Competition and pass-through on international markets: Firm-level evidence from VAT shocks *

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January 2010

(Preliminary)

Abstract

We rely on the French customs firm-level data and a model of imperfect competition on international markets to study how exporters pass a change in the VAT rate of one importing country through their prices. Contrasting with exchange-rate shocks, VAT-rate changes are long-lasting, do not affect exporters' marginal costs and affect exporters and domestic producers symmetrically. This shock combined with the individual dimension of the data set allows us to identify the extent of markup adjustment in exporters' incomplete pass-through at the level of a firm and to point out the influence of changes in competition strength in the process. For a sample that covers French exportations to the Euro zone over the 1996-2005 period we find that (*i*) the median pass-through of VAT shocks is incomplete: 82% at a one-year horizon when all sectors are considered; (*ii*) exporters' population is recomposed after the shock: an increase in VAT rate lowers the number of competitors on a given export market and increases the market share of the remaining ones; (*iii*) this change in competition affects the optimal markup adjustment: an increase in VAT lowers competition and allows the remaining exporters to pass more of the shock to their prices.

Keywords: International prices, pass-through, competition, extensive margin, Value-Added Tax.

*We thank Matthieu Crozet and Cyril Schwellnus for useful comments. This paper does not reflect the views of the Banque de France. e-mails: philippe.andrade@banque-france.fr, agnes.benassy@cepii.fr, martine.carre@u-cergy.fr.

1 Introduction

How do exporters pass macroeconomic shocks through their prices? The question is fundamental to understand the international transmission of business cycles, or to characterize the effects of macroeconomic policies in open economies. It has mostly been answered by looking at the reaction of international prices to exchange rate fluctuations. This so called exchange rate pass-through literature typically emphasizes weak and long-lasting adjustments to these shocks[1] suggesting exporters smooth the shock by adjusting their markup. However, it is not clear how much of these results are driven by exchange rate peculiarities and therefore whether these conclusions extend to other macroeconomic shocks. Indeed, exchange rates fluctuate a lot and it may be optimal not to react to their transitory components. Moreover, exchange rates may affect the marginal cost of an exporter through imported inputs so that the incomplete pass-through can occur even without markup changes.

In this paper, we study whether incomplete pass-through holds for other shocks than exchange rate fluctuations and to which extent it relates to imperfect competition on international markets. More precisely, we rely on a rich micro data set to look at exporter's price reaction to variations in the value-added tax (VAT) rates of the importing countries. We argue this type of shock is a good candidate to identify a pure markup adjustment effect. The richness of the data set also allows us to investigate how these shocks modify the strength of competition on these markets and therefore interacts with incomplete pass-through to international prices.

Focusing on the VAT rather than exchange rate bears three attractive features. First, a change in VAT rates in a foreign country affects the consumer-price of a firm but leaves its marginal cost constant. Thus incom-

[1] In an authoritative survey, Goldberg and Knetter (1997)) report a median (across studies) pass-through of 50% one year after the shock. Goldberg and Campa (2005), **?** and Bouakez and Rebei (2008) provide more recent evidence of incomplete pass-through.

plete pass-through is not attributed to marginal cost adjustment associated with imported inputs. Second VAT-rate changes are unfrequent, exogenous policy events that are generally expected to be permanent. Any finding of incomplete pass-through thus is unlikely to be related to perceptions that the shock will die out rapidly and to transitory price rigidities issues. Finally, VAT applies in a symmetric way to imported and local goods. Thus, incomplete pass-through cannot be attributed to any distortion created by the shock in favor or against foreign suppliers and in particular non-traded local distribution services. In brief, focusing on VAT shocks allows us to derive a measure of pass-through based on the sole markup adjustment and therefore this measure bears general implications for other types of macroeconomic shocks.

We rely on the firm-level, French customs' database that tracks volumes and prices of exported goods at the firm's level according to an 8-digit classification of goods (around 10,000 products), between 1996 and 2005. We aim at identifying how each exporter adjusted its pricing strategy, for each different good to each destination country, in reaction to VAT-rate shocks that occurred in the eleven EMU12 partner countries of France over this period. The use of firm-level data allows us to deal with firm heterogeneity and to highlight the role of competition on international markets to understand the reaction of prices to VAT shocks. The reaction of a firm's markup in response to a VAT shock depends on how its perceived demand-elasticity varies with price, which in turn depends on the impact of the shock on the number of competitors on the shocked market. Our micro data set allows us to estimate the change in competition on the export market, as measured by entry and exit rates, hence the evolution of market shares, following a VAT shock. Subsequently, we are able to disentangle what in the price/mark-up reaction to VAT shocks comes from changes in the strength of competition and what comes from others sources in demand-curve elasticity variations.

Working with firm level data also ensures that we are insulated from the aggregation bias issues.[2]

We find that, at the firm level, the pass-through of VAT shocks to consumption prices is far from complete. We get a median (across sectors) estimate for the one-year horizon pass-through of 82% for the whole sample. The figure drops to 70% when restricting the sample to final consumption goods, for which there are more French competitors on each elementary market. Though higher than for exchange rate rates, these incomplete degrees of pass-through confirms the consensus view from the literature, which also reports long-lasting, incomplete adjustment of international prices to macroeconomic shocks. By focusing on demand-side, symmetric and permanent shocks, and by relying on firm-level data, our results suggest that incomplete pass-through may be a very general pattern of international pricing strategies rather than just related to exchange rate fluctuation features.

We also find changing competition to be at play in the incomplete pass-through process. Indeed, a VAT hike in a destination country lowers the entry rate and increases the exit rate of exporters to that country and therefore reduces the strength of competition on that market. We show that the adjustment to VAT shocks also takes place through a recomposition of the population of exporters. The market share of surviving firms increases, allowing them to reap more market power and therefore to lower their markup adjustment, which raises the extent of the pass-through.[3] Controlling for the competition strength, the degree of pass-through would have been of only 73% (rather than 82%) for the whole sample and of 65% (rather than 70%) for final consumption goods.

[2]See Imbs et al. (2005)

[3]In a world with heterogeneously productive firms (Melitz (2003)), the ones that exit are those that cannot adjust their markup and therefore are forced to pass through a large share of the shock to consumer prices. This extensive margin effect reduces the sector-level pass-through (see Berman et al. (2009) for empirical evidence). Here we also have firm-level imperfect pass-through, but our result does not derive from a composition effect.

Our analysis also bear important implications in terms of tax policy others than this redistribution across sectors. Indeed, the incomplete VAT pass-through implies that the exporters share a part of a VAT hike burden. Moreover the importing country experiences a terms-of-trade gain. However, there is a fall in the number of varieties available to the consumers and a rise in the market power of the remaining foreign suppliers. All in all, and despite it is levied according to the destination principle, VAT bears important international implications.

