

Taxes and Location Decisions of Firms

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Abstract

In traditional tax literature it is argued that (further) integration among countries will inevitably lead to a race to the bottom of corporate tax rates. In order to attract firms, countries are assumed to lower their tax rates below the ones of their 'competitors'. According to the New Economic Geography literature this however does not necessarily need to be the case. It is argued that more agglomerated regions benefit from what is called agglomeration rents and that these rents can be taxed. As integration moves on, one might expect the tax difference between more and less agglomerated regions to increase instead of fading out. The purpose of this paper is to test this theory for Belgian firms.

1 Introduction

In this paper we analyze the impact of corporate taxes on location decisions of firms within Belgium. On the one hand, the foreign direct investment (FDI) literature has shown that there is a negative relation between corporate taxes and attracting firms. [De Mooij and Ederveen (2003)] show using a meta-analysis that a 1 percentage point higher tax rate will lead to 3.3 percent less firms in a certain country or region. This type of research is very popular and several studies come up with different tax elasticities for FDI in different countries. Also the impact of taxation on entrepreneurship, the formation of new businesses, has been studied before, although less than FDI. These studies find that a 10 percentage point decrease in the tax rate increases the entry rate in a country by 0.88 to 1.3 percentage points ([Da Rin, Giacomo and Sembenelli (2008)]; [Djankov et al (2008)] and [Konings and Nursky (2008)]). On the other hand, the New Economic Geography literature shows that more agglomerated regions benefit from agglomeration rents. The idea is that firms benefit from locating close to one another because of spillovers, because of being able to buy or sell intermediates at a more profitable rate from/to each other, because of a better infrastructure and so on. As a consequence, more agglomerated regions can impose higher corporate taxes without necessarily driving firms away [Baldwin and Krugman (2004)]. This paper combines both strands of literature and studies whether agglomerated forces reduce a firm's sensitivity to tax rates.

Only three studies have studied this particular research question for regions in Switzerland [Brühlhart, Jametti and Schmidheiny (2007)], municipalities in Catalonia [Solé-Ollé and Jofre-Mons

and for regions in the UK [Devereux, Griffith and Simpson (2007)]. We test this hypothesis using data of newly established firms in Belgium in 2006. Belgium has an interesting setting to study. Although it is a small country, it is clear that it has large regional differences. Belgium has three regions: Flanders, Brussels and Wallonia. In our study, we will focus on the regions Flanders and Wallonia since its central location in Europe and presence of international institutions will bias our results. Flanders is known worldwide as a very industrialized region with high employment rates and a good developed infrastructure and transport network. Calculating agglomeration indices, we indeed observe that Flanders is the most agglomerated region compared to Wallonia. Our results also indicate that Flanders is able to attract more firms than Wallonia for a certain level of effective tax rates. This means that other elements such as agglomeration rents attract firms to Flanders irrespective of the tax rate. Moreover, we find that an equal rise in the effective tax rate in both regions implies more firms to set up their activities in Flanders rather than in Wallonia.

The paper is structured as follows. Section 2 gives an overview of the taxation literature and the Belgian tax system. Section 3 describes the data and section 4 reports the descriptive empirical results. Subsequently, section 5 introduces how we can set up future research based on our results. Finally, section 6 concludes.

2 Literature overview

This section is split up in two subsections. The first subsection discusses the taxation literature related to firm location and agglomeration effects. The second subsection describes the Belgian tax system.

2.1 Tax competition and agglomeration effects

In the taxation literature one often encounters the fear of a race to the bottom. In an international tax competition context, the mobile factor bears too little of the tax burden compared to the immobile factor. One argues that competition among countries in order to attract firms will make them lower their taxes. This process will lower taxes such that we eventually end up in a situation where taxes are more or less equalized to the tax level of the country with the lowest taxes [Wilson (1999)]. Several empirical studies have indeed shown that corporate taxes have a negative impact on attracting FDI. According to a meta-study of [De Mooij and Ederveen (2003)], a decrease in the corporate tax rate with 1 percentage point would lead to an increase in FDI by 3.3 percent. This negative relation between taxes and FDI could indeed lead to a race to the bottom. Empirical literature however has until now not observed such a race to the bottom - despite the fact that firms have become more and more mobile ([Devereux, Griffith and Klemm (2002)];

