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The political economy of interregional competition for firms

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The political economy of interregional competition for firms

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Abstract

This paper studies the impact of majority voting on interregional competition for firms. We model the competition as a first-price sealed bid auction under full information between two regions inhabited by low- and high-skilled individuals. The firm's location causes an increase in wages for the high-skilled. A region's bid is determined by the median voter's preference. We derive two results: First, the location decision may be inefficient because the firm may not locate in the region that benefits most. Second, if regional differences are sufficiently small and the median voter of the successful region is high-skilled, the winning region suffers a loss of aggregated income as subsidies exceed the surplus created by a firm's location. This implies that restricting interregional competition for firms, e.g. regulating subsidies, may prevent inefficient location decisions.

JEL classification: H23, H25, H31, P16

Keywords: median voter, political economy, subsidy competition, spillover

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1 Introduction

Local governments often attract firms by offering state aids (e.g. subsidies) in order to create long-term jobs, tax revenue, and spillover effects. Each year, for instance, states, counties and cities spend about 80 billion US-Dollar on tax rebates or cash grants and loans in the United States.¹ This extensive usage of tax and non-tax incentives raises the question whether the resulting bidding competition between regions leads to efficient results. The rules on granting state aid differ among states. In the United States incentives are not regulated whereas member states of the European Union are generally not allowed to provide aid for large firms.² The regulation of state aid by the European Commission is based on the following three arguments. First, subsidies are considered as harmful interventions which may distort competition and, therefore, contradict the idea of a functioning common market. Second, bidding competitions pose the risk of wasteful public spending. Third, allowing for state aids may lead to greater divergence within the European Union as richer countries have advantages due to higher spending capacities (European Commission 2014).

This paper adds a new argument in favour of restrictive rules for granting subsidies by considering the political process. We show that subsidies determined by majority voting may lead to an inefficient location decision.

In our model the competition for a firm among two regions is designed as a first-price sealed bid auction. Both regions are inhabited by low- and high-skilled individuals and differ in their production technology. The low-skilled individuals obtain an exogenous gross income whereas high-skilled receive wages that depend on the productivity. A lump-sum transfer financed by a proportional tax redistributes income from high-skilled to low-skilled individuals within a region. In the winning region the attracted firm increases

¹See Story L., Fehr T. and Watkins D. (2012). Available at <http://www.nytimes.com/interactive/2012/12/01/us/government-incentives.html>.

²The sole exceptions are aids being compatible with the internal market. For more details see Art. 107 of the Treaty on the Functioning of the European Union (TFEU).

productivity and, therefore, wages for the high-skilled.³ The resulting total surplus in a region is the aggregated wage differential. The low-skilled individuals benefit from the location via higher transfers due to redistribution of income, albeit to a lesser extent since their gross income does not increase. In line with the median voter theorem a region's majority determines the bids.

In order to analyse the role of a political process, we start by considering a benchmark scenario in which a benevolent planner decides on the firm's location by comparing the total surplus in both regions. Black and Hoyt (1989) show that the firm's location decision remains efficient when allowing for a bidding competition. This finding is based on the strong assumption that a social planner is able to offer the region's aggregated willingness to pay by collecting all individual gains resulting from the location. In contrast, we model a political process to account for a heterogeneous population that determines a region's bid that is financed by a tax on wages in a lump-sum fashion. As stated by Oates and Schwab (1988), when considering heterogeneous populations efficient allocations may be distorted. The authors consider the political decision on a capital tax rate and environmental quality, which is determined by the majority structure in the society. Applied to our framework this distortion affects the bid for a firm that is determined by the median voter's preference. It follows that the bid may differ from the region's aggregated willingness to pay. Therefore, the firm's location decision in our model can contradict the optimal outcome derived by Black and Hoyt (1989).

Our main results are the following: First, the firm may locate in the region that benefits less. This result is driven by redistribution and by the political process. Redistribution harmonises benefits of a firm's location within a region and thus increases (decreases) a low-skilled (high-skilled) median voter's willingness to pay. Therefore, different levels of redistribution between regions may distort the location decision. Moreover, due to the

³This assumption is in line with empirical findings. See e.g. Girma and Görg (2007), Huttunen (2007) and Heyman et al. (2011) who show that high-skilled benefit more from a firm's location.

political process a high-skilled median voter is able to impose a contribution to the subsidy on the low-skilled that is larger than their individual willingness to pay. As low-skilled individuals can be exploited by the high-skilled majority, a firm's location is beneficial for high-skilled whereas it may be detrimental for low-skilled.