Literature

We are not aware of another work assessing the reaction of VAT shocks on trade prices.[4] Feenstra (1989) evidences that changes in ad-valorem tariffs on imports are incompletely passed-through to consumer prices, thus suggesting a terms-of-trade effect of trade policies. Although exogenous and permanent, a tariff shock nevertheless affects domestic and foreign suppliers asymmetrically, which is not the case of VAT. Also related to our work is the research carried out by Chen et al. (2009). Based on sectoral European data, they show that increases in competition that follows a sectoral opening to international trade reduce prices and markups in that sector on a comparable horizon than our.

Our econometric identification is based on a model of imperfect competition among French exporters on each foreign market. Prices are assumed to be perfectly flexible but markups can vary due to changes in the perceived elasticity of demand on each market. Incomplete pass-through thus results from optimal price discrimination on segmented markets, *i.e.* from Pricing To Market (PTM) in the spirit of Dornbusch (1987) and Krugman (1987). Relating the optimal pass-through to the strength of competition on a market also connects our paper to Froot and Klemperer (1989) and

[4]This lack of literature contrasts with both domestic VAT pass-through (see e.g. for the French case) and, on the international sphere, exchange-rate pass-through.

to the models with heterogenous firms, entry & exit and variable markups by Bernard *et al.* (2003) and Melitz and Ottaviano (2008). Atkeson and Burstein (2008) is a recent example of a model that features both PTM on segmented international markets due to trade costs and varying competition between heterogenous firms.

The theoretical literature points to two other important channels explaining incomplete pass-through: sticky prices in local currency (e.g. Devereux and Engel (2002)), and non-traded distribution services (e.g. Burstein et al. (2003), Corsetti and Dedola (2005)). Although highly relevant especially for exchange-rate pass-through, these two channels are unlikely to be important in our case, for two reasons. First, we work on yearly prices, thus at a sufficiently low frequency for price adjustments to be complete in most sectors of the economy (see Bils and Klenow (2004) for the United States and Dhyne et al. (2006) for the European Monetary Union). Second, our trade prices are registered free on board (FOB) at the French border, hence before transportation and local distribution costs have been charged. More crucially, VAT is levied at the final consumer's level, which includes local distribution costs, but the same rate applies to the value-added produced abroad and to that produced locally.[5] Therefore our results suggest that incomplete pass-through is still observed when short-run price stickiness and distribution costs are excluded from the analysis.[6]

Finally, our results can be compared with the very recent theoretical models and evidence of incomplete exchange-rate pass-through based on firm-level behaviors. For instance Gopinath and Rigobon (2008) or Fitzgerald

[5]By contrast, exchange-rate shocks do not affect local distribution costs, which may contribute to explaining incomplete pass-through (see Corsetti and Dedola (2005)).

[6]These two channels will then reinforce pass-through incompleteness. Goldberg and Verboven (2001), Hellerstein (2008) and Nakamura and Zerom (orth), based respectively on evidence from the car, beer and coffee sectors, show that variable markups and distribution costs are indeed the most significant components of incomplete pass-through. See also Goldberg and Campa (2008) for macroeconomic estimates of distribution margins and their implications.

and Haller (2009) find much more incomplete pass-through in international prices, with pass-through degree to exchange rate variations of less than 50%, and stress the importance of markup adjustments and the segmenting role of countries' borders. However, they do not assess the role of changes in competition in that incomplete pass-through. By contrast, Berman et al. (2009) and Auer and Chaney (2009) do stress the importance of the firms' entry and exit on export markets induced by exchange-rate fluctuations, and consequently of the extensive margin adjustment, to account for limited exchange-rate pass-through.[7] The firms who do not exit are those that have the capacity to pass-through shocks the less. In this paper, we underline that the impact of VAT shocks on market entry and exit goes beyond a mere composition effect of the population of exporters. Independently of heterogenous behavior in productivity, therefore price setting, incomplete pass-through is also related to the changes in the market structure implied by the shock.

The rest of the paper is organized as follows. In Section 2 we describe the imperfect-competition model on export markets and derive our pass-through identification strategy. Section 3 presents the database. We provide and discuss the empirical results in Section 4. Section 5 concludes.

2 An empirical model of imperfect competition on international markets

2.1 Exporters' optimal prices

Consider a firm f selling goods $k = 1, \ldots, K$ on several destination markets $l = 1, \ldots, L$. Let τ_l be the VAT rate on destination market l, Q_{fkl} the quantity of good k sold by firm f on market l, $\widetilde{P}_{fkl}(Q)$ the (inverse) demand function for product k on market l and $C_{fk}(\cdot)$ the variable production cost. The optimal price can be written as a markup over marginal cost, MC_{fk},

[7] Also of interest is Méjean and Schwellnus (2009) who emphasize the extensive margin channel to account for the different but related issue of the deviations from law of one price.

namely

$$\frac{\widetilde{P}_{fkl}}{1+\tau_l}\left(1-\frac{1}{\epsilon_{fkl}}\right)=MC_{fk} \tag{1}$$

where $MC_{fk} \equiv \frac{\partial C_{fk}}{\partial Q_{fkl}}$ and $\epsilon_{fkl} \equiv \frac{\partial \widetilde{P}_{fkl}}{\partial Q_{fkl}} \frac{Q_{fkl}}{\widetilde{P}_{fkl}}$ the price-demand elasticity for good k produced by firm f and sold on market l, that we assume strictly greater than 1.

For notational convenience, let us index by $i \equiv \{f,k,l\}$ a good of type k produced by firm f and sold on market l, and let $P_i \equiv \frac{\widetilde{P}_i}{1+\tau_l}$ denote the corresponding optimal price net of VAT. As shown in Equation (1), this optimal price is the product of a markup over marginal cost. In our model, the markup is specific to each unit i because the price-elasticity of demand depends on the target market, on the firm and on the type of good. Let us denote by $\mu_i \equiv \left(\frac{\epsilon_i}{\epsilon_i-1}\right)$ this markup. By contrast, the marginal cost is specific to a firm and to a particular type of good but does not vary across destinations. Using the log transformation, the optimal net price can be split into two terms, namely:

$$\log P_i = \log \mu_i + \log MC_{fk} \tag{2}$$

Note that the fact that the marginal cost MC_{fk} does not depend on the destination market means that transport and distribution costs are excluded from the exporter's cost function. Hence, our model describes the optimal price of an exporter at the border of his own country, i.e. before tariffs, transportation and distribution costs are charged. However our specification does not preclude a good k produced by firm f being sold at a different price on different locations l. Those deviations from the law of one price can be initiated by differences across destinations in the elasticity of demand addressed to that firm/product. These differences in demand elasticities may indirectly derive from differences in transportation and distribution costs: a more costly distribution in one destination may reduce local demand for a given export price, hence reduce the demand elasticity. However, since VAT

affects domestic and foreign-sourced value-added in the same way, distribution costs should be neutral regarding VAT pass-through.[8]

Our elasticity of demand is a general, unspecified function of the sector-specific elasticity of demand, ϵ_k, the market share of firm f on the market for good k in country l, $s_i \equiv P_i Q_i / \sum_{j \in (k,l)} P_j Q_j$ and a vector of firm characteristics Z_f:

$$\epsilon_i \equiv \epsilon \left(\epsilon_k, s_i, Z_f \right)$$

where, by normalization, $\epsilon \left(\epsilon_k, 1, \overline{Z}_{f \in k} \right) = \epsilon_k$, with $\overline{Z}_{f \in k}$ the average of firms characteristics across firms that operate on the market for good k and where $\epsilon \left(\epsilon_k, s_i, Z_f \right) \to \infty$ when $s_i \to 0$.