[Vandenbussche and Crabbé (2006)]). One possible reason why a universal lowering of tax rates is not observed is provided by the new economic geography literature. This strand of literature argues that increasing returns to scale and imperfect competition combined with transport costs may cause agglomeration. If firms locate in a few regions, this agglomeration generates benefits such as spillovers, presence of suppliers and buyers and a more developed infrastructure [De Bruyne (2006)]. In a next step, more agglomerated regions will be able to tax these agglomeration benefits without driving firms away. Several authors provided theoretical support for the existence of taxable agglomeration rents. [Ludema and Wooton (2000)] show indeed that as trade costs decrease, integration will attenuate tax competition. [Andersson and Forslid (1999)] show that mobile factors will not move if tax rates change only marginally, thus again indicating the existence of agglomeration rents. [Kind, Midelfart-Knarvik and Schjelderup (2000)] also show that tax competition depends on trade costs and pecuniary externalities. [Baldwin and Krugman (2004)] and [Borck and Pflüger (2006)] finally developed a core-periphery model with taxation. The first paper is based on the core-periphery network, while the second one uses a model yielding partial stable agglomeration in addition to the core-periphery outcome. Both papers show that the tax differential between alternative locations is explained by the difference in their agglomeration patterns. The tax differential turns out to be a bell-shaped function of trade integration since agglomeration rents are a bell-shaped function of trade costs. Indeed, for respectively high and low trade costs one finds fairly low agglomeration rents. For intermediate trade costs, agglomeration rents turn out to be highest. Therefore, it is expected that the tax differential between the core of economic activity and the periphery is highest for intermediate trade costs. Indeed, for these intermediate trade costs agglomeration rents in the centre are higher implying that taxes can be set at a higher level in the centre compared to the periphery.

The central question in this paper is whether agglomeration rents reduce the sensitivity of firms to tax differentials. From the basic tax competition models, we know that higher corporate taxes act as a push factor for firms. The new economic geography, however, states that agglomerated regions have agglomeration rents that may act as a pull factor for firms - pulling firms to the centre of economic activity. The central question is then whether location decisions of firms are less sensitive to higher corporate taxes because of these agglomeration rents.

Several empirical studies have tackled the impact of agglomeration rents on tax levels and the location decision of firms. [Brühlhart, Jametti and Schmidheiny (2007)] find empirical evidence that firm births in Swiss municipalities on average react negatively to corporate tax burdens, but that the deterrent effect of taxes is significantly weaker in sectors that are more spatially concentrated. [Devereux, Griffith and Simpson (2007)] also investigated the impact of agglomeration economies on the sensitivity to local fiscal incentives of firms' location choices in the UK. More specifically, the authors dig into the effect of grants on location decisions of firms. They find that grants have a small effect in attracting plants to specific geographic areas, but that firms are less responsive to subsidies in areas where there

are fewer existing plants in their industry - again confirming the existence of agglomeration economies. [Solé-Ollé and Jofre-Monseny (2007)] show for Catalonia that taxes have a negative impact on location. They observe that omitting agglomeration variables leads to a severe underestimation of the negative effect of business taxes on location decisions. [Charlot and Paty (2007)] finally estimate a derived tax-setting equation for French municipalities. The authors confirm a positive and significant relationship between the tax rate and market access, which suggests there is a taxable agglomeration rent in French municipalities.

2.2 Belgian Tax system

In our paper, we want to focus on the Belgian case. Do we observe firm entry in Belgian municipalities with higher agglomeration rents to be less sensitive to higher tax rates? Corporate profit taxes are set at the federal level in Belgium. This means that the nominal or statutory tax rate (STR) and taxable income are determined at the federal level and thus the same for all large firms in Belgium¹. While the STR is the same for all firms, the effective tax rate (ETR) can differ across firms. The ETR is defined as the ratio of firm level ‘tax liabilities’ in a particular year over the ‘reported income/profits’ in that same year. This definition is widely used and known as the micro-backward method since it uses firm level archival data ([Nicodème (2002)]; [Collins and Shackelford (2002)]; [Vandenbussche, Crabbé and Janssen (2006)]). The ETR or real tax burden of a firm can differ across firms because of several reasons such as differences in efficiency levels of local tax administration or tax rulings² [Nicodème (2002)]. [Vandenbussche, Crabbé and Janssen (2006)] provide empirical evidence that the effective tax rate of firms located in Flanders is significantly higher than the ETR of firms in Wallonia and Brussels when holding all other firm or sector characteristics constant (*ceteris paribus*). Their study was carried out using large Belgian firms for the period 1993-2002 (before the Belgian tax reform of 2003).

3 Data

For the purpose of our study, we use the number of new firms that have set up their activities in each Belgian district in 2006. These data are retrieved from the Belfirst database which comprises annual accounts of 250 000 Belgian firms. This database counts in total 8790 new firms setting up their activity in 2006 - 6578 of them in Flanders and 2212 in Wallonia. As a taxation variable we calculate the effective tax rate for existing firms in 2005. As stated before, this effective tax rate is the amount of taxes paid divided by the profit before tax. In order to calculate this variable we need the amount of taxes paid and the

¹The STR is 33.99% for Belgian firms with a taxable income above 322 500 euro. Firms with a lower taxable income are subject to a progressive tax system (Van Kerckhove and Heirewegh, 2003).

²Firms can ask a tax ruling. This means that they can negotiate with the Belgian government about a particular element in their tax liability.

Figure 1: Belgian districts



income of all firms that had activities in the different districts in 2005. We use data for 41328 Wallonian firms - after clearing out the firms for which one of both variables was not available. For Flanders, we have 114776 firms in total. We opt for the effective tax rate because it indicates what firms actually pay as stated in section 1. We argue that the effective tax rate paid by existing firms in a region in the previous period may be a good indication of the tax rate that new firms might have to pay. We also only take into account observations with an ETR between 0 and 1, similar as in ([Gupta and Newberry (1997)]; [Collins and Shackelford (2002)]; [Vandenbussche, Crabbé and Janssen (2006)]).