Second, if the median voter is high-skilled, aggregate income may decrease in the winning region if the loss in income of the low-skilled cannot be compensated by the increased income of the high-skilled.⁴

There is an abundant literature that analyses diverse reasons in favour of attracting firms by granting subsidies.⁵ In our paper, regions compete for a foreign firm, that generates positive spillover effects on the productivity of domestic firms.⁶ Barrios et al. (2005) find empirical evidence for spillover effects on the productivity of domestic firms in Ireland, Greenstone et al. (2010) for the United States, Zhou et al. (2002) and Hu and Jefferson (2002) for China. In our model, the increase in productivity is the basis for higher wages and, thus, for the surplus effect, i.e. the region's benefit created by a firm's location. This assumption of increasing wages is in line with empirical findings, see e.g. Aitken et al. (1996), Lipsey and Sjöholm (2004) and Greenstone and Moretti (2003). The latter show that the wage bill increases in US counties where a new firm locates.

Our paper is closely related to Fumagalli (2003), who shows that banning subsidies increases social welfare if the heterogeneity between competing regions measured by the degree of technological disparity is sufficiently small.

In contrast, we concentrate on the role of political processes. Meltzer and Richard (1981) show that the median voter's position in the income distribution and, thus, her preferences for redistribution may explain the size of the government. Fuest and Huber (2001) and Persson and Tabellini

⁴A similar result is derived by Greenstone and Moretti (2003) who show that politicians overbid if they derive private benefit from granting subsidies.

⁵Haufler and Wooton (1999) and Fumagalli (2003) analyse increased competition. Haufler and Wooton (2010), Becker and Fuest (2010), Bjorvatn and Eckel (2006) model positive effects on consumer surplus.

⁶See e.g. Olsen and Osmundsen (2003) who analyse competition for FDI between two regions within a tax competition framework.

(1992) apply a political economy approach with heterogeneous individuals to analyse the effect of majority voting on a region's fiscal policy in a standard tax competition model. In line with these studies, we assume that the level of subsidies granted to a firm is subject to majority voting. Taking a political process into account, our paper extends the existing literature on subsidy competition (see e.g. Black and Hoyt 1989; Bond and Samuelson 1986; Haaparanta 1996; Barros and Cabral 2000).

Further, our results are related to Dewatripont and Seabright (2006) who provide a theoretical argument in favour of supranational monitoring to avoid wasteful public spending of politicians who want to signal their diligence to the voters. Jensen et al. (2015) add empirical evidence for their findings by analysing investment incentives in the United States. Biglaiser and Mezzetti (1997) state that re-election concerns may influence the amount of incentives offered to firms.

The remainder of the paper is organised as follows. The next section lays out the model. Section 3 concludes.

2 The model

2.1 Setup

We assume a world with two regions, indexed by $i \in \{A, B\}$, each of which consists of N_i individuals. These individuals can be either low-skilled, n_i^l , or high-skilled, n^h , with $N_i = n_i^l + n^h$. For simplicity reasons, we assume that the number of high-skilled individuals is the same in both regions. Regions, however, can differ in population size and in the skill ratio n^h/N_i . Moreover, we assume that there is no migration between regions due to high migration costs. As we will describe below regions may also face different production technologies. Individuals' utilities depend on net income, y_i , which is

$$\begin{aligned} y_i^h &= (1 - t_i)w_i + T_i \\ y_i^l &= (1 - t_i)\bar{w} + T_i \end{aligned} \tag{1}$$

for the high-skilled and low-skilled individuals, respectively.⁷ The wage of the high-skilled individuals is denoted by w_i . Low-skilled individuals obtain a smaller gross income \bar{w} , which can be interpreted as a minimum wage earned e.g. in a low-paid service sector. We ignore leisure and assume that individuals supply a single unit of labour. No region exhibits unemployment. For the purpose of redistribution a proportional tax t_i is levied on the gross income of both types to finance a lump-sum transfer T_i . Tax rates are exogenously given, e.g. set by federal governments, and may diverge between regions as a result of different preferences for redistribution. The region's budget constraint has to satisfy

$$N_i T_i = t_i (n^h w_i + n_i^l \bar{w}) \quad (2)$$

The transfer function directly follows from equation (2)

$$T_i = t_i \left(w_i \frac{n^h}{N_i} + \bar{w} \frac{n_i^l}{N_i} \right) \quad (3)$$

Thus, T_i depends on the number of high- and low-skilled individuals and it holds that $\frac{\partial T_i}{\partial n^h} > 0$ and $\frac{\partial T_i}{\partial n_i^l} < 0$. Therefore, T_i increases in the number of high-skilled and decreases in the number of low-skilled individuals.