This general specification covers several models of imperfect competition on international markets. See for example Atkeson & Burstein (2009).

2.2 Optimal pass-through to changes in VAT rates

Assuming that there are no production scale effects, the marginal cost will not react to a change in the VAT rate of the destination market l. This will induce a variation in the optimal net price that equals the variation in the optimal mark-up, without any interference from the marginal cost:

$$\sigma(P_i) = \sigma(\mu_i) = \frac{-\sigma_{\epsilon_i}}{\epsilon_i - 1}$$

where $\sigma_{\epsilon_i} = \frac{d\epsilon_i}{dP_i} \frac{P_i}{\epsilon_i}$ is the price elasticity of the demand elasticity, $\sigma(\mu_i)$ is the elasticity of the markup with respect to VAT, and $\sigma(P_i) = \frac{dP_i}{d(1+\tau_l)} \frac{(1+\tau_l)}{P_i}$ is the elasticity of the net price with respect to VAT. This equation can be re-written in log-linear form as:

$$d \log P_i = \frac{-\sigma_{\epsilon_i}}{\epsilon_i - 1} d \log(1 + \tau_l) \tag{3}$$

Equation (3) states that the exporter will reduce its net price following an increase in VAT in the destination country if the price-elasticity of demand is

[8] This is contrast with one strand of the recent literature on exchange-rate pass-through, where local distribution costs invoiced in the destination currency affect the amount of pass-through, see Corsetti and Dedola (2005) and Berman et al. (2009).

an increasing function of the price level. Conversely, if the price-elasticity is constant ($\sigma_{\epsilon_i} = 0$), there will be no net-price adjustment, hence an increase in VAT will result in a one-for-one increase in the VAT-included price (with no change in the net price): VAT will be fully passed on to the consumers.

This result can also be catched by calculating the elasticity of the gross price ($\widetilde{P}_i = (1 + \tau_l)P_i$) to the VAT rate:

$$\sigma(\widetilde{P}_i) = 1 + \sigma(P_i) = 1 - \frac{\sigma_{\epsilon_i}}{\epsilon_i - 1} \tag{4}$$

$\sigma(\widetilde{P}_i) = 1$ (i.e. pass-trough is complete) whenever the demand elasticity is constant. By contrast, there is no pass-through at all when the elasticity of the demand elasticity is equal to the markup denominator, *i.e.* $\sigma_{\epsilon_i} = \epsilon_i - 1$. In that case the firm adjusts its markup in order to fully compensate for the rise in VAT rate: $\sigma(\widetilde{P}_i) = 0$.

Note that the above analysis holds for any shock that affects the optimal markup *while leaving the marginal cost constant*. This is the assumption made by the exchange rate pass-through literature, P_i being the exporter's price in domestic currency and $\widetilde{P}_i$ the foreign-currency price of the exporter. However, the assumption that the MC is constant in the wake of an exchange-rate variation is difficult to support for firms that have a cost structure with imported inputs. In fact, the total elasticity of the exporter's price to the exchange rate is $\sigma(P_i) = \sigma(\mu_i) + \sigma(MC_i)$. The second term is likely to be negative due to the negative impact of an exchange-rate appreciation on imported input costs. Hence we have $\sigma(\mu_i) \leq 0$ and $\sigma(MC_i) \leq 0$: the pass-through coefficient will be underestimated.

Using the above function of demand elasticity, $\epsilon\left(\epsilon_k, s_i, Z_f\right)$, the reaction of the elasticity to an exogenous change in VAT can be further decomposed. Totally differentiating the elasticity function, and making the simplifying assumption that the variables in Z_i represent structural factors that stay unaffected by VAT changes so that $\frac{\partial \log Z_i}{\partial \log(1+\tau_l)} = 0$, the elasticity of the elasticity of demand can be split into two term: (i) a term deriving from the

change in the sector-specific elasticity of demand ϵ_k (demand effect), and (ii) a term deriving from the change in the market share (competition effect):

$$\sigma_{\epsilon_i} \equiv \frac{d\log\epsilon_i}{d\log(1+\tau_l)} = \underbrace{\left(\frac{\partial\epsilon_i\epsilon_k}{\partial\epsilon_k\epsilon_i}\right)\frac{\partial\log\epsilon_k}{\partial\log(1+\tau_l)}}_{\text{Demand}} + \underbrace{\left(\frac{\partial\epsilon_i s_i}{\partial s_i\epsilon_i}\right)\frac{\partial\log s_i}{\partial\log(1+\tau_l)}}_{\text{Competition}}$$

This leads to a total markup — therefore optimal net price — reaction to a VAT-rate change that is given by:

$$\frac{d\log P_i}{d\log(1+\tau_l)} = \frac{-1}{\epsilon_i - 1}\left[\left(\frac{\partial\epsilon_i\epsilon_k}{\partial\epsilon_k\epsilon_i}\right)\frac{\partial\log\epsilon_k}{\partial\log(1+\tau_l)} + \left(\frac{\partial\epsilon_i s_i}{\partial s_i\epsilon_i}\right)\frac{\partial\log s_i}{\partial\log(1+\tau_l)}\right] \tag{5}$$

The recent literature has underlined the role of firm heterogeneity and entry/exit behaviors to better understand international trade patterns. The above decomposition shows that the optimal pass-through of a destination-specific shock (here, a VAT shock) depends both on the change in the demand elasticity that is specific to each product, and on the variation in the numbers of competitors on each product-market (which determines market share). The demand and competition terms have opposite effects on the optimal net price reaction of an exporter. For instance, a VAT hike in one destination tends to raise the VAT-included prices of all exporters. This leads to a rise in the sector-specific elasticity of demand, which in turn reduces firms' optimal markup, and therefore the optimal pass-through, by an amount of $\frac{-1}{\epsilon_i-1}\left(\frac{\partial\epsilon_i\epsilon_k}{\partial\epsilon_k\epsilon_i}\right)\frac{\partial\log\epsilon_k}{\partial\log(1+\tau_l)} < 0$. Due to this fall in profitability, some firms will exit the market and few new firms will enter the market. This will increase the market share of surviving and new firms ($\frac{\partial\log s_i}{\partial\log(1+\tau_l)} > 0$), and therefore increase their market power: The optimal pass-through is positively affected by the reduction in competition by an amount of $\frac{-1}{\epsilon_i-1}\left(\frac{\partial\epsilon_i s_i}{\partial s_i\epsilon_i}\right)\frac{\partial\log s_i}{\partial\log(1+\tau_l)} > 0$. Indeed $\left(\frac{\partial\epsilon_i s_i}{\partial s_i\epsilon_i}\right)$ is usually assumed to be negative.

