



## The proximity-concentration trade-off with profit shifting

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### ABSTRACT

We study a firm which serves two unequally-sized jurisdictions and must choose where to locate its first production plant, and whether to open a second plant to serve the other market through local sales rather than exports. An exporter pays taxes only to the region where it locates its single production plant. A double-plant multi-regional firm pays taxes in both regions, but may shift taxable profits across them, at a cost. We show that the standard trade-off between fixed and trade costs is modified, depending on both the average tax of, and the tax difference between, the two regions. We also find that increased market size asymmetry may make it more likely that the firm builds a second production plant. From a total-welfare viewpoint, it is always desirable to control the firm's tax avoidance ability when the double-plant structure is given. However, the fact that the firm may react to corporate taxation by changing its production structure may be a reason not to curb profit-shifting activities.

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### 1. Introduction

Firms operating in multiple jurisdictions are the norm, rather than the exception, in modern economies. It is generally acknowledged that industries characterized by scale economies and imperfect competition are dominated by this kind of firms.<sup>1</sup> Firms which own fiscal entities at different locations are capable of shifting profits from high-tax to low-tax jurisdictions. This has prompted several countries to introduce specific rules as to the way in which taxable profits are to be allocated across regions. The most well-known examples are the Formula Apportionment systems implemented in Canada, the United States and Germany (Riedel and Runkel, 2007).<sup>2</sup>

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<sup>1</sup> See, e.g., Markusen (1995), Markusen and Venables (1998), and Barba Navaretti et al. (2004).

<sup>2</sup> The European Communities (2001) has recently proposed a move from a Separate Accounting (taxable profits in each jurisdiction are based on computing the value of transactions between related affiliates as if they had occurred among independent firms) to a Formula Apportionment (taxable profits on worldwide operations are combined into a single measure, which is then split into jurisdictions according to some measure such as the relative stock of capital or the relative revenue from sales).

The existence of profit shifting through various mechanisms, such as royalty payments, transfer price manipulation, debt-financing and dividend remittances, is widely documented (see Hines (1999), for a comprehensive survey of the empirical literature). While most of the empirical evidence relates to profit shifting across countries, there are by now a number of contributions showing that firms also manipulate taxable profits at the sub-national level. As stated by Mintz and Smart (2004), while the inter-regional tax differences are lower, hence decreasing the incentives to shift taxable profits, there is an offsetting effect, that of the likely lower costs to do so. These authors report an elasticity of taxable income with respect to tax rates of 4.9 for multi-jurisdictional firms in Canada, more than the double of that of the firms which cannot shift income across locations. Klassen and Shackelford (2000) also report evidence of profit shifting across Canadian provinces and US states. At the international level, horizontal Foreign Direct Investment (FDI) has become a major policy issue in the last decades, as multinational firms carry out growing proportions of international economic activity (according to the OECD, around 60% of international trade involves transactions between two related parts of multinationals).<sup>3</sup> Both the

<sup>3</sup> Clausing (2003) shows that export-import-intrafirm prices for US internationally traded products do increase (decrease) with the tax rate of the destination (origin) region as compared to the – non-intrafirm – market prices.

OECD (1995, 1998) and the European Communities (1992, 1998) have issued documents reacting to such a widespread phenomenon alleged of eroding corporate tax bases.

From a theoretical viewpoint, the firm's choice on how to serve the consumers in another jurisdiction has been treated in the literature by the so-called "proximity-concentration trade-off".<sup>4</sup> The trade-off states that serving distant markets through local production is a good option under high trade costs, whereas concentrating production in just one location and exporting to the other markets is the best option when fixed set-up costs (e.g. building the factory, buying machines, training workers, etc.) are high. One of the main contributions of our paper is to shed additional light on this issue by showing how taxes and profit shifting might affect this trade-off.

In general, the relationship between transport and fixed production costs is fundamental to the regional organization of an economy, as the New Economic Geography (NEG) literature growing out of Krugman's (1991) work has often highlighted.<sup>5</sup> The primary focus of NEG is on how agglomeration of economic activities results from the interaction of increasing returns to scale, trade costs and factor price differences.<sup>6</sup> The *Home Market Effect* (HME), one of the main NEG results, suggests that, in a two-region economy, the location with larger local demand will attract a more than proportionate share of firms in imperfectly competitive industries. Combining the proximity-concentration trade-off with the HME, a common theoretical prediction is that a multi-regional firm is more likely to arise when regional income is fairly similar.<sup>7</sup>

Several empirical papers, including Devereux and Griffith (1998) and Head and Mayer (2002), find a robust positive relationship between market size and the likelihood to attract FDI. The empirical literature on strategic tax-setting shows that region size positively impacts tax rates.<sup>8</sup> Moreover, there is extensive evidence that the corporate tax rate of the host region has a negative and significant impact on inward FDI (see, e.g., De Mooij and Ederveen (2003) for a synthesis of empirical studies based on EU data). If we put such empirical findings together, we are led to conclude that large regions are more likely to benefit from direct investments by foreign firms but also to set higher corporate tax rates which, in turn, should discourage foreign firms from investing there.