In each of the two regions there is a large number of identical firms. For simplicity we assume that firms are foreign owned and, thus, create benefits for the region via wages only. The firms use high-skilled labour as the single input factor. As described above, low-skilled individuals are employed in a domestic service sector. The production function, $F_i(n^h)$, is a constant returns to scale production function and, hence, firms make zero profits. The global market's price is one. The region's aggregated profit is then given by

$$\pi_i(n^h) = F_i(n^h) - w_i n^h \quad (4)$$

The labour supply is assumed to be inelastic and, thus, corresponds to

⁷Instead of deriving utility levels we consider the individuals' net income. In this model both approaches are equivalent since we assume a linear utility function. Imposing concave utility functions does not change the results fundamentally.

the amount of high-skilled individuals in the respective region. Accordingly the wage is determined by the labour demand. As constant returns to scale imply zero profits, the wage rate can be written as

$$w_i = \frac{F_i(n^h)}{n^h} \quad (5)$$

The right-hand side of equation (5) is the output per capita which can be interpreted as the productivity in region i . We denote this productivity as $f_i(n^h)$. Without loss of generality we assume for the remaining analysis that region A is more productive than region B , that is $f_A(n^h) > f_B(n^h)$ or put differently $F_A(n^h) > F_B(n^h)$. This technological gap can be explained by region specific organisational structures or management practices.

The two regions compete for a new multinational firm, which has a labour demand \hat{L} , with $\hat{L} < n^h$, and produces an output $\hat{F}_i(\hat{L})$ with constant returns to scale.

If the firm locates in region i , its profit reads

$$\hat{\pi}(\hat{L}) = \hat{F}_i(\hat{L}) - \hat{w}_i \hat{L} \quad (6)$$

The new firm's productivity exceeds the regions' productivity, i.e. $\hat{F}_i(\hat{L})/\hat{L} > F_i(\hat{L})/\hat{L}$.⁸ The firm's production technology is totally applicable in the winning region i as the high-skilled workers are mobile between the firms within a region.⁹ Part of the local high-skilled workforce is trained in the multinational firm and subsequently incumbent firms benefit via migration of these more experienced employees (Fosfuri et al. 2001). Additionally, imitation of management practices and production methods as transmission mechanisms of spillovers may explain the productivity gain of the local firms

⁸The MNE that acts as an entrant needs a more enhanced technology compared to the incumbents to equalise disadvantages caused by lack of experience, established clientele etc. (see e.g. Markusen et al., 1995, p. 395).

⁹Our model is in line with Fumagalli (2003) assuming that all firms become as productive as the new firm. For empirical literature finding spillover effects see Branstetter (2006), Javorcik (2004), Sjöholm (1999) and Kokko et al. (1996). For contradicting evidence see Haddad and Harrison (1993), Aitken and Harrison (1999) and Blomström and Sjöholm (1999). A review of the literature is provided by Görg and Greenaway (2001) and Blomström et al. (2001).

(Haacker 1999). However, empirical findings support the view that spillover effects are not only unidirectional from the new firm to the incumbent firms but also vice versa (Branstetter 2006). Therefore, we assume that \hat{F}_i varies between regions as we consider the spillover effect to be a two-way process. This process implies that all firms in the winning region produce with the new enhanced technology \hat{F}_i . As we assume a global market, the additional production caused by the new firm and the new technology applied in the incumbent firms do not affect the selling price. The adjustment of wages restores zero profits.

According to equation (5) the attraction of the multinational firm leads to a rise in high-skilled wages, i.e. $\hat{w}_i > w_i$. However, due to different initial levels of productivity and different gains of productivity caused by spillovers the firm's surplus effect diverges between the two regions. We assume the wage differential in B ($\hat{w}_B - w_B$) to be larger than the wage differential in A ($\hat{w}_A - w_A$) as the less advanced region profits more by the spillover effects.¹⁰ The increase in wages generate the surplus effect which is the reason for the regions to engage in the bidding competition.