In the next section we present an empirical strategy that aims at properly estimating the total pass-through coefficient and at disentangling the demand and competition effects.

2.3 Econometric strategy

2.3.1 Estimating pass-through coefficients

Let $p_i \equiv \log P_i$ and assume that the price for product i is observed at successive dates $t = 1, \ldots, T$. Equation (3) translates into the following time evolution of p_i:

$$\Delta p_{it} = -\sigma_{\epsilon_i} \left(\frac{1}{\epsilon_i - 1} \right) \Delta \log(1 + \tau_{lt}) + \Delta e_{it} \tag{6}$$

where Δe_{it} controls for variations in (log) demand and marginal costs that are unrelated to changes in the VAT rate. We assume the following, general decomposition for Δe_{it}:

$$\Delta e_{it} = \alpha_i + \theta_t + \gamma' X_{lt} + u_{it}, \quad \mathrm{E}\{ u_{it} | \theta_t, X_{lt} \} = 0 \tag{7}$$

where X_{lt} represents macroeconomic factors specific to the destination market l that will affect demand for imports in that country. The exogeneity of Δe_{it} vis-a-vis VAT-rate changes can be written as:

$$\mathrm{E}\{ \Delta e_{it} | \Omega_{it}, \Delta \log(1 + \tau_{lt}) \} = \mathrm{E}\{ \Delta e_{it} | \Omega_{it} \} \tag{8}$$

Finally, we assume that the elasticity of the demand elasticity is homogenous across unit goods $i \equiv \{f, k, l\}$:

$$\sigma_{\epsilon_i} = \sigma \quad \forall i \tag{9}$$

This homogeneity assumption does not constraint the pass-through of a VAT-rate changes to be homogenous across firms, neither across products. It only concerns the way the various demand elasticities react to prices. This specification allows for a heterogenous reaction of prices to VAT changes across firms and products, which is given by $\frac{-\sigma}{\epsilon_i - 1}$. Hence our identification scheme implies substantial heterogenous reactions across sectors, with a degree of pass-through increasing with the sector-specific elasticity of substitution. For a large elasticity, therefore when competition is fierce, the pass-through is

nearly complete. It is the reverse on a market with inelastic demand. Denoting $\Delta r_{it} \equiv \left(\frac{1}{\epsilon_i - 1}\right) \Delta \log(1 + \tau_{lt})$, we can re-write Equation (6) as the following pass-through regression:

$$\Delta p_{it} = \alpha_i + \theta_t - \sigma \Delta r_{it} + \gamma' X_{lt} + u_{it}, \quad \mathrm{E}\left\{ u_{it} | \, \theta_t, \Delta r_{it}, X_{lt} \right\} = 0 \tag{10}$$

The exogeneity assumption is justified by the fact that VAT-rate changes are exogenous political decisions. However it may be the case that the assumption fails to hold if firms have production technologies with increasing returns. Then, a change in aggregate demand induced by a change in VAT will modify the scale of production and therefore affect the marginal cost. To the extent that exports to a specific country (where the VAT rate has been changed) represents a limited fraction of total output, this increasing-return argument does not appear compelling, though. We control for the size of production of each good in each firm through introducing unit-i fixed effects.

An empirical difficulty is that Δr_{it} is not directly available since the unit good elasticity ϵ_i cannot be observed. We deal with this issue by replacing ϵ_i with consistent sectoral/country elasticity estimates $\widehat{\epsilon}_{sl}$ ($\simeq \epsilon_{sl}$ if they are estimated on a large sample). Then, Δr_{it} is replaced by:

$$\Delta \widehat{r}_{slt} \equiv \left(\frac{1}{\widehat{\epsilon}_{sl} - 1}\right) \Delta \log(1 + \tau_{lt}), \tag{11}$$

so that the following relationship can be estimated:

$$\Delta p_{it} = \alpha_i + \theta_t - \sigma \Delta \widehat{r}_{slt} + \gamma' X_{lt} + \widetilde{u}_{it}, \quad \mathrm{E}\left\{ \widetilde{u}_{it} | \, \theta_t, \Delta \widehat{r}_{st}, X_{lt} \right\} = 0. \tag{12}$$

Equation (12) will be estimated through a fixed effect method. From $\widehat{\sigma}$, sectoral/country estimates of the pass-through coefficient can ultimately be recovered using the formula:

$$\text{Pass-through}_{sl} = 1 - \frac{\widehat{\sigma}}{\widehat{\epsilon}_{sl} - 1}. \tag{13}$$

2.3.2 Demand and competition channels

The above estimation of the pass-through coefficient does not distinguish between the demand and the competition contributions to the total change in the optimal markup following a VAT-rate change. An empirical counterpart of Equation (5) is given by:

$$\Delta p_{it} = -\left(\frac{\kappa_{\epsilon_k}}{\epsilon_i - 1}\right)\Delta\log(1+\tau_{lt}) - \phi_{s_i}\Delta\log s_i + \Delta e_{it} \tag{14}$$

with $\kappa_{\epsilon_k} \equiv \left(\frac{\partial\epsilon_i\epsilon_k}{\partial\epsilon_k\epsilon_i}\right)\frac{\partial\log\epsilon_k}{\partial\log(1+\tau_l)}$ and $\phi_{s_i} \equiv \left(\frac{\partial\epsilon_i s_i}{\partial s_i\epsilon_i}\right)\frac{1}{\epsilon_i - 1}$, and where Δe_{it} still represents variations in (log) demand and marginal costs for unit good i that are not related to VAT-rate changes and for which we can postulate the same general decomposition as previously (Equation (7)). We also constraint the parameters κ_{ϵ_k} and ϕ_{s_i} to be homogeneous across goods items i: $\kappa_{\epsilon_k} = \kappa\ \forall\ k$ and $\phi_{s_i} = \phi\ \forall\ i$. We approximate again the unobserved unit good i demand elasticity by sectoral/country estimates $\widehat{\epsilon}_{sl}$ and construct the variable r_{slt}. Finally, the following empirical model can be estimated:

$$\Delta p_{it} = \alpha_i + \theta_t - \kappa\Delta\widehat{r}_{slt} - \phi\Delta\log s_{it} + \gamma' X_{lt} + \widetilde{u}_{it}, \quad \mathrm{E}\left\{\widetilde{u}_{it}\middle|\,\theta_t, \Delta\widehat{r}_{slt}, X_{lt}\right\} = 0. \tag{15}$$

A difficulty is then to address the endogeneity of the market share regressors in that equation. Indeed, the market share and the price on a market are jointly determined so that $\mathrm{E}\left\{\widetilde{u}_{it}\middle|\,\Delta\log s_{it}\right\} \neq 0$: the parameter ϕ cannot be estimated by simply adding $\Delta\log s_{it}$ to the price-variation regression. To infer the contribution of market share to incomplete pass-through, and to disentangle this effect from a pure demand reaction, one needs identifying assumptions. We rely on the predetermination of the past market share s_{it-1}

$$\mathrm{E}\left\{\widetilde{u}_{it}\middle|\,\Delta\log s_{it-1}\right\} = 0.$$

This assumption implies that one can use variables that affect $\log s_{it-1}$ as instruments for $\Delta\log s_{it}$ in Equation (15).