The theoretical literature has analyzed the relationship between firm location and fiscal policies mostly using single-plant firms, the notable exceptions being Behrens and Picard (2008) and Bucovetsky and Haufler (2008). Behrens and Picard (2008) set up a symmetric two-region tax/subsidy competition model which builds on a NEG general equilibrium framework. They show that compe-

tion for mobile firms can be weakened when firms are allowed to establish an additional plant abroad, rather than simply relocate production across regions. Namely, when only double-plant firms exist in the economy, the tax base becomes immobile, and governments may tax away firms' *organizational rents*.<sup>9</sup> Bucovetsky and Haufler (2008) model capital tax competition when firms can endogenously choose their organizational structure and governments can commit to long-run tax discrimination between multinational and domestic firms. While granting tax breaks to multinationals softens tax rate competition, it also provides incentives for firms to choose a multinational structure with the aim of enjoying tax savings. Interestingly, a small coordinated increase in the tax preferences in favor of mobile firms may relax tax rate competition, thereby increasing global welfare. A different line of research focuses on competition for firms and for taxable profits at the sub-national level. Pinto (2007) analyses strategic manipulation of Formula Appointment by regions facing a multi-regional firm (when the multi-regional structure of the firm is given). Mintz and Smart (2004) also put forward a theoretical model to motivate their empirical analysis on profit shifting across Canadian provinces. Riedel and Runkel (2007) model the co-existence between two regions that impose Formula Appointment as an accounting system on multi-regional firms and a third one under Separate Accounting. It should be noted, however, that most of the insights of these papers are valid for both multi-regional and multinational firms (and the same is true of papers whose primary focus is on multinationals).

In this paper, we study the interaction between the proximity-concentration trade-off and fiscal motivations when the possibility of profit shifting is explicitly taken into account. Differently from Behrens and Picard (2008), we take into consideration asymmetric market size and profit shifting, and we model an optimal tax avoidance decision by a multi-regional firm, unlike Bucovetsky and Haufler (2008). In addition, while the focus of the latter is on the tax breaks versus fixed costs trade-off for the firm, we do consider both trade costs and tax savings stemming from serving the distant market locally. Our tax policies are, however, taken as exogenous for most of the analysis, while both Behrens and Picard (2008) and Bucovetsky and Haufler (2008) endogenize fiscal policy decisions. Our theoretical set-up is based on the literature about policy competition for multi-plant firms under imperfectly competitive markets, region-size asymmetries and trade costs.<sup>10</sup> We model two regions of asymmetric market size who levy corporate taxes on the profits generated within their borders and allow the firm to partially deduct its investment (fixed) costs from the corporate tax base. A monopolist must decide on whether to serve the two markets locally, i.e., with two local production plants (a *multi-regional* structure) or to set a production plant in one market and serve the other one through exports (an *exporter* structure).<sup>11</sup> The trade-offs faced by the firm are twofold. On the (technological) cost side, building a second production plant entails a fixed set-up cost, while serving the distant market through exports involves positive trade

<sup>4</sup> See, for example, Horstmann and Markusen (1992), Brainard (1993, 1997), and Markusen and Venables (2000). More recently, Helpman et al. (2004) have emphasized the role of intra-industry firm heterogeneity – in terms of productivity differences – in explaining the structure of trade and investment when firms face a proximity-concentration trade-off.

<sup>5</sup> Recent contributions where this relationship plays an important role include Zeng (2008) and Behrens and Murata (2009). Zeng (2008) introduces heterogeneous preferences of mobile workers for private goods into a NEG framework. The interaction of increasing returns and monopolistic competition leads to persistent residential segregation of workers. On the other hand, industries of the manufacturing sector evolve from dispersion to agglomeration following a continuous path with decreasing transport costs. Behrens and Murata (2009) set up a model of monopolistic competition with variable elasticity of substitution (VES) in a monocentric city setting. Transportation costs are incurred by workers *commuting* from their living place to the central business district. At the second best, aggregate land rents fall short of aggregate fixed costs (i.e., the Henry George Theorem does not hold) because of pro-competitive effects that lead to excess entry of firms. Notably, the difference gets larger for lower commuting costs.

<sup>6</sup> See, e.g., Fujita and Thisse (2002) and Ottaviano and Thisse (2004) for a unified overview of NEG and standard location theory.

<sup>7</sup> See, e.g., Markusen and Venables (1998, 2000).

<sup>8</sup> Devereux et al. (2008) find that GDP positively affects *statutory* corporate tax rates of OECD countries over the period 1982–1999. Baldwin and Krugman (2004) obtain a similar result for *average* corporate tax rates.

<sup>9</sup> Baldwin and Krugman (2004) get a similar result in a model with single-plant firms and asymmetric regions, where the bigger one ends up taxing away the firms' *agglomeration rents*.

<sup>10</sup> Haufler and Wooton (1999) initiate this line of research with an analysis of tax competition between two regions of unequal size trying to attract a foreign-owned monopolist. The existence of positive trade costs separating the two markets entails a location advantage in the larger one. As a result, the big region *wins* the competition for FDI, and it may even do so while imposing a positive (lump-sum) profit tax on the foreign firm (rather than subsidizing it). Capital tax competition models building on the traditional public finance approach – Zodrow and Mieszkowski (1986) or Bucovetsky (1991) and Wilson (1991) for the asymmetric-countries case – seem to be more appropriate to analyze competition for portfolio investments since trade costs are typically not accounted for.

<sup>11</sup> We abstract here from *vertical* multi-plant firms, involving fragmentation of the firm's production process across regions. See, e.g., Markusen (2002, Chapter 9), for a discussion of this form of FDI.

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