The timing is as follows. At stage 1 both regions simultaneously offer a lump-sum subsidy to the firm. Regions can credibly commit to their bid. The level of the subsidy is determined by the median voter's preference. At stage 2, the firm makes its location decision and payoffs are realised. Since the lump-sum subsidy does not affect the firm's production choice, its location decision is solely driven by the subsidy. It follows that the firm locates in the region which offers the higher subsidy.

2.2 Analysis

2.2.1 Optimal location

A region's welfare is measured by the aggregated net income. Hence, the socially efficient case is characterised by a location in the region which profits most, i.e. the region where the firm creates the largest effect on wages

¹⁰Empirical findings by Barrell and Pain (1997) and Sjöholm (1999) support this assumption.

$(\hat{w}_i - w_i)$. Since the firm neglects this surplus effect when making its location decision a possible reason for market failure arises, i.e. the firm does not locate in the regions that benefits most. Subsidies may internalise this external effect and lead to an efficient allocation (Black and Hoyt 1989).

First, we evaluate the bid inducing the optimal location as a benchmark for further considerations. Second, we derive the bids generated by a political process by comparing the net income before and after the location separately for both types of individuals. The net income after a location reads

$$\begin{aligned}\hat{y}_i^h &= (1 - t_i)\hat{w}_i + \hat{T}_i \\ \hat{y}_i^l &= (1 - t_i)\bar{w} + \hat{T}_i\end{aligned}\tag{7}$$

Taking the subsidy and the wage effect into account, the region's budget constraint after location reads

$$N_i\hat{T}_i + B_i = t_i(\hat{w}_i n^h + \bar{w} n_i^l)\tag{8}$$

Rearranging equation (8) gives the new transfer function

$$\hat{T}_i = t_i(\hat{w}_i \frac{n^h}{N_i} + \bar{w} \frac{n_i^l}{N_i}) - \frac{B_i}{N_i}\tag{9}$$

with B_i corresponding to the bid offered by region i . B_i is financed by the tax revenue. Therefore, a higher bid induces a lower transfer.

The change in individual income depends on the skill level. The low-skilled individuals profit only via higher transfers \hat{T}_i . Their change in income reads

$$\Delta y_i^l = t_i \frac{n^h}{N_i}(\hat{w}_i - w_i) - \frac{B_i}{N_i}\tag{10}$$

The low-skilled individuals' benefit created by the firms location increases in the degree of redistribution as well as in the wage differential. However, a high bid per capita may exceed this income gain and so it is

possible that Δy_i^l may turn negative.

The high-skilled individuals' benefit is directly generated by the increase in gross income.

$$\Delta y_i^h = \left(\frac{n^h}{N_i} + (1 - t_i) \frac{n_i^l}{N_i} \right) (\hat{w}_i - w_i) - \frac{B_i}{N_i} \quad (11)$$

The gain increases in the wage differential $(\hat{w}_i - w_i)$ and decreases in the degree of redistribution.

To characterise the optimal location, we consider a social planner who determines the region's bid. Each region's planner evaluates the net effect of the location and is willing to bid the aggregated maximum willingness to pay. We define B_i as the bid offered to the firm, whereas the maximum willingness to pay of the decisive individual in region i is denoted by V_i . We derive the social planner's valuation (V_i^*) by aggregating the benefits resulting from firm location over the whole population.

$$V_i^* = n^h (\hat{w}_i - w_i) \quad (12)$$

The valuation depends on the wage differential and the number of high-skilled individuals. Intuitively spoken, the social planner is willing to offer the sum of wages created by the new firm. Note that V_i^* induces a loss in income for the low-skilled individuals which is compensated by the high-skilled individuals' gains.

Using equation (12) we can derive the optimal location with respect to an efficient allocation.

Proposition 1 (Black and Hoyt, 1989) *In a subsidy competition with monolithic regions, B attracts the firm by bidding $V_A^* + \varepsilon$. Therefore, the firm's decision is efficient from an allocative point of view.*

Proof. Since the wage differential in region B is larger than in region A , B attracts the firm by marginally overbidding A 's maximum bid. ■

However, taking a political process into account this efficient allocation can be distorted.