3 Data

The dataset provided by the French customs administration contains annual exports by country of destination at the firm and product level for the period 1996-2005.[9] Contrasting with many other sources of firm-level information, the French customs data are (almost) exhaustive.[10] Each observation is identified by a firm identifier f, a product identifier at the 8-digit level of disaggregation k, an export destination l and a time period t. Unit values are computed as ratios of value over volume, the latter being expressed as the physical weight of the product in kilograms. These unit values are used as proxies for FOB export prices at the unit good i level: $P_{fklt} \equiv P_{it}$. Note that using weights instead of physical units to calculate unit values may result in a less precise proxy for prices. However, this measurement error will not lead to the classical attenuation bias in our empirical analysis since this measurement error affects the dependent variable and is not related to exogenous shifts in VAT rates, although it may reduce the precision of our estimates. Another critique that is commonly addressed to the use of unit values is that they hide quality differences across goods (see Kravis and Lipsey (1974)). However, our estimation procedure at least partly handles this issue by including fixed effects that are specific to each unit i, i.e. specific to a good k produced by a firm f and sold in a destination market l. This corrects for constant vertical differentiation across products, firms and countries.

Here, we restrict the database to exports that are shipped to the set of

[9] This database has been already used by Eaton and Kramarz (2004), Berthou and Fontagné (2008), Méjean and Schwellnus (2009), Berman et al. (2009). The sample covers 1995-2005, but due to a change in the nomenclature of products in 1996, year 1995 has been dropped here. To circumvent changes in declaration thresholds over time, we also dropped firms that declared *total* exports to the European Union of less than EUR 100,000.

[10] Below a threshold of 1,000 euro, firms do not have to declare their exports. Below a threshold of 150,000 euro, firms exporting only to the EU do not have to declare their export volumes. These two thresholds are very low, so in practice the dataset includes most French exporters.

11 countries (other than France) that were in the euro area in 2001.[11] In addition to the free movement of goods and services (no border tariffs, no export/import quotas), this subset of countries presents the advantage to have been almost preserved from intra-area exchange-rate fluctuations between 1995 and 1999, and totally preserved from 1999 on. Selecting this sample allows us to get rid to this major source of international price variations. However, as argued above, export prices may react not only to local VAT-rate changes, but more generally to any macroeconomic shock. We control for these variations by introducing time dummies, which capture for the shocks that are common to all euro area Member states, and country-specific macroeconomic factors namely real GDP growth and inflation rates (from Eurostat), plus real GDP per capita (from Penn World tables).

Sectoral price-elasticities of demand are recovered from Broda and Weinstein (2006). We obtain 1523 observations for 9 countries. On average we have roughly 170 sectors per country classified at the 3-digit level. As shown in Figure 1, the distribution of these elasticities over our sample is quite concentrated around 3-4. Table 1 further shows that countries have comparable average, median, min and max sectoral price elasticities of demand.[12]

Table 2 provides some descriptive statistics for our sample of French exporters, together with price elasticities of demand corresponding to firm sectors, taken from Broda and Weinstein (2006).[13] The table shows that the median French exporter sells a specific good to three different euro-area destinations (excluding Belgium) where it competes with 28 other French exporters and faces a price elasticity of demand of 3.33. Considering a specific

[11] The euro area was launched in 1999 with 10 countries plus France. Greece joined in 2001.

[12] The highest elasticity of the sample is 1560 but only 26 observations are greater than 30. Dropping them, as is done in Figure 1, modifies significantly average and median elasticities. For instance, the average falls from 7.02 to 4.44.

[13] Here, again, the 26 elasticities greater than 30 have been dropped. We also excluded Belgium as a destination because of the unavailability of demand elasticities for this country.

destination country, the medium French exporter sells 12 different goods to this country. The minimum number of goods sold to each market is one. This confirms the quasi-exhaustiveness of our dataset which includes small firms exporting a single good. The maximum number of goods sold is 1212, confirming this time the importance of "champions" in the structure of French exports. The median elasticity of demand is 3.3, implying a median markup of 1.4 - a relatively large figure compared to usual macroeconomic references (see, i.e., Rotemberg and Woodford (1992)). Note however that the distribution is skewed to the right: the average elasticity is 4.2, implying a markup of 1.3.

It can be argued that exporters of intermediate goods should be unaffected by VAT changes in target countries since VAT is generally recovered by the importing firm. In fact, to the extent that intermediate inputs and final goods produced by the importer are being applied the same VAT rate (generally the standard rate), changes in VAT can have the same impact on price strategies of firms selling either intermediate or final goods: both types will have to face the same percentage change in final demand. However some intermediate inputs may be applied different VAT rates compared to final goods they allow the importer to produce. This could blur the price reaction of exporters of intermediate goods. More importantly, as evidenced in the bottom part of Table 2, demand elasticities are somewhat lower for final consumption goods, with a median of 2.9, corresponding to a 1.5 markup. The number of destinations and of competitors in each market are also higher (approximately twice as high as for the whole sample). The lower price-elasticity points to lower pass-through for these goods, which is consistent with each exporter having to compete with more firms on the same markets. To account for this possibility, we successively estimate VAT pass-through on the whole sample and on the sample reduced to final consumption goods.

Finally, VAT rates are taken from European-Commission (2009). As

shown in Table 3, standard VAT rates were changed eight times over the 1996-2005 period. Only one change was a cut (Ireland in 2001, a measure that was reversed the following year). In all other cases, the standard rate was raised, most of the time by one percentage point. As for reduced rates, our sample covers three changes, all being upward.[14] These various changes in VAT rates were matched with our firm-level export data by identifying the product categories concerned by the changes.[15] As apparent in Table 3, most VAT changes happened at the beginning of the year. However, in some cases, VAT rates changed at mid-year or even in the fall. Since our export data is yearly, we could not exploit the monthly information on VAT rates. In order not to multiply VAT-rate events, we chose not to interpolate the rates. Hence, any change in VAT occurring during year T was assumed to apply during the whole year.

