of local tax administration or differences in the deductibility of local taxes[2] (Crabbé & De Bruyne, 2010).

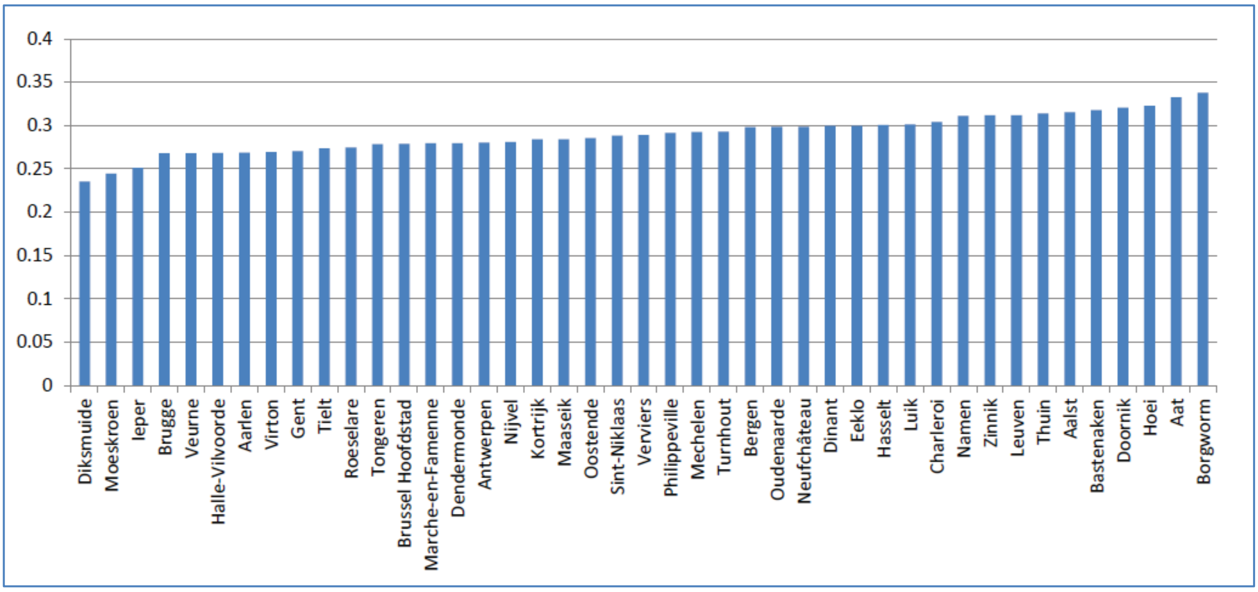

Figure2: Average ETR by district in Belgium (1998-2006)

[2] The most important local tax is the surcharge on the regional property tax . The surcharge can be freely set by all 589 municipalities in Belgium (Crabbé and De Bruyne, 2010)

The effective tax rates we use will capture these differences. We define the ETR as the ratio of taxes paid by the firm over the reported profit in that year. These variables are retrieved from the Belfirst BvD database. To obtain the average ETR on the district level, we calculate the mean of these rates within each district for each year[3]. In order to avoid endogeneity problems, we drop each firm's own effective taxation rate from the mean effective rate. An overview of these rates can be found in figure 2.

2.3 Agglomeration Economies

We develop three different measures of agglomeration economies, derived from detailed social security data (NSSO). The measures can be traced back to the seminal work of Marshall (1898), who pioneered the ideas on agglomeration rents and externalities. We first consider intra-industry knowledge spillovers. These learning externalities arise between firms belonging to the same industry. One can think of workers moving from to firm, carrying along job specific knowledge and expertise, or common technology platforms or imitation strategies of firms operating in the same sector. We construct the measure using regional industry-employment, where the industry is defined at the NACE 4 digit level. We subtract own firm employment to avoid possible endogeneity issues and add 1 in order to calculate the logarithm of this measure[4]. In order to identify the relevant region where these spillovers operate, we construct the measure for concentric circles at different distances around the commune where the firm is located[5] (Konings and Torfs, 2011). This results in the following formula, for firm *j*, industry *i*, region *r* and time *t*:

$$IIKS_{jirt} = ln[E_{irt} - E_{jirt} + 1]$$

A second source of agglomeration economies that we model originates from the sharing of inputs. Linkages between firms reduce logistical and transportation costs. In addition, many suppliers active in the same region will result in more competitive pricing of intermediate inputs or could result in a learning effect from working close with suppliers and having access to a large variety of input providers. The measure that we will include in our specifications measures total employment of all the industries that supply to the sector in which the firm is active. The employment of the supplying industries is weighted by their respective shares in the inputs of a specific sector, derived from the 2005 Belgian

[3] We first drop the rates which are below zero or above one.
[4] If a firm is the only regional representative of its industry we cannot calculate the logarithm of this measure.
[5] The closest ring is defined as a 5 km radius around the firm's commune city hall.