2.2.2 Political process

The game is now solved by backward induction. At stage 2 the firm chooses its location by comparing the profits in both regions and locates in the region, which offers the larger subsidy. At stage 1 subsidies are determined. In the following we take into account that the political process defining the level of the subsidy is formed by majority voting. According to the median voter theorem, the individuals representing the majority in the society determine the outcome. As the two different groups diverge in their benefits from attracting the firm, their preferential maximum bid varies accordingly. The low-skilled individuals do not directly profit by the location via higher wages, but through higher transfers T_i which are financed by the proportional tax t_i . We derive the low-skilled individual's valuation using equation (10).

$$V_i^l = n^h t_i (\hat{w}_i - w_i) \quad (13)$$

The valuation corresponds to the maximum bid that a low-skilled median voter would offer in the auction. For all $t_i < 1$ this maximum bid is smaller than the social planner's valuation (12). The following Corollary describes the relationship between redistribution and a low-skilled individual's willingness to pay.

Corollary 1 *A higher degree of redistribution, i.e. a higher tax rate t , increases the low-skilled individual's valuation.*

Corollary 1 shows that redistribution may lead to higher bids by inducing a harmonisation of benefits created by a location. This result may contradict the intuition that left-wing parties representing low-skilled individuals demand greater redistribution but refrain from providing subsidies for MNEs.

The high-skilled individual's benefit is directly generated by the gross income increase, while the tax financing the transfer reduces the favoured maximum bid. Despite this fact, the valuation is larger than V_i^l and reads

$$V_i^h = (n^h + (1 - t_i)n_i^l)(\hat{w}_i - w_i) \quad (14)$$

For $t_i \in (0, 1)$, V_i^h is larger than V_i^* and V_i^l . The reason is the higher individual gain in conjunction with the opportunity to impose a contribution to the subsidy on the low-skilled that exceeds their individual benefit. Unlike the case with a low-skilled median voter, higher redistribution induces a smaller bid. A tax rate of one implies an equal income distribution over the whole population and, thus, assimilates all valuations inducing V_i^* .

Both regions engage in a first-price sealed bid auction. Under full information bids B_i are determined by the median voter's preference V_i^m , with $m \in \{l, h\}$. For B_i it must hold that

$$B_i = \begin{cases} V_i^m & \text{if } V_i^m \leq V_j^m \\ V_j^m + \varepsilon & \text{if } V_i^m > V_j^m \end{cases} \quad (15)$$

Therefore, the region with the highest valuation V_i^m wins the auction by marginally overbidding the competitor ($V_j^m + \varepsilon$). Lemma 1 summarises the bids depending on the composition of the population.

Lemma 1 *The equilibrium bids read $B_A = (V_B^m + \varepsilon)$ and $B_B = V_B^m$ if*

- (i) *both median voters are low-skilled ($n_i^l > n^h$) and $t_A/t_B \geq (\hat{w}_B - w_B)/(\hat{w}_A - w_A)$*
- (ii) *the median voter is high-skilled in A ($n_A^l < n^h$) and low-skilled in B ($n_B^l > n^h$) and $(\hat{w}_A - w_A)/(\hat{w}_B - w_B) \geq n^h t_B / (n^h + (1 - t_A)n_A^l)$*
- (iii) *both median voters are high-skilled ($n_i^l < n^h$) and $(\hat{w}_A - w_A)/(\hat{w}_B - w_B) \geq (n^h + (1 - t_B)n_B^l) / (n^h + (1 - t_A)n_A^l)$*

Otherwise the equilibrium bids read $B_A = V_A^m$ and $B_B = (V_A^m + \varepsilon)$.

Proof. The combination of two regions and two types of median voters results in four possible cases. We identify the auction winner by using the bids in equation (15) which are determined by the median voters preferences given in equations (13) and (14). In cases (i)-(iii) the auction winner depends on the composition of the population and on the tax rate. In the case

where $n_A^l > n^h$ and $n_B^l < n^h$ region B wins the auction as

$$\frac{n^h t_A}{(n^h + (1 - t_B)n_B^l)} < \frac{\hat{w}_B - w_B}{\hat{w}_A - w_A} \quad (16)$$

always holds. The right hand side of equation (16) is strictly greater than one as the wage differential in region B is greater than in region A . Recall that $t_i \in [0, 1]$. It follows that the maximum value of the left hand side is 1.

■

Using Lemma 1 we can state the following proposition.

