# Low-cost Import Competition and Firm Exit: Evidence from the EU*

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**Abstract**

This paper investigates the impact of import competition on firm exit from the manufacturing industries of eight EU countries. A distinction is made between imports originating from low-cost countries and other imports. While the exit of small firms is high and small firms react strongly to import competition originating from other advanced countries, their exit is not found to be directly affected by imports from low-cost countries. Conversely, the exit rate of larger firms is much smaller in magnitude, but their exit is systematically and positively related to growing imports from low-cost countries. Such empirical evidence is consistent with small and larger firms making up different strategic groups within the same industries, where they face foreign competition of a different nature.

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# 1 Introduction

During the last two decades the world economy has been undergoing a pervasive globalization process. Within this general change, the observed dramatic boost in international trade between rich Western countries and low-cost economies is one of the most controversial and debated phenomena. At this purpose, the figures are stark. Between 1990 and 2006, as the volume of global exports was almost tripling, the share accounted for by non-OECD countries has been growing from 25% to 33%. In particular, imports from low-cost economies have been the fastest growing component of total manufacturing imports for both the EU and the US. This pattern configures itself as a deep structural change, which implies an increase in the competitive pressure on domestic firms in Western countries (Altomonte and Barattieri, 2007; Abraham et al., 2009; Auer and Fischer, 2010; Bugamelli et al., 2010).

In a globalizing environment, firms need to adapt their strategies to the new competitive scenario in order to survive and benefit from the opportunities offered by international trade (Coucke et al. 2007). Failure in doing so implies higher probabilities of exit. Indeed, consistent with policy concerns, several studies have found that increasing import competition from low-cost economies is associated to higher firm exit in industrialized countries, with less productive, low-tech and more labor intensive firms being relatively more affected (Bernard et al., 2006; Coucke and Sleuwaegen, 2008; Bloom et al., 2011; Utar and Torres Ruiz, 2012).[1] International trade liberalization thus appears as an important driver of Schumpeterian industrial change. As trade integration deepens, the market selects those firms that are more fit to international competition, while their "unfit" counterparts are forced to exit.

The literature has identified different strategic channels of firm-level reaction to globalization threats. First of all, cost reductions and efficiency gains are of crucial importance when competing with foreign firms based in low-cost countries (Coucke et al., 2007; Utar and Torres Ruiz, 2012). In addition to this, firms in industrialized countries have been shown to respond by changing their product-mix towards more capital and skill intensive products, thus specializing in activities which are more consistent with their comparative advantage (Bernard et al., 2006; Altomonte and Barattieri, 2007; Bloom et al., 2011). A recent article by Khandelwal (2010) has found that US firms operating in industries with a larger scope for quality differentiation are relatively sheltered from import pressure. More in general, several papers have shown that low-cost import competition triggers an upgrading of manufacturing activities in industrialized countries, through a positive effect on firms' investments in R&D and IT equipment, patenting and skill upgrading of the workforce (Bloom et al., 2011; Utar and Torres Ruiz, 2012; Mion and Zhu, 2012). Finally, international sourcing of intermediate goods and services, through de-localization of production or arms-length trade, has been found to increase the likelihood of firm survival (Coucke and Sleuwaegen, 2008; Mion and Zhu, 2012). Overall, firm heterogeneity seems to matter decisively in determining the way in which companies are affected by deepening trade integration (Bernard et al., 2007; Tybout 2003), consistent with the recent developments of international trade theory (Melitz (2003) and Bernard et al. (2003) to quote the early contri-

butions). And yet, there is one important dimension of heterogeneity whose implications in this context have not been explored so far: firm size. To the best of our knowledge, in fact, none of the available studies has investigated whether trade integration has a different impact on small firms versus their larger competitors. This paper aims at filling this gap by analyzing the exit dynamics of small and larger European firms in response to increasing import penetration from low-cost countries.

In principle, there are various reasons for expecting a differentiated impact of foreign competition on firms of heterogeneous size. These reasons are related to the two main factors which the literature has traditionally identified as sources of comparative advantage for small firms with respect to their larger competitors. First, small firms are normally characterized by higher output flexibility (Mills, 1984; Dean et al., 1998). Indeed, their cost structure typically involves low fixed costs and high reliance on variable factors of production. Therefore, while small firms tend to produce at higher marginal costs at a given point in time, they are also likely to incur lower adjustment costs as demand fluctuates (Brock and Evans, 1989; Acs and Audretsch, 1990). Second, small firms usually display a strong "niche-filling" attitude. In particular, they tend to specialize their products in specific market-niches, as a strategy to make up for their lack of economies of scale and remain viable (Porter, 1980; Dean et al., 1998). The implications of these differences in a globalizing context are discussed in the first part of the paper, leading to the development of three research hypotheses.

In the second part of the paper an empirical analysis is carried out, focusing on the exit dynamics of small and larger firms in eight European countries and twelve manufacturing industries, over the time-span 1997-2003. In line with the expectations, large firms' exit is found to be positively affected by the shock of soaring import penetration from low-cost countries. The exit of small firms within the same industries is instead only affected, to a lower extent, by marginal increases in trade integration with respect to neighboring European countries or other relatively wealthy trading partners. Finally, increasing levels of intra-industry trade, reflecting higher product differentiation with respect to foreign competitors, are associated to lower exit, but only for small producers. These results are robust to several specification checks, and hold unaffected when accounting for the potential endogeneity of import competition.