input/output table on the NACE 2 digit level. As we take the weights from only one input/output table, the variation in the variable is due to the variation in the regional employment of the supplying industry. We use the following definition, for region *r*, industry *i* and time *t*:

$$IL_{irt} = \ln\left[\sum_{k}^{K} \propto_{i\rightarrow k} \; E_{kr}\right]$$

Finally, we include a measure for labor market pooling. This externality stems from the mere size of the labor market pool, regardless of the industrial experience of those workers. Having a large labor pool reduces the recruitment costs for firms and increases the probability of a good match between vacancy and workers. We calculate the measure in a similar way as the intra-industry knowledge spillovers, but do not focus on one industry.

$$LMP_{rt} = ln\left[E_{rt} - E_{jrt} + 1\right]$$

An overview of these measures can be found below in table 1. We list the summary statistics for various sizes of concentric circles. Note that the regressions will include the natural logarithm of these measures.

	mean	**std.dev**	**min**	**max**
Labor Market Pooling (0-10 km)	118021.9	129765.8	790.11	479444
Labor Market Pooling (0-20 km)	260554.6	193382.3	6279.399	683736.4
Labor Market Pooling (0-30 km)	447374.7	270378.6	12394.84	1203146
Input Linkages (0-10 km)	4250.478	6258.937	0	54533.87
Input Linkages (0-20 km)	7475.22	8092.302	0	63409.29
Input Linkages (0-30 km)	11505.01	10150.31	0	79644.96
Intra-Industry Knowledge Spillovers (0-10 km)	448.4199	1131.584	0	29013
Intra-Industry Knowledge Spillovers (0-20 km)	671.4264	1325.25	0	29192
Intra-Industry Knowledge Spillovers (0-30 km)	941.5069	1486.885	0	29381

Table 1: Overview agglomeration measures

3. Regression results

In this section we test whether we find an effect of taxation and agglomeration on the amount of investments in Belgium. The first measure of agglomeration externalities we discuss are the input linkages, measured by the amount of employees that are listed as suppliers to a specific industry. Table 2 summarizes our findings. All regressions include firm fixed effects and year dummies. We also include specifications where we control for industry specific year shocks. In the first two columns we look at the effect of economic clustering measured in a concentric circle of 10 km around the city hall of the commune where the firm is located. We find an initial negative effect of taxation on investments of about –0.47. However, in order to assess the full tax sensitivity, we need to look at the interaction term as well. The coefficient is positive and significant, which could provide evidence of a dampening effect of agglomeration on the tax sensitivity of investments: the more input linkages around the firm, the less sensitive it becomes to adverse changes in the tax rate. We repeat the analysis in columns 3 and 4, but enlarge the radius of the concentric circles to 20 km. We see a confirmation of our earlier results: an initial negative effect of taxation which is compensated by a positive coefficient on the interaction variable. Finally, the last two columns summarize our findings with a 30 km radius. We see that the effect has disappeared: the coefficients have the expected sign, but none of them are significant..

The second measure of agglomeration we include is labor market pooling. We test to what extent firms benefit from a large pool of workers, regardless of the industry in which they operate. The results are presented in table 3. Looking within a 10 and 20 km radius, we observe the same results as the regressions with the input linkages in table 2: there is a significant and negative initial effect of taxation on investments within the firm and a compensating positive effect of the size of the labor force. The coefficients have the same sign in the specifications of the 30 km radius, but fail to be significant. The effect of labor market pooling seems to be, like the input linkages, happening at a local level. Turning to table 4 for the effect of intra-industry knowledge spillovers, we see the same picture: all coefficients have the expected sign, but none of them are significant. This is in line with the results in Konings and Torfs (2011), where the effect of intra-industry spillovers on firm productivity proved to be strongest within a 5 km radius[6].

These results enable us to test to what extent investments in the Belgian regions are sensitive to changes in fiscal policy. Using the estimated coefficients of the first column of table 1, we calculate the

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[6] We performed an additional robustness check with the IIKS measure, limiting it to a 5 km radius. None of the coefficients became significant, but the significance improved slightly.

point where the tax sensitivity is equal to zero. This is at a value of the input linkages of 6.638. Comparing this with the average size of input linkages in Flanders, 7.147, we see that it falls above the threshold. This leads us to conclude that, on average, an increase in the tax burden in Flanders does not necessarily result in fewer investments. We perform the same analysis using the coefficients of column 1 of the labor market pooling regressions and see a similar picture. Placing the point of zero tax sensitivity at a value of labor market pooling of 6.671, we see that this number is lower than the average value of log labor market pooling in Flanders, 10.948.

4. Conclusion

This paper has looked at the effect of agglomeration economies on the tax sensitivity of investments in Belgian companies. We use company accounts from Belfirst BvD to obtain our investment and taxation variables and detailed employment figures from the Belgian National Social Security Office to construct the regional agglomeration externalities. We pick up a negative effect of taxation on investment and a dampening effect of economic clustering in the labor market pooling and input linkages specifications. These effects are the strongest within a 10 and 20 km radius around the firm. We have also tested the effect of intra-industry knowledge spillovers on the tax sensitivity of Belgian investments: the specifications yielded the correct sign, but failed to pick up a significant effect. As earlier studies have pointed out, these intra-industry spillovers are generally more present on a local scale, within a 5 km radius (Konings and Torfs, 2011).