Proposition 2 *A political process that determines the subsidies offered in a bidding competition induces an inefficient location if the firm locates in region A , i.e. if conditions (i)-(iii) hold as stated in Lemma 1.*

Proof. This proposition follows directly from Lemma 1. ■

The case in Lemma 1 part (i) occurs if the level of redistribution in A is sufficiently higher than in B . Given the disparities in wage differentials between both regions $((\hat{w} - w_B)/(\hat{w} - w_A))$, region A 's bid is determined by low-skilled individuals and is larger than B 's bid since the higher tax rate t_A redistributes the benefit created by a firm's location to a higher extent. However, in case (ii) the inefficient location arises as the high-skilled median voter in region A is able to impose a contribution on the low-skilled individuals which exceeds individual benefit. Therefore, a low skill ratio in A , i.e. a high amount of individuals potentially being exploited, as well as low redistribution in both regions make inefficiencies more likely. The latter applies because a low tax rate in the region with a high-skilled majority increases the median voter's valuation. However, a low tax rate decreases the valuation of the decisive individual in the other region. In contrast to case (i) case (ii) may also occur if A is the low-tax region. Analogously in case (iii) a larger population in A gives the high-skilled median voter the opportunity to impose his individual willingness to pay on more contributors. Furthermore, a high tax rate in B and a low one in A imply an inefficient outcome. However, if it holds that $t_B > t_A$, an inefficient allocation is more likely under two conditions. Either the differences between regions in terms

of the gain in wages of the high-skilled has to be sufficiently small or the population in region A has to exceed the population in region B . In general, the smaller the disparity in wage differentials between the regions the more likely is an inefficient outcome.

We can further show, that for the case with a low-skilled median voter in region A and a high-skilled median voter in region B the location decision is efficient, i.e. the firm locates in B . In Proposition 2 we state that even if a location in region B would be efficient from an allocative point of view the political process can induce an inefficient location.

While we consider the allocation between regions in Proposition 2, in Proposition 3 we focus on the effects on income generated by a firm's attraction within a region. All results derived in the following hold for both regions.

Lemma 2 shows how the bid affects individual and aggregated income. Analysing these effects we distinguish three cases.

Lemma 2 *(i) If $B_i < V_i^l$, individuals of both types benefit by the firm's location.*

(ii) If $V_i^l < B_i < V_i^$, the low-skilled suffer a loss in income whereas the high-skilled individuals' net income increases. The aggregated effect is positive as the gains of the high-skilled exceed the losses of the low-skilled.*

(iii) If $V_i^ < B_i < V_i^h$, the impact of the location on individuals' income is equal to the effect in case (ii). However, the overall effect for the region is negative.*

Proof.

- (i) For each $B_i < V_i^l$ it holds that Δy_i^l and Δy_i^h are strictly greater than 0 (see equations (10) and (11)).
- (ii) For each $V_i^l < B_i < V_i^*$ it holds that Δy_i^l is smaller and Δy_i^h is greater than 0. Since B_i is smaller than the surplus effect created by the firm's location (V_i^*) the net effect is positive.

(iii) As B_i exceeds the firm's surplus effect the net effect is negative.

■

Considering case (iii) in Lemma 2 we can show that high subsidies induced by a strong bidding competition may decrease aggregated income. This inefficiency is summarised in the following Proposition.

Proposition 3 *Even though the firm's location is efficient from an allocative point of view the winning region suffers a loss in income if its median voter is high-skilled and if the heterogeneity between both regions is sufficiently small.*

Proof. A location in region B is efficient from an allocative point of view (see Proposition 1). A bid inducing a loss in income for the low-skilled (see case (iii) in Lemma 2) occurs only if the median voter is high-skilled because a low-skilled individual would not offer a bid that exceeds her personal valuation. Lemma 1 shows that under certain circumstances region B is able to attract the firm if the median voter is high-skilled. The bidding function (equation (15)) shows that a close similarity between regions' valuations leads to high bids offered in the competition. ■

The problem identified in Proposition 3 occurs if the magnitude of the potential surplus effect created by the firm and, thus, the corresponding valuation is similar in both regions. Greenstone and Moretti (2003) and Greenstone et al. (2010) show that competing regions have similar trends in wage bill, employment and per capita income, which may cause similar behaviour in the bidding competition. Obviously, this result is more likely if the median voter in region A is high-skilled.

In the case of a low-skilled median voter (see case (i) in Lemma 2) the high-skilled individuals benefit from the attraction of a firm due to a bid that is smaller than their individual willingness to pay. The low-skilled individuals are at least indifferent between location or no location. Therefore, the attraction is a pareto-improvement.

However, we find two dimensions of inefficiencies caused by the political process. First, the firm may locate in the region, that benefits less. Second, the winning region may suffer a loss of aggregated income.