We analyse the data for 42 Belgian districts - 22 in Flanders (Northern part of the country) and 20 in Wallonia (Southern part of the country)³. Figure (1) illustrates the location of all Belgian districts. We disregard Brussels since it attracts so many firms because of reasons that have nothing to do with tax rates (eg the presence of a lot of international institutions). Moreover, we want to be able to make a clear distinction between the Northern and the Southern part of the country and the presence of the Brussels district could misrepresent our findings. As we will illustrate, Flanders is more agglomerated than Wallonia, so we might expect higher taxes to be less of an entry barrier for new firms in that region compared to the other region.

³Appendix 1 lists the different districts

4 Empirical results

The empirical results can be divided in two parts. First of all we analyse in which districts we observe the most agglomeration and therefore in which districts we may expect agglomeration rents to be highest. Afterwards we plot the number of new firms against the effective tax rate of 2005 for different districts in order to analyse whether the relationship is positive or negative.

4.1 Agglomeration indicators

There are several indicators of agglomeration used in the literature. We will focus our attention on two of them. First, we calculate the number of firms per squared kilometer for each district. This gives us an indication of the clustering of firms. However, the number of firms per se does not necessarily indicate the true location of economic activity. If there are a lot of small firms present in a district it might mistakenly give the impression that the district considered has a large part of the economic activity within its boundaries. We therefore also use the number of employees per squared kilometer as an indicator of agglomeration.

Figure (2) shows the number of firms per squared kilometer for the different Belgian districts. The Flemish districts are represented by filled rectangles while the Walloon districts are represented by white rectangles. The districts surrounding the Antwerp harbour (Antwerp, Mechelen) and the districts in Flanders language valley (Kortrijk, Roeselare) show the highest agglomeration. There are on average 13 firms per squared kilometer in Flemish districts, while the average Wallonian district has 5 firms per squared kilometer. In other words, the Flemish districts are more agglomerated than the Wallonian districts.

Figure (3) reports the number of employees per squared kilometer for the different Belgian districts. The same districts as in Figure (2) appear to be most agglomerated. The average Flemish district has 140 employees per squared kilometer while the average Walloon district has 72 employees per squared kilometer.

It is obvious from both figures that Flanders is more agglomerated than Wallonia. This could imply a different impact of taxes on the location decision of firms. It could be the case that a higher tax rate in Flanders is less of a problem than in Wallonia. Indeed, if there are more agglomeration rents in Flanders, higher taxes would not necessarily imply fewer firms to be attracted.

4.2 Effective tax rates and new firms setup

Figure (4) shows the effective tax rate for 2005 for the different Belgian districts. They range between 22.5 and 26.5 percent. Moreover, the average effective tax rate in Flanders is 24.5 percent and in Wallonia it is 25.2 percent. The tax difference between the regions