4 Results

4.1 Incomplete pass-through to international prices

Equation (12) is estimated using a within estimator and robust standard errors in order to account for potential heteroscedasticity and auto-correlation. Those robust estimators are clustered at the level of a specific industry in a specific destination country in order to account for potential common shocks to unit markets i that share the same product-destination couple (k, l). The results are displayed in Table 4, where Columns (1) to (3) refer to the whole sample while Columns (4) to (6) are related to the restricted sample (final consumption goods). Columns (1) and (4) provide the benchmark results. In Columns (2) and (5), we remove from the estimation the product items i that do not survive VAT shocks and finally, Columns (3) and (6) control for

[14] We did not account for eight very small, successive changes in the Irish super-reduced rate for we could not match these super-reduced rates with the exact NC8 products.

[15] The car industry was handled the same way as the other sectors since the origin-principle only applies to imports carried out by individuals whereas most imports are made by intermediaries and are applied a destination principle.

changes in market structure (see the Section 4.3).

The coefficients on our control variables are not surprising: French exporters react to higher growth in the destination country by raising their prices, and they set lower prices in less-wealthy countries. Inflation in the destination country also has a positive, although less significant impact. Additionally, firms that sell more goods to a larger number countries tend to set higher prices, which is consistent with them being able to reap more market power.

The first line of Table 4 shows that a rise in the VAT rate of a destination country induces a fall in the prices of exports to that country. The impact is weakly significant for the whole sample (10%), but more significant for final consumption goods (1 or 5%): in the wake of a VAT hike in a destination country, French exporters face a rise in the elasticity of demand in this market and therefore react by reducing their markup.

To recover the pass-through of a 1% increase in VAT rate to the price charged to the final buyer, the estimated coefficient ($\hat{\sigma}$) needs to be interacted with sectoral price elasticities of demand as in Equation (13). Knowing from Tables 2 that the median elasticity is equal to 3.3 for the whole sample and 2.9 for final consumption goods, and based on Columns (1) and (4) estimates, we obtain a median pass-through equal to $1-(0.4/2.3) \simeq 83\%$ for the whole sample and $1-(0.6/1.9) \simeq 70\%$ for final consumption goods.[16] As expected, the degree of pass-through is smaller for final consumption goods that directly bear the burden of taxation and face more competitors on each unit market. These estimates are greater than the results usually reported in the pass-through literature, which are close to 50%, perhaps due to our focus on exogenous, permanent shocks that do not impact marginal costs.

As we underline in the next subsections, the exporters' population reacts to the VAT shock. This reaction of competition affects the optimal pass-

[16]In both cases, the average pass-through coefficient is higher due to higher average elasticity.

through of each remaining exporter.

4.2 Entry, exit & competition

Our database tracks the same firms over the whole 1996-2005 period. We can therefore observe whether a firm f enters or exits a market k, l at a specific date t and calculate entry and exit rates that will shed line on the evolution of of the number of competitors following a VAT shock.[17] We define the entry rate $entry_{klt}$ as the percentage of firms that were not present on market (k, l) in $t-1$ but entered in t, the year during which the shock occurs. In turn, the exit rate $exit_{klt+1}$ is defined as the percentage of firms that were present in market (k, l) in t but absent in $t+1$, so that they exit the market after the shock.[18] Table 5 reports estimation results where entry and exit rates of (k, l) markets are regressed on the same variables as in Section 4.1, for the whole sample (columns (1) and (2)) and for final consumption goods (columns (4) and (5)).[19]

As expected, GDP growth in the target country has a significant and positive impact on the entry rate of French exporters and a negative (again, significant) impact on their exit rate. Additionally, markets served by firms that export a wide range of goods to a large number of countries tend to have lower entry and exit rates, i.e. more stable market structure. As for the impact of VAT shocks, it is significant and negative for the entry rate and positive, although non-significant for final consumption goods, for the exit rate. As a consequence, a rise in VAT in the target country reduces competition among French exporters. These results are consistent with Berman

[17] Although French exporters also face competitors from other countries as well as local competitors, competition among French exporters selling the same good k may be the harshest since their products are more likely to be close substitutes. As a matter of fact, our database does not include any information on local and foreign, non-French competition. See Auer & Chaney (2009) for related arguments.

[18] Note that we consider delayed exits following a shock at time t. We also tested for simultaneous exists, but the results were insignificant.

[19] This regression does not bear a firm dimension. Accordingly, we aggregate the firms that export on the same (k, l) market.

et al. (2009) who find a significant impact of an exchange-rate depreciation on the entry probability, based on the same data. They imply that the elasticity of the number of competitors, n, on a market is negative in the wake of the VAT shock. Indeed, using the identity $\Delta n/n = entry - exit$, a 1% increase in VAT decreases the number of competitors by 1.1% over the whole sample. It increases it by almost two time less, namely .6%, for final consumption goods, where entries are reduced but firms' exits are not significantly different from zero.

In a world with symmetric firms, the reduction in the number of competitors increases the market share of the remaining firms and therefore decreases their perceived elasticity of demand (i.e. increases their market power). This is not systematically the case when firms are heterogenous. The change in competition faced by an exporter f on a given market (k,l) is measured as the change in her (log) market share for good k in country l. Table 5 shows that the variation in competition takes place over the periods of and after the shock (firms significantly exit in $t+1$). Therefore, we study the reaction of changes in market shares over these two years. Table 5 also provide estimation results of a market share dynamic equation using the Arellano & Bond estimation procedure respectively for the whole sample and final consumption goods. On average, and on a given market, the market share of exporters that survive the shock increases. That effect is greater for final consumption goods than for the whole sample: a 1% increase in VAT rate raise the market share of exporters respectively by 5% an 1.5%. Note also that the price increase that comes from a pass-through will lower the market share. Price and market share reactions interact.

In the following, we explore how the competition channel, i.e. the fact that a VAT-rate increase may reduce competition among surviving firms, can affect the degree of pass-through.

4.3 Change in competition & incomplete pass-through

As shown in Equation (5), a change in market share affects the optimal reaction of export prices to a VAT-rate shock in a destination country by modifying the demand-elasticity faced by exporters. Here, we decompose the net-price reaction to a VAT shock in (i) a pure demand-elasticity channel (for a given number of competitors) and (ii) a competition channel (for a given product-specific elasticity of demand).

Columns (2) and (5) in Table 4 show that the incomplete pass-through results are robust to removing those firm-product-country items i that do not survive the VAT shocks, i.e exporters that exit the markets. The effect of a VAT hike on exporters' optimal price is significantly negative, with implied median pass-through of 73% for the whole sample. Consistent with related previous works, the extent of optimal price adjustment is stronger in that sample when one limits oneself to firms that stay in the market after the shock. An explanation of the low pass-through degree at the level of a market is to be found into the composition effect: firms that do not exit the market are the ones that have the ability to adjust their markup the most and thus to pass-through the shock to their price the less. Berman et al. (2009) relate that result to differences in firms' productivity. The results of the previous subsection also link this reaction to an increase in the market power of the exporters that remains. For final consumption goods, the pass-through estimate is still significant but stays at 70%. For these goods markets, the extent of symmetry in price decisions between producers appears to be more important than on average.

