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Corporate taxes and intra-firm trade

Peter Egger[a,b,c,d,*], Tobias Seidel[c,e]

[a] ETH Zurich, Switzerland
[b] CEPR, London
[c] CESifo, Germany
[d] GEP, United Kingdom
[e] University of Duisburg-Essen, Germany

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ABSTRACT

We argue in this paper that differences in corporate taxes between economies stimulate vertical integration of final goods producers and suppliers of intermediate goods causing more intra-firm trade. This is due to the fact that vertically integrated firms can shift profits from a high-tax jurisdiction, rendering this organizational type more attractive for more productive firms as compared to outsourcing at arm's length. Using data on intra-firm imports of US multinational firms, we provide empirical support for our theoretical findings. Apart from reduced-form regressions we structurally estimate and calibrate the multi-country model for the US and 27 host countries. We find that the observed increase in the tax gap between the US and the average host country of 3.1 percentage points has led to an increase of intra-firm trade flows by 5.5%. Our calibration suggests that this change was stimulated largely by a 9.8% increase in the number of vertically integrated multinational firms.

1. Introduction

How firms organize their production process in a globalized world is a crucial determinant of profitability. Whether to serve foreign customers through exports or local sales (implying foreign direct investment) or to choose between outsourcing components at arm's length and integrating suppliers of intermediate goods into the boundaries of the corporation are important decisions for firms. The latter is referred to as the *internalization decision*. In an increasingly integrated world where intermediate goods are shipped across borders, vertical integration of production implies that more goods are traded within the boundaries of multinational enterprises (MNEs). It is well documented that these international intra-firm transactions account for a large share in global trade. For instance, intra-firm exports and imports represented about 40% of the total US trade flows in 2008 (Census, 2009) while Antràs (2003) points out that one-third of global trade takes place within the boundaries of MNEs. Hence, it appears essential to improve our understanding of the determinants of intra-firm trade.

We argue in this paper that the *internalization decision* is crucially affected by the difference in corporate tax rates between countries. Provided that headquarters source an intermediate input from a foreign country that has a comparative advantage in producing it, choosing vertical integration offers the advantage of minimizing the tax burden across both

* Corresponding author at: ETH Zurich, KOF, Weinbergstrasse 35, WEH E6, 8092 Zurich, Switzerland. Tel.: +41 446324108.
E-mail address: egger@kof.ethz.ch (P. Egger).

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jurisdictions by setting transfer prices for intermediate goods. However, vertical integration also implies higher fixed costs as compared to outsourcing so that only more productive firms find it profitable to choose this production structure. Our theoretical model suggests that both the share and the volume of bilateral intra-firm trade increases in the corporate tax differential between the home and the host country. As the benefit of transfer pricing rises in the tax gap, expected after-tax profits increase. This leads to both a higher number and share of vertically integrated MNEs causing more intra-firm trade.

Using data on intra-firm imports of US MNEs, we provide empirical support for our theoretical findings by reduced-form estimates and structural estimation of the general-equilibrium multi-country model for the US and 27 OECD host countries for the average year 1999–2006. We calibrate the model to intra-firm trade data by adjusting fixed costs and the number of firms. Taking the specific tax rates for 1999 and 2006, we solve the model for both scenarios and compute the corresponding changes of key variables predicted by the model. We find that the multilateral changes in corporate tax rates imply an increase of both the share and the volume of intra-firm trade of about 5.5% for US headquarters on an average. The number of vertically integrated MNEs would grow by 9.8%. The reduced-form estimates suggest that an increase of the tax gap between the US and the average host country of 1 percentage point is associated with an increase of the volume and the share of intra-firm trade of about 7%.