Figure 2: Number of firms per squared km

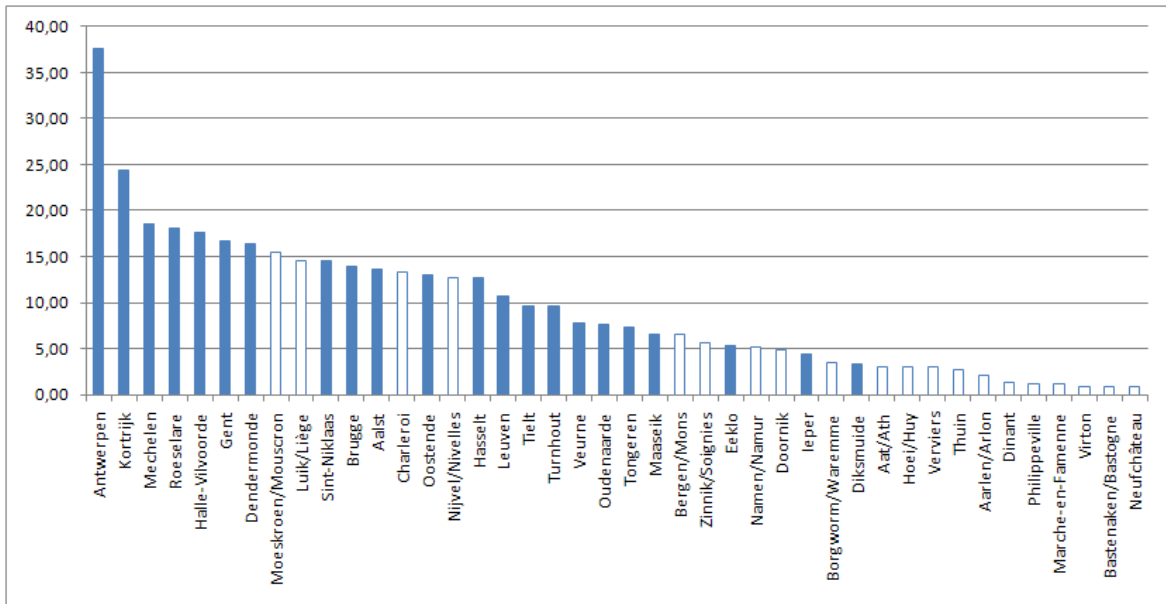


Figure 3: Employment per squared km

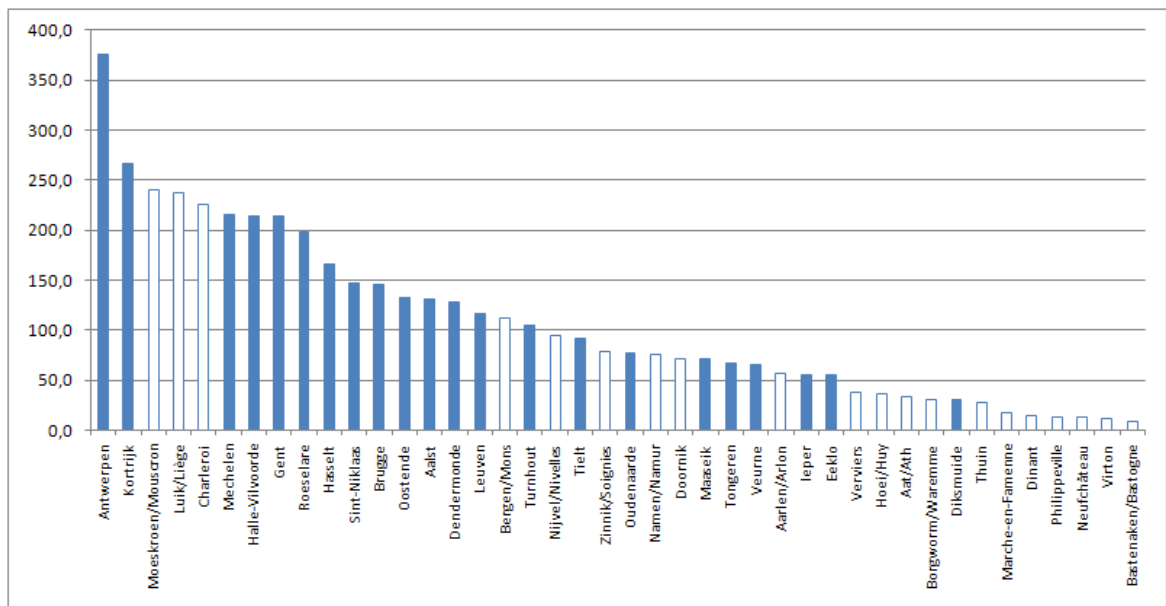
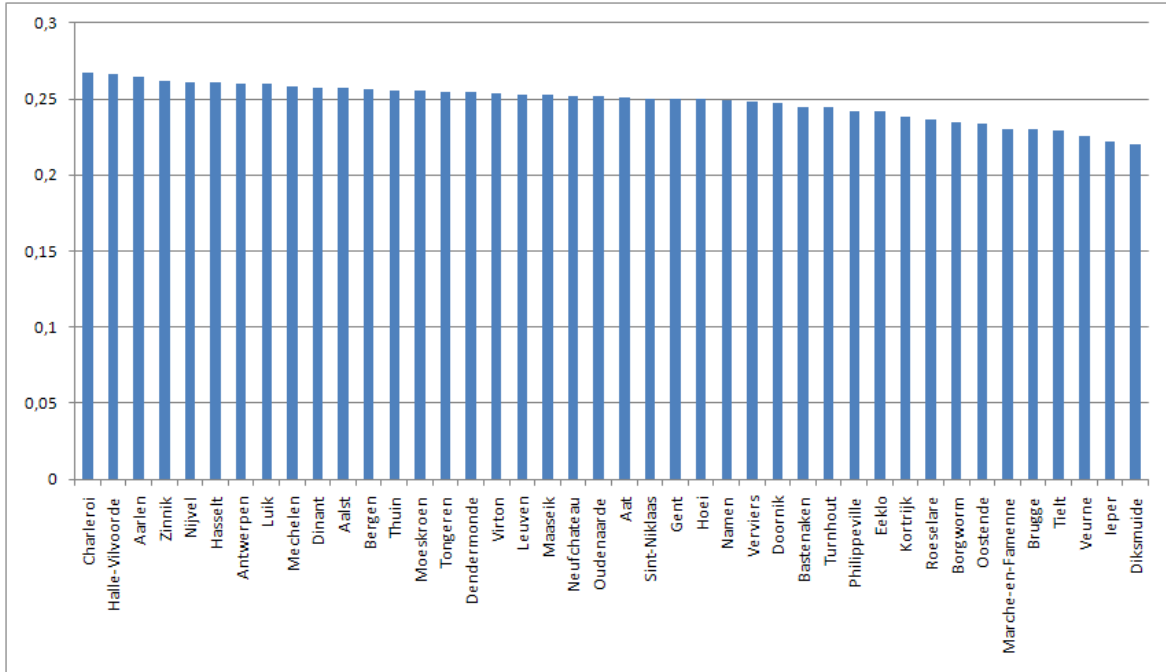


Figure 4: Effective tax rates 2005 Belgium



turns out to be small, but there is quite some variation in the tax rates within the regions. The variation is clearly larger between the Wallonian districts. Figures (5) and (6) illustrate this finding. Note that the effective tax rate is much lower than the statutory tax rate in Belgium which is 33.99 %. [Vandenbussche, Crabbé and Janssen (2006)] also show that the effective tax rates are much lower than the statutory tax rate because of tax exemptions for example for investments.