Columns (3) and (6) in Table 4 report the estimation results for Equation (15) obtained using the IV estimation procedure described in Section 2.3.2. More precisely, the market-share variation $\Delta \log s_{it}$ is instrumented by the predetermined variable $\log s_{it-1}$. This instrumented variation in market shares has an impact on export prices for the whole sample as for final con-

sumption goods. For final consumption goods sectors, controlling for this variation in competition raises the impact of VAT shocks on net prices, in absolute value (first line of the table): for a given market share, exporters' markups fall by a larger extent following a VAT hike then when market share is not controlled for. Hence the competition channel leads to a reduction in pricing-to-market, or equivalently to higher pass-through. For these goods, the implied pass-through coefficient is close to 65% when the competition channel is controlled for, instead of the 70% in the baseline estimation where it is not. For the whole sample goods, controlling for the market share has no truly noticeable impact on the pass-through coefficient on top of the adjustment that comes from the change into the composition of the population of exporters (Column (2)).

Following a VAT hike in a destination country, French exporters that survive the compression of their margins are able to reap more market power, hence to pass a higher share of the shock on to the consumer. This effect is especially at stake when exporters are more numerous and symmetric on each market and where market shares are more sensitive to VAT shocks, as it is the case for final consumption goods.

5 Conclusion

In this paper, we confront firm-level data on French exports to VAT-rate shocks in EMU countries to identify the extent of pass-through that is directly due to a demand effect, i.e. to changes in the price-elasticity of demand in the destination country. To do so, we use unit prices based on French customs data for the 1996-2005 period as well as Broda and Weinstein (2006) estimations of price-elasticities of demand by sector and country. Thanks to the individual dimension of the customs database, we are able to disentangle the pure demand effect from the marginal cost and competition effects.

Our baseline result is that, for the whole sample, VAT-rate changes are

largely passed on export prices: the pass-through coefficient is found to be 82%. This figure is higher than those generally found for exchange-rate pass-through. Higher figures are not surprising since we concentrate on VAT shocks, which are deemed to be permanent and unable to affect marginal costs (except through an increasing-return effect). By isolating demand and competition channels, we believe our results to shed new light on the pass-through literature. In particular, we find the competition effect to be important: when controlling for it, the pass-through coefficient reduces to 73%. The reduction in competition that follows a VAT hike in one destination country helps exporters to pass more of the shock to their customers.

From a policy point of view, our results suggest that consumer prices will not react one-for-one following a VAT-rate hike, because the price of imported final consumption goods will not increase by the same amount as VAT. Hence, part of the VAT burden will be shifted to foreign suppliers. However, the loosening of competition among foreign suppliers may bear negative effects on local competition and on the availability of a wide range of varieties. On the whole, VAT-rate changes cannot be considered as a purely-domestic policy issue, although it is raised on a destination principle.

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Table 1: Sectoral elasticities by country

	Aust.	Finl.	Ge	Gr	Ie	It	Nl	Po	Sp
Mean	5.265	3.563	5.029	3.568	5.217	4.695	4.471	4.413	3.751
Median	4.073	3.062	3.902	2.626	3.795	3.720	3.229	3.390	2.785
Max	28.798	25.032	25.032	25.03	29.806	25.032	25.032	25.032	25.032
Min	1.359	1.275	1.278	1.129	1.058	1.34	1.077	1.283	1.210
Std Dev	4.293	2.444	4.301	3.578	4.573	3.677	4.623	3.583	3.483

Source: Broda & Weinstein (2006) and authors' calculations.

Figure 1: Distribution of sectoral elasticities

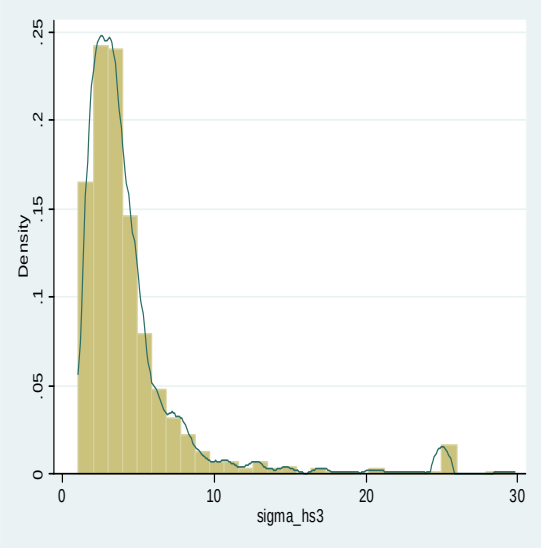

Table 2: Descriptive statistics on the firm-level sample

	ELAS	**GOOD**	**DEST**	**COMP**	**MASHA**
Whole sample					
Mean	4.18	45.76	3.64	63	.1989
Median	3.33	12	3	28	.0121
Max	29.806	1212	9	1287	1
Min	1.05	1	1	1	
Std Dev	3.56	99	2.42	111.32	
Final consumption goods					
Mean	3.63	36.54	8.56	96.6	0.113
Median	2.91	13	7	61	0.00591
Max	185.51	423	143	679	1
Min	1.21	1	1	1	$3.32e^{-09}$
Std Dev	4.16	58.09	9.28	100.55	0.2555

Notes: Sample: 1995-2005 period, excluding Belgium; ELAS = price-elasticity of demand (from Broda & Weinstein, 2006, dropping the 26 elasticities exceeding 30) for sector s in which good k is classified; GOOD = number of goods shipped by a firm to a given country l; DEST = number of destinations served by a firm for a good k; COMP = number of French competitors on a specific market (good k & country l); MASHA = market share of a firm f on a specific market (good k & country l).

Table 3: VAT rate changes between 1996 and 2005 – Euro-area

Countries	Standard rates		Reduced rates	
	Nb. of changes	Dates of changes	Nb. of changes	Dates of changes
Austria	0		0	
Finland	0		1	1 Jul 1998
Germany	1	1 Apr 1998	0	
Greece	1	1 Apr 2005	1	1 Apr 2005
Ireland	2	1 Jan 2001 and 1 Mar 2002	1	1 Jan 2003
Italy	1	1 Oct 1997	0	
Luxembourg	0		0	
Netherlands	1	1 Jan 2001	0	
Portugal	4	5 Jun 2002 and 1 Jul 2005	1	
Spain	0		0	

Source: European Commission (2008).