3 Conclusion

This paper analyses the competition for a firm between two regions in a first-price sealed bid auction under full information. A region's bid is determined by a political process, in our case majority voting. The size of the resulting subsidy transferred to the firm depends on whether a region's median voter is considered to be high-skilled or low-skilled as both types differ in the benefits they derive from the firm's location. The surplus effect of a firm's location is modelled as an increase in wages. The firm's location may be inefficient because of diverging levels of redistribution and distortions caused by the political process. Furthermore, if the median voter is high-skilled, the winning region may suffer a loss of aggregated income. As a consequence, regulating the opportunity of granting subsidies enhances welfare by preventing an exploitation of the low-skilled by the high-skilled individuals.

Our findings support a restrictive subsidy policy pursued, for instance, by the European Union. Due to European regulation, state aid is controlled by the European Commission and restricted to few exceptional regions characterised by an 'abnormally low standard of living' (art. 107(3a) TFEU). The EU Treaty is designed to prevent competitive distortion which would contradict the idea of an internal market. Besides this argument, we offer a novel rationale based on political mechanisms.

Our model provides an example where, even under full information, external effects of attracting a firm are not perfectly internalised by a region's bid and, thus, may lead to a decrease in aggregated income. This result is contradicting the existing literature (see e.g. Black and Hoyt, 1989).

One possible extension for future research may be the analysis of opportunities for firms to influence the median voter, e.g. by local cultural investments or lobbying.

References

- [1] Aitken, B., Harrison, A. E., & Lipsey, R. (1996). Wages and Foreign Ownership: A Comparative Study of Mexico, Venezuela, and the United States. *Journal of International Economics*, 40(3/4), 345-371.
- [2] Aitken, B., & Harrison, A. E. (1999). Do Domestic Firms Benefit from Direct Foreign Investment? Evidence from Venezuela. *American Economic Review*, 89(3), 605-618.
- [3] Barrell, R., & Pain, N. (1997). Foreign direct investment, technological change and economic growth within Europe. *The Economic Journal*, 107(445), 1770-1786.
- [4] Barrios, S., Görg, H., & Strobl, E. (2005). Foreign direct investment, competition and industrial development in the host country. *European Economic Review*, 49(7), 1761-1784.
- [5] Barros, P. P., & Cabral, L. (2000). Competing for Foreign Direct Investment. *Review of International Economics*, 8(2), 360-371.
- [6] Becker, J. & Fuest, C. (2010). EU regional policy and tax competition. *European Economic Review*, 54(1), 150-161.
- [7] Biglaiser G., & Mezzetti, C. (1997). Politicians' decision making with re-election concerns. *Journal of Public Economics*, 66(3), 425-447.
- [8] Bjorvatn K., & Eckel, C.. (2006). Policy competition for foreign direct investment between asymmetric countries. *European Economic Review*, 50(7), 1891-1907.
- [9] Black, D., & Hoyt, W. (1989). Bidding for firms. *The American Economic Review*, 79(5), 1249-1256.
- [10] Blomström, M., & Sjöholm, F. (1999). Technology transfer and spillovers: Does local participation with multinationals matter?. *European Economic Review*, 43(4-6), 915-923.

- [11] Blomström, M., Kokko, A., Globerman, S., & Pain, N. (ed.) (2001) *Inward Investment Technological Change and Growth: The Impact of Multinational Corporations on the UK Economy The determinants of host country spillovers from foreign direct investment: a review and synthesis of the literature*. Palgrave Macmillan UK, 34-65.
- [12] Bond, E. W., & Samuelson, L. (1986). Tax Holidays as Signals. *The American Economic Review*, 76(4), 820-826.
- [13] Branstetter, L. (2006). Is foreign direct investment a channel of knowledge spillovers? Evidence from Japan's FDI in the United States. *Journal of International Economics*, 68(2), 325-344.
- [14] Dewatripont, M., & Seabright, P. (2006). "Wasteful" Public Spending and State Aid Control. *Journal of the European Economic Association*, 4(2/3), 513-522.
- [15] European Commission (2014). Guidelines on Regional state aid for 2014-2020. *Competition policy brief*, 14, 1-5.
- [16] Fosfuri, A., Motta, M., & Rønde, T. (2001). Foreign direct investment and spillovers through workers' mobility. *Journal of International Economics*, 53(1), 205-222.
- [17] Fuest, C., & Huber, B. (2001). Tax competition and tax coordination in a median voter model. *Public Choice*, 107(1), 97-113.
- [18] Fumagalli, C. (2003). On the welfare effects of competition for foreign direct investment. *European Economic Review*, 47(6), 963-983.
- [19] Girma, S., & Görg, H. (2007). Evaluating the foreign ownership wage premium using a difference-in-difference matching approach. *Journal of International Economics*, 72(1), 97-112.
- [20] Görg, H., & Greenaway, D. (2001). Foreign direct investment and intra-industry spillovers: a review of the literature. Research paper / Leverhulme Centre for Research on Globalisation and Economic Policy, No. 2001, 37.