Calculating the correlation coefficient between the effective tax rate and the agglomeration indicators gives us a first insight in the possible existence of taxable agglomeration rents. The correlation between the effective tax rate and the number of firms per squared kilometer is 0.51, while the correlation between the effective tax rate and the number of employees per squared kilometer is 0.53. These values are very high compared to results for other countries in other papers. Coulibaly (2007) finds a correlation between an agglomeration index and tax differences between agglomerated and peripheral regions to be only 0.05 for Swiss municipalities. Sollé-Ollé and Jofre-Monseny (2007) find the correlation between manufacturing employment and the tax rate to vary from 0.3 to 0.4 for Catalonian municipalities.

Based on the New Economic Geography theory one might expect the more agglomerated region - Flanders - to be able to set the highest tax rate. The fact that this is not the case might be puzzling at first sight. However, a higher agglomeration in Flanders than in Wallonia also implies that given a certain effective tax rate, the agglomeration rents in Flanders are higher and given the tax rate Flanders will therefore most likely attract more firms than Wallonia. We will indeed show that given a similar tax rate in both regions,

Figure 5: Effective tax rates 2005 Flanders

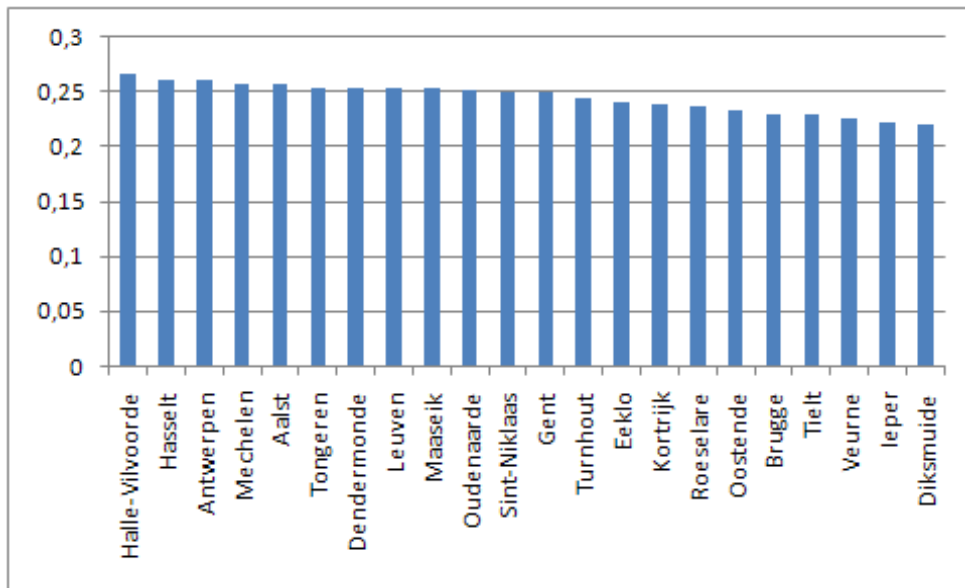


Figure 6: Effective tax rates 2005 Wallonia

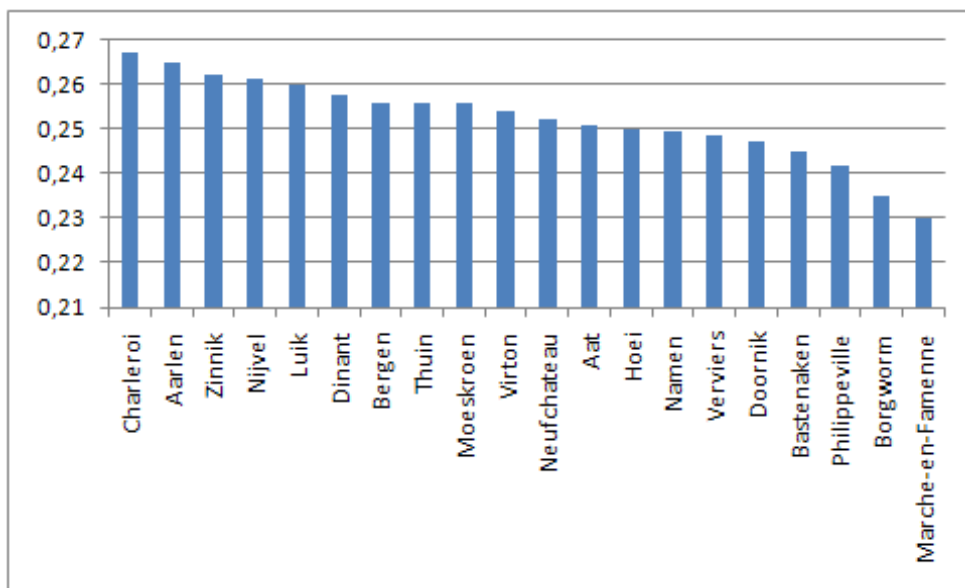
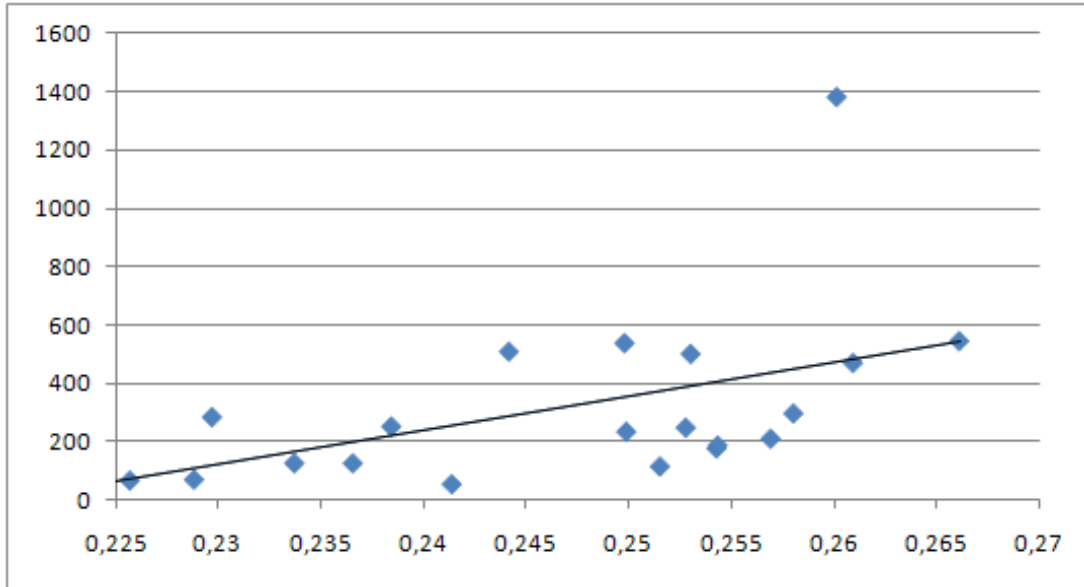


Figure 7: Number of firms in 2006 as a function of ETR in 2005 in Flanders



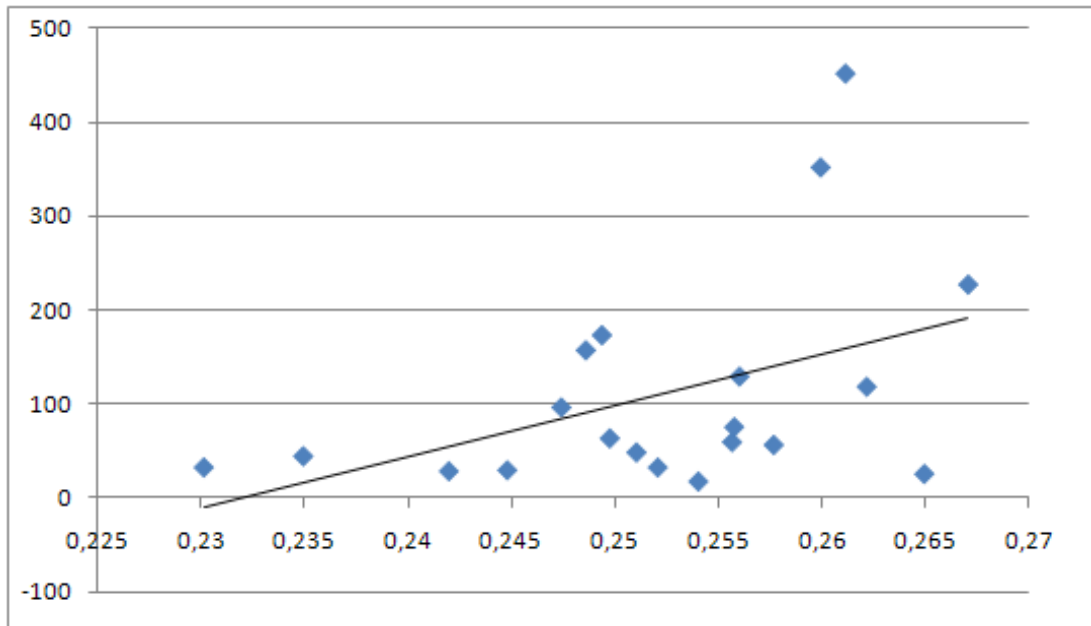
Flanders attracts more firms than Wallonia. In order to corroborate this statement we first need to introduce the set-up of new firms. We want to analyse the relationship between new firms set up in 2006 and the effective tax rate that existing firms paid in 2005.

Figures (7) and (8) show the relationship between the number of new firms in 2006 and the effective tax rate in 2005 for all Flemish and Walloon districts respectively. Both relationships are clearly positive indicating that regions with higher effective tax rates in 2005 attract more firms in 2006. This is an indication that agglomeration rents may indeed play a role.