Table 4: Pass-through estimation results

Dependent variable:	Whole sample			Final consumption goods		
price log-variation	(1)	(2)	(3)	(4)	(5)	(6)
$dVATs$	-0.405*	-0.573*	-0.618*	-0.600***	-0.596*	-0.687**
	(0.226)	(0.300)	(0.369)	(0.352)	(0.505)	(0.818)
growth	0.585***	0.630***	0.532***	0.644***	0.723***	0.688**
	(0.078)	(0.092)	(0.129)	(0.124)	(0.151)	(0.295)
Lgrowth	-0.072	-0.133	0.019	-0.494***	-0.491***	-0.255
	(0.074)	(0.088)	(0.123)	(0.125)	(0.146)	(0.282)
infl	0.273**	0.197	-0.050	0.298*	0.177	0.942**
	(0.109)	(0.123)	(0.166)	(0.172)	(0.196)	(0.388)
Linfl	-0.046	-0.158	-0.033	-0.232	-0.291	-0.214
	(0.102)	(0.121)	(0.159)	(0.154)	(0.186)	(0.372)
nb_count	0.003***	0.003***	0.021***	0.006***	0.004***	0.056***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)
nb_count_sq	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
nb_nc8	0.000***	0.000***	0.002***	0.000	0.000***	0.004***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
n_nc8_sq	-0.000**	-0.000***	-0.000***	0.000***	0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lgdpc	-0.082***	-0.055**	-0.154***	-0.157***	-0.169***	-0.373***
	(0.018)	(0.025)	(0.041)	(0.027)	(0.035)	(0.090)
dshare			0.377***			0.595***
			(0.005)			(0.014)
Observations	3182233	2087512	2087512	832998	542319	542319
Number of id	1019488	633745	633745	267728	166907	166907

Notes: $dVATs$: VAT-rate variation in the destination country, normalized by sector-demand elasticity (see Equation (11)); growth: real GDP growth rate in the destination country (Lgrowth: lagged GDP growth rate); infl: consumer price inflation in the destination country (Linfl: lagged inflation rate); nb_count: number of destination countries for the exporting firm (nb_count_sq: squared destination number); nb_nc8: number of products exported by the firm (nb_nc8_sq: squared product number); lgdpc: log of real GDP per capita; dshare: forward variation in firm's market share among French exporters in the specific country for the specific product, normalized by sector-specific demand elasticity (see Equation (11)); all regressions include individual fixed effects (within estimation) and time dummies; numbers in brackets are robust std errors of estimates; ***, **, * indicates significance at the 1, 5 and 10% levels respectively.

Table 5: Impact of VAT-rate shocks on entry and exit rates

Dependent	Whole sample		Final consumption goods	
variable:	entry	exit	entry	exit
	(1)	(2)	(3)	(4)
$dVATs$	-0.677***	0.385***	-0.599***	-0.311
	(0.103)	(0.128)	(0.181)	(0.254)
growth	0.095**	-0.123***	-0.156	0.063
	(0.045)	(0.047)	(0.109)	(0.097)
Lgrowth	0.147***	-0.276***	0.282***	-0.084
	(0.041)	(0.042)	(0.098)	(0.093)
infl	0.068	-0.029	-0.202	-0.146
	(0.061)	(0.064)	(0.152)	(0.141)
Linfl	0.011	-0.406***	-0.126	-0.055
	(0.054)	(0.056)	(0.130)	(0.122)
nb_coun	-0.020***	-0.016***	-0.020***	-0.017***
	(0.001)	(0.001)	(0.001)	(0.001)
nb_coun_sq	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
nb_nc8	-0.000***	-0.000***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
nb_nc8_sq	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
lgdpc	-0.006	0.154***	-0.053**	-0.000
	(0.011)	(0.012)	(0.025)	(0.024)
Observations	488196	488196	58892	58892
Number of id	78274	78274	7692	7692

Notes: entry: contemporaneous entry rate on target market; exit: forward exit rate on target market; $dVATs$: VAT-rate variation in the destination country, normalized by sector-demand elasticity (see Equation (11)); growth: real GDP growth rate in the destination country (Lgrowth: lagged GDP growth rate); infl: consumer price inflation in the destination country (Linfl: lagged inflation rate); nb_count: number of destination countries for the exporting firm (nb_count_sq: squared destination number); nb_nc8: number of products exported by the firm (nb_nc8_sq: squared product number); lgdpc: log of real GDP per capita; all regressions include individual fixed effects (within estimation) and time dummies; numbers in brackets are robust std errors of estimates; ***, **, * indicates significance at the 1, 5 and 10% levels respectively.

Table 6: Market share dynamics and VAT-rate shocks

dep variable	Whole sample		Final consumption	
dmarsha	(1)	(2)	(3)	(4)
dVATs		1.449**		4.745***
		(0.703)		(1.282)
dlprices	-0.050***	-0.050***	-0.065***	-0.065***
	(0.002)	(0.002)	(0.003)	(0.003)
Ldmarsha	0.044***	0.044***	0.042***	0.042***
	(0.001)	(0.001)	(0.002)	(0.002)
Lmarsha	-1.047***	-1.047***	-1.048***	-1.049***
	(0.002)	(0.002)	(0.002)	(0.002)
Lmarsha*dVATs	0.253**	0.491***	0.016	0.770***
	(0.115)	(0.174)	(0.150)	(0.271)
growth	-0.210	-0.239	-0.153	-0.227
	(0.203)	(0.203)	(0.291)	(0.292)
Lgrowth	-0.240	-0.218	-0.132	-0.057
	(0.195)	(0.195)	(0.276)	(0.277)
inf	0.627**	0.588**	0.486	0.360
	(0.248)	(0.249)	(0.356)	(0.358)
Linf	-0.025	-0.012	-0.216	-0.141
	(0.272)	(0.272)	(0.388)	(0.389)
nb_coun	-0.003***	-0.003***	-0.015***	-0.015***
	(0.001)	(0.001)	(0.001)	(0.001)
n_coun_sq	0.000***	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
nb_nc8	-0.000***	-0.000***	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
n_nc8_sq	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
lgdpc	0.316***	0.302***	0.278**	0.236*
	(0.100)	(0.100)	(0.139)	(0.140)
Observations	991054	991054	455832	455832
Number of id	311762	311762	145952	145952

Notes: dmarsha: contemporaneous log market share variation; dlprices: contemporaneous log price variation; $dVATs$: VAT-rate variation in the destination country, normalized by sector-demand elasticity (see Equation (11)); growth: real GDP growth rate in the destination country (Lgrowth: lagged GDP growth rate); infl: consumer price inflation in the destination country (Linfl: lagged inflation rate); nb_count: number of destination countries for the exporting firm (nb_count_sq: squared destination number); nb_nc8: number of products exported by the firm (nb_nc8_sq: squared product number); lgdpc: log of real GDP per capita; all regressions include individual fixed effects and time dummies; estimation is obtained implementing Arellano & Bond method; numbers in brackets are robust std errors of estimates; ***, **, * indicates significance at the 1, 5 and 10% levels respectively.