Although transfer pricing is not a legal activity, several studies document that MNEs systematically charge different prices for internal transactions or report higher profits in low-tax countries. Bernard et al. (2006) show that US MNEs charge substantially different prices for goods that are exported to customers at arm's length compared to own affiliates. Clausing (2003) provides evidence for transfer pricing by analyzing prices for US exports and imports and finds systematic differences between related-party and arm's-length trade. Looking at product-level import prices in the US between 1981 and 1988, Swenson (2001) identifies price variations that are consistent with the incentives for transfer pricing.[1]

Economists have discussed several determinants of vertical integration in the literature. Ethier (1986) argues that quality-contingent contracts are infeasible in certain cases thus making integrated production within the boundaries of the firm the dominant (albeit inefficient) strategy. Ethier and Markusen (1996) consider possible dissipation of knowledge capital when producing abroad. As dissipation is higher under licensing than under integrated production in an affiliated plant, this might give rise to internalization. McLaren (2000) and Grossman and Helpman (2002, 2005) emphasize the *thickness of the market* for the choice of the organizational structure as matching with a supplier becomes more likely. These papers build on the transaction cost approach to the boundaries of the firm featuring the central assumption that contracts for arm's length transactions are imperfect and sometimes too complex to be written, but become perfect within the boundaries of the firm (although at an exogenous cost). Hence, a thick market implies lower transaction costs in finding a suitable supplier so that vertical integration becomes less attractive.

An alternative framework based on the seminal work by Grossman and Hart (1986) roots in the assumption that hold-up problems also exist within the boundaries of the firm. There are several important contributions following this property-rights approach. In Antràs (2003), vertical integration takes place with a higher probability in more capital-intensive industries. Since final goods producers provide capital in the joint production process to the intermediate goods supplier, it is efficient to assign control rights to the final goods producer if her contribution is large. Following a similar idea, Antràs and Helpman (2004) introduce firm-heterogeneity and derive equilibria where firms that vertically integrate or outsource can co-exist. Again, the relative intensity of the input provided by the final goods producer makes it more likely that headquarters opt for acquiring property rights of the supplier. Carluccio and Fally (2012) and Bas and Carluccio (2010) discuss the role of imperfect capital markets and wage bargaining, respectively, in that framework. Antràs (2005) introduces product cycles as another determinant of intra-firm trade. Products that require less technologically advanced intermediate inputs tend to be produced at arm's length. Grossman and Helpman (2003) argue that better institutions facilitate contracting such that vertical integration becomes less likely when institutional quality improves.[2] Devereux and Keuschnigg (2013) consider profit taxes as an additional determinant of the integration decision, but they focus on the distorting nature of the arm's length principle for inference about whether firms escape taxation through transfer pricing or not.

To isolate the corporate tax channel for firm organization, we employ a multi-country heterogeneous-firms model where none of the above mechanisms is at work. In the absence of any tax differential, all firms would prefer *outsourcing* to *vertical integration* as fixed organizational costs are lower and, hence, profits are higher. If corporate profit taxes differ across countries, however, highly productive firms switch to vertical integration. This is driven by the advantage of setting transfer prices to minimize the overall tax burden and thus increase after-tax profits. As the benefit of transfer pricing monotonically increases the tax gap between jurisdictions and firm productivity, both the number and the share of vertically integrated firms rise in the tax differential. This intuition translates to the share and the absolute level of *quantities* traded within the boundaries of firms. However, if the transfer price declines in response to a widening tax gap, the price effect points in the opposite direction. This implies that the effects of transfer pricing for the volume of trade are weaker for negative tax gaps.

Our empirical results are related to the earlier work providing reduced-form evidence for a link between profit-shifting opportunities and intra-company transactions and ownership structures (see Grubert, 2003; Desai et al., 2004). We point to

[1] For a review of the older literature, we refer the reader to Hines (1997, 1999).

[2] We refer to the excellent survey article by Spencer (2005) for a more detailed and complete review of this literature. A more recent empirical literature provides broad support for these determinants (Corcos et al., 2013; Bernard et al., 2010; Nunn, 2007; Nunn and Trefler, 2008; Yeaple, 2006).