In order to compare both regions better, Figure (9) shows the results for both regions combined. The spades indicate Walloon districts while the squares represent Flemish districts. As stated before, it is obvious that both relationships are positive. A higher corporate tax rate in the previous year implies more firms setting up their activities in the district considered. This is an indication that agglomeration rents indeed play a role. There are two noticeable differences between the two regions however. First of all, the trend line for Flanders is situated higher than the one for Wallonia. This implies that given a certain *level* of the effective tax rate, Flanders attracts more firms than Wallonia. This phenomenon can be explained because of the higher agglomeration - and therefore higher agglomeration rents - in Flanders. Secondly, the slope of the Flemish trend line is steeper than the one of Wallonia. This shows that an equal *rise* in the effective tax rate in both regions implies more firms to set up their activities in Flanders rather than in Wallonia. We can therefore conclude that the impact of both the *level* and the *growth rate* of the effective tax rate on location outcomes is stronger in Flanders than in Wallonia.

We do however observe outliers in both Flanders and Wallonia that may affect our results. For Flanders, the district of Antwerp is the outlier. It is pretty obvious that the

Figure 8: Number of firms in 2006 as a function of ETR in 2005 in Wallonia



district with the international harbour attracts most new firms - irrespective of the tax rate. For Wallonia, Luik and Nijvel are obvious outliers. In order to analyse whether these outliers affect our findings, we plot a similar figure but now excluding the districts of Antwerp, Nijvel and Luik. Figure (10) shows the results. We can conclude that our main finding remains the same even if we exclude the outliers. Both relationships remain positive and there is indeed an indication of higher agglomeration rents in Flanders. The difference between both regions becomes even larger as the effective tax rate increases.

One last robustness check concerns loss-making firms. Our dataset indeed also includes firms that make losses which might affect our results. We therefore recalculated the effective tax rate excluding firms that make losses. Of course we find on average a slightly higher effective tax rate in both regions. All our other findings however remain the same. The relationship between the effective tax rate and the number of firms remains positive in both regions (even more positive than before) and the impact of both the *level* and the *growth rate* of the effective tax rate on location outcomes remains stronger in Flanders than in Wallonia

Figure 9: Number firms in 2006 as a function of ETR 2005 for Belgium

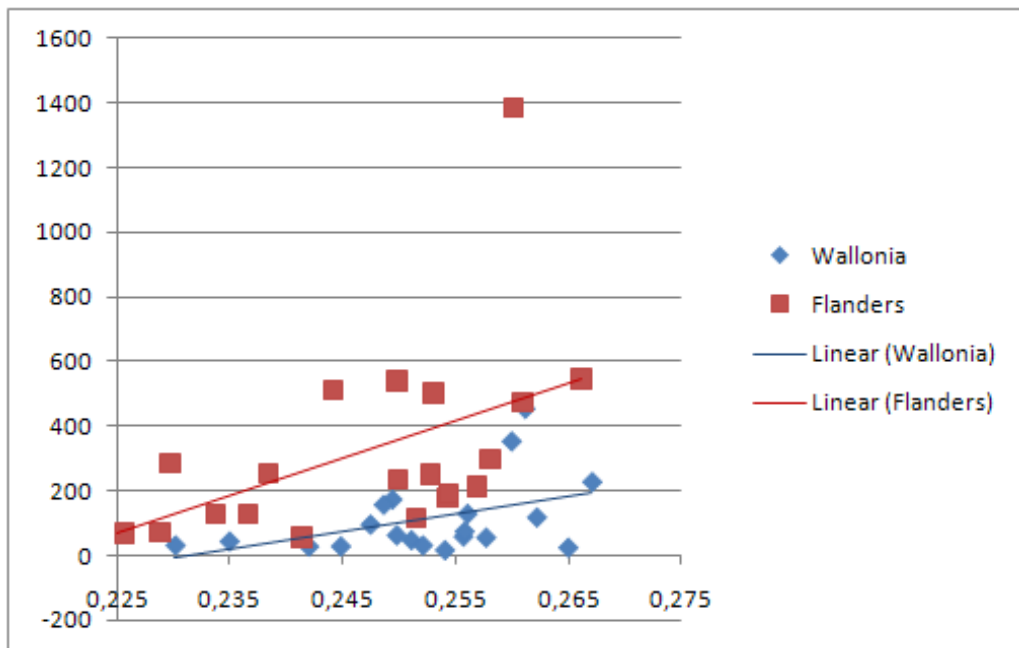
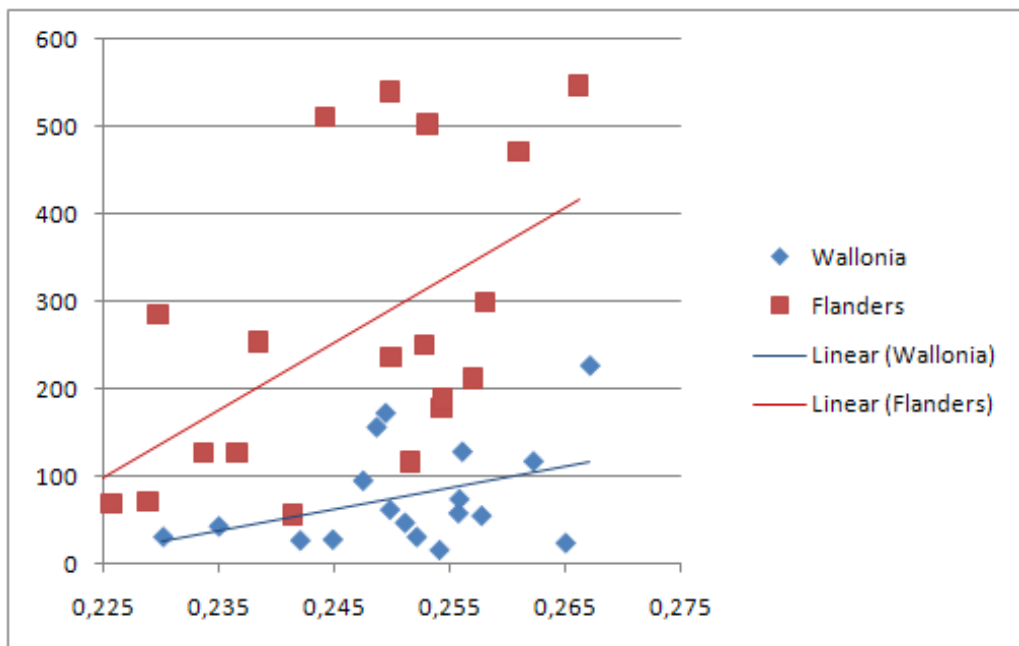