- [21] Greenstone, M., & Moretti, E. (2003). Bidding for Industrial Plants: Does Winning a 'Million Dollar Plant' Increase Welfare? NBER Working Paper No. 9844, National Bureau of Economic Research.
- [22] Greenstone, M., Hornbeck, R., & Moretti, E. (2010). Identifying Agglomeration Spillovers: Evidence from Winners and Losers of Large Plant Openings. *Journal of Political Economy*, 118(3), 536-598.
- [23] Haacker, M. (1999). Spillover from foreign investment through labour turnover: The supply of management skill. Centre for Economic Performance, LSE, London.
- [24] Haaparanta, P. (1996). Competition for foreign direct investments. *Journal of Public Economics*, 63(1), 141-153.
- [25] Haddad, M., & Harrison, A. (1993). Are there positive spillovers from direct foreign investment? *Journal of Development Economics*, 42(1), 51-74.
- [26] Haufler, A. & Wooton, I. (1999). Country Size and Tax Competition for Foreign Direct Investment. *Journal of Public Economics*, 71(1), 121-139.
- [27] Haufler, A., & Wooton, I. (2010). Competition for firms in an oligopolistic industry: The impact of economic integration. *Journal of International Economics*, 80(2), 239-248.
- [28] Heyman, F., Sjöholm, F., & Tingvall, P. G. (2011). Multinationals, Cross-border Acquisitions and Wage Dispersion. *Canadian Journal of Economics*, 44(2), 627-650.
- [29] Hu, A. G. Z., & Jefferson, G. H. (2002). FDI Impact and Spillover: Evidence from China's Electronic and Textile Industries. *The World Economy*, 25(8), 1063-1076.
- [30] Huttunen, K. (2007). The Effect of Foreign Acquisition on Employment and Wages: Evidence from Finnish Establishments. *The Review of Economics and Statistics*, 89(3), 497-509.

- [31] Javorcik, B. S. (2004). Does Foreign Direct Investment Increase the Productivity of Domestic Firms? In Search of Spillovers through Backward Linkages. *The American Economic Review*, 94(3), 605-627.
- [32] Jensen, N. M., Malesky, E. J., & Walsh, M. (2015). Competing for global capital or local voters? The politics of business location incentives. *Public Choice*, 164(3), 331-356.
- [33] Kokko, A., Tansini, R., & Zejan, M. (1996). Local technological capability and spillovers from FDI in the Uruguayan manufacturing sector. *Journal of Development Studies*, 34, 602-611.
- [34] Lipsey, R. E., & Sjöholm, F. (2004). Foreign direct investment, education and wages in Indonesian manufacturing. *Journal of Development Economics*, 73(1), 415-422.
- [35] Markusen, J. R., Melvin, J. R., Kaempfer, W. H., & Maskus, K. E. (1995). *International Trade: theory and evidence*. New York: McGraw-Hill.
- [36] Meltzer, A. H., & Richard, S. F. (1981). A Rational Theory of the Size of Government. *Journal of Political Economy*, 89(5), 914-927.
- [37] Oates, W., & Schwab, R. (1988). Economic Competition Among Jurisdictions: Efficiency Enhancing or Distortion Inducing?. *Journal of Public Economics*, 35, 333-354.
- [38] Olsen, T. E., & Osmundsen, P. (2003). Spillovers and International Competition for Investments. *Journal of International Economics*, 59(1), 211-238.
- [39] Persson, T., & Tabellini, G. (1992). The politics of 1992: Fiscal policy and European integration. *The Review of Economic Studies*, 59(4), 689-701.
- [40] Sjöholm, F. (1999). Technology gap, competition and spillovers from FDI: Evidence from establishment data. *The Journal of Development Studies*, 36(1), 53-73.

- [41] Zhou, D., Li, S., & Tse, D. K. (2002). The impact of FDI on the productivity of domestic firms: the case of China. *International Business Review*, 11(4), 465-484.