These results have implications for the current debate on the regionalization of corporate taxes in Belgium. Our results show that the fear of a race to the bottom, as predicted by the classic tax competition models, is tempered by the presence of economic clustering. This follows the recent findings of the New Economic Geography literature which states that a tax differential between regions is sustainable, provided that agglomeration externalities are present. The results suggest that there is some scope for more decentralization of fiscal policy in Belgium, without leading to increased competition of corporate tax rates between the regions or disinvestment of Belgian firms.

Table 2: Effect of Corporate Taxation and Input Linkages on Investment

	0-10 km		0-20 km		0-30 km	
Dependent Variable: Log Tangible Assets	(1)	(2)	(3)	(4)	(5)	(6)
ETR	-0.476**	-0.511**	-0.571**	-0.615**	-0.249	-0.331
	(0.197)	(0.2)	(0.265)	(0.265)	(0.292)	(0.298)
IL	0.107**	0.118***	0.104**	0.113**	0.0441	0.0597
	(0.044)	(0.0446)	(0.0488)	(0.049)	(0.05)	(0.051)
ETR * IL	0.0717**	0.0786**	0.0729**	0.0799**	0.0257	0.0371
	(0.0328)	(0.0332)	(0.0367)	(0.0367)	(0.0368)	(0.0374)
Constant	3.996***	3.934***	3.896***	3.832***	4.305***	4.182***
	(0.274)	(0.278)	(0.361)	(0.363)	(0.406)	(0.416)
Observations	46522	46522	46522	46522	46522	46522
Firm dummies	Y	Y	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y	Y	Y
Year*n2 dummies	N	Y	N	Y	N	Y

Heteroskedasticity robust standard errors adjusted for year country clusters in parentheses. *, **, *** reports significance at the 10%, 5%, 1% level.

Table 3: Effect of Corporate Taxation and Labor Market Pooling

	0-10 km		0-20 km		0-30 km	
Dependent Variable: Log Tangible Assets	(1)	(2)	(3)	(4)	(5)	(6)
ETR	-1.888***	-1.986***	-2.427**	-2.519***	-1.442	-1.719
	(0.704)	(0.719)	(0.956)	(0.968)	(1.144)	(1.159)
LMP	-0.0642*	-0.0687*	-0.0773*	-0.0817*	-0.0347	-0.0442
	(0.0384)	(0.0390)	(0.0434)	(0.0437)	(0.0476)	(0.0479)
ETR * LMP	0.283**	0.304**	0.311**	0.328**	0.159	0.198
	(0.116)	(0.118)	(0.132)	(0.133)	(0.142)	(0.144)
Constant	5.138***	5.139***	5.316***	5.326***	5.037***	5.104***
	(0.244)	(0.384)	(0.324)	(0.677)	(0.392)	(0.612)
Observations	46516	46516	46516	46516	46516	46516
Firm dummies	Y	Y	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y	Y	Y
Year*n2 dummies	N	Y	N	Y	N	Y

Heteroskedasticity robust standard errors adjusted for year country clusters in parentheses. *, **, *** reports significance at the 10%, 5%, 1% level.

Table 4: Effect of Corporate Taxation and Intra-Industry Knowledge Spillovers on Investment

	0-10 km		**0-20 km**		**0-30 km**	
Dependent Variable: Log Tangible Assets	(1)	(2)	(3)	(4)	(5)	(6)
ETR	-0.533	-0.476	-0.490	-0.444	-0.248	-0.276
	(0.370)	(0.388)	(0.438)	(0.460)	(0.516)	(0.535)
IIKS	-0.0229	-0.0207	-0.0199	-0.0213	-0.0151	-0.0207
	(0.0285)	(0.0297)	(0.0280)	(0.0292)	(0.0291)	(0.0300)
ETR *IIKS	0.105	0.100	0.0790	0.0797	0.0187	0.0314
	(0.0969)	(0.101)	(0.0955)	(0.0996)	(0.0984)	(0.102)
Constant	4.775***	4.749***	4.819***	4.806***	4.840***	4.852***
	(0.113)	(0.118)	(0.132)	(0.137)	(0.155)	(0.161)
Observations	43366	43366	44881	44881	45332	45332
Firm dummies	Y	Y	Y	Y	Y	Y
Year dummies	Y	Y	Y	Y	Y	Y
Year*n2 dummies	N	Y	N	Y	N	Y

Heteroskedasticity robust standard errors adjusted for year country clusters in parentheses. *, **, *** reports significance at the 10%, 5%, 1% level.

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Steunpunt beleidsrelevant onderzoek 2007-2011

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