Figure 10: Number firms in 2006 as a function of ETR 2005 for Belgium without Antwerp, Nijvel and Luik



5 Future Research

Our analysis thus far can be extended in many ways. First of all, instead of merely interpreting the data we may estimate a LOGIT model explicitly analyzing the location decision of firms. [Brülhart, Jametti and Schmidheiny (2007)] performed a similar analysis for Switzerland introducing explicitly an interaction term between taxes and a sector-specific measure of agglomeration. [Devereux, Griffith and Simpson (2007)] also use a LOGIT model for UK firms but they face the problem that taxes in the UK may be sector and/or region specific - a problem that [Brülhart, Jametti and Schmidheiny (2007)] did not encounter for Switzerland. We will have to take this into account too when we estimate the model for Belgium. [Solé-Ollé and Jofre-Monseny (2007)] for Catalonian municipalities and [Charlot and Paty (2007)] for French districts performed similar analyses.

Another way to extend our research would be to verify our underlying assumption. We assume that districts with higher agglomeration rents are faced with higher tax rates. The high correlation coefficient between the two variables corroborates this assumption. [Coulibaly (2007)] tests for Swiss municipalities whether higher agglomeration rents indeed lead to higher tax differences between more agglomerated and more peripheral regions. A similar analysis for Belgium would enhance the robustness of our results.

Finally, in future work we would like to allow for heterogeneity of firms. As [Baldwin and Okubo (2007)] show, bigger firms are more likely to relocate in order to escape high-taxes imposed in the big nation. Correcting for the size of the different firms that locate in Belgium it would indeed be very interesting to find out whether larger firms are indeed more footloose.

6 Conclusion

The aim of this paper is to analyze the impact of corporate taxes on firm start-ups in agglomerated regions. To study this research question we used data of newly established firms in 2006 in 42 Belgian districts. Our results show that agglomeration rents indeed play a role. The more agglomerated region - Flanders - attracts more firms than the less agglomerated region - Wallonia. Both in terms of the effect of *levels* and *growth rates* of the effective tax rate on location decisions of firms, Flanders outperforms Wallonia. For the same *level* of the effective tax rate, Flanders will attract more firms. For a similar *growth rate* of the effective tax rate, again Flanders will attract more firms than Wallonia. The results of previous studies are therefore corroborated.

What does this imply from a policy point of view? We can first of all conclude that although Flanders is able to set higher taxes - because of the higher agglomeration rents - it doesn't do so. Secondly, if Wallonia wants to attract more companies it has two options. It could first of all try to turn the region in a more attractive location for firms - for instance through investments in infrastructure - in order to increase the agglomeration rents. Secondly, it could lower its taxes to compensate for the lower agglomeration rents.

However, since corporate taxes in Belgium are determined at the federal level, Wallonia has little flexibility in this area. Of course they could for instance use exemptions but ideally they should be able to set their taxes locally. For Wallonia a regionalisation of corporate tax rates might therefore be a good idea.

Appendix: Belgian regions and districts

Region	District
Flanders	Aalst
	Antwerpen
	Brugge
	Dendermonde
	Diksmuide
	Eeklo
	Gent
	Halle-Vilvoorde
	Hasselt
	Ieper
	Kortrijk
	Leuven
	Maaseik
	Mechelen
	Oostende
	Oudenaarde
	Roeselare
	Sint-Niklaas
	Tielt
Tongeren	
Turnhout	
Veurne	
Wallonia	Aarlen
	Aat
	Bastenaken
	Bergen
	Borgworm
	Charleroi
	Dinant
	Doornik
	Hoei
	Luik
	Marche-en-Famenne
	Moeskroen
	Namen
	Neufchateau
	Nijvel
	Philippeville
	Thuin
Verviers	
Virton	
Zinnik	

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