This paper adds to the existing literature on trade and industry dynamics in two main ways. First of all our results strengthen, based on cross-country evidence, the view that domestic firms display higher exit rates as industries adjust to increasing import penetration, in particular when the latter is driven by low-cost countries. Second, and most importantly, this paper shows that firms of heterogeneous size may be affected differently by diverse sources of import competition. In particular, small firms seem to be relatively sheltered in a context of boosting import penetration from low-cost countries. These results are in line with recent evidence by Bellone et al. (2008), who have also found, focusing on firm age, that some determinants of firm survival might have different effects on heterogeneous firms within the same industry. The whole body of our findings conveys important managerial and policy implications, which are extensively discussed in the final section of the paper. Putting things in perspective, our results

reinforce the line of thinking put forward by Ghemawat and Ghadar (2006), when they argue that globalization does not necessarily imply, as some predicted, that only a few large firms and product varieties will survive and win the international competition. Rather, it appears that there are multiple ways of competing successfully within the same industry, and a large number of heterogeneous firms can co-exist and remain viable in a global environment. In particular, while large firms compete intensively on wider relevant markets, small firms can still play a crucial role on narrower markets, by leveraging on their comparative advantage in terms of flexibility and niche-filling capabilities.

The remaining of the paper is structured as follows: in Section 2 we develop the research hypotheses. In Sections 3 we describe the data and the empirical model. Results are presented in Section 4, while Section 5 concludes.

## 2 Theoretical framework and hypotheses

Consistent with the literature on the natural evolution of industries (e.g. Jovanovic, 1982; Hopenhayn,1992; Ericson and Pakes, 1995), recent models of international trade with heterogeneous firms have analyzed firms' import and export behavior in terms of selection (Melitz, 2003; Bernard et al., 2003; Melitz and Ottaviano, 2008; Altomonte and Békés, 2010). Such models predict that following trade liberalization, being faced with increased competition, the least productive (and thus small) firms within each industry will be forced to exit. Moreover, these models also predict a shift in production from small non-exporting firms towards large exporting firms. The basic reason for this reallocation of production shares is the reduced size of the local market, which makes non-exporting firms shrink in size, in favor of the more efficient and large exporting firms, which are able to exploit scale economies within an enlarged market. While these models predict a drastic shake-out of marginal small firms as a result of trade liberalization, there remain some technological and strategic differences between small and large firms, which may actually lead to a different outcome in industries exposed to increasing import competition from low-cost countries. Indeed, the literature has shown that small and large firms face different competitive conditions, by operating on markets of a different scope and employing different technologies (e.g. Audretsch et al., 1999). Such factors make them behave as very differentiated competitors.

First, the technological differences deal with firm flexibility. Indeed, previous studies have shown that small firms are characterized by higher output flexibility than larger firms (e.g. Stigler, 1939; Mills, 1984; Fiegenbaum and Karnani, 1991; Dean et al., 1998). This means that they can reduce their output without incurring a significant increase in average costs, a feature that allows them to adapt relatively easily to shrinking demand. Conversely, for larger firms employing a scale intensive technology, a loss of output often implies a significant increase in average costs. In the context of declining industries this technological difference may force large firms to exit before small firms, which can survive at a lower scale in the long-run. Such an

outcome has been originally proposed in a seminal paper on exit by Ghemawat and Nalebuff (1985), and has found empirical support in several studies focusing on exit in declining industries (see Lieberman, 1990). A relatively high growth in import competition from low-cost countries can be taken as an indication that a certain manufacturing industry is declining in the EU. Indeed, following a basic implication of the Heckscher-Ohlin trade model, since EU countries are relatively capital- and skill-abundant when compared to China and the other low-cost countries, they are expected to move out from less capital- and skill-intensive industries, which decline as globalization deepens (Bernard et al., 2006). Therefore, one might expect small firms to be hurt less than larger ones in the short-run, in response to increasing import penetration from low-cost countries.

Second, in terms of strategic focus, small firms tend to specialize their products in specific market-niches, as a strategy to avoid direct competition with larger companies. The literature has long highlighted the comparative advantage of small firms in serving narrowly defined customer groups, by operating with a strong customer orientation and close customer relationships (Penrose, 1959; Caves and Porter, 1977; Porter, 1980). Larger firms are instead more visible on wider scope markets, and their behavior has a more direct impact on the competitive landscape. Recently, Shimomura and Thisse (2012) have formally derived the implications of such a differential behavior, finding large firms to be strongly affected by external shocks in the wider competitive environment. Empirical evidence by Boone et al. (2007) and Coad and Teruel (2012) points to the same direction and suggests that drastic changes in competition forces are more relevant for large firms than for small ones. Extending this logic, a niche-focus is also expected to shelter small firms from import competition originating from low-cost countries. In fact, this competition has been particularly focused on standardized labor-intensive products, which are produced on a large scale for mass markets (Amiti and Freund, 2010). Considering the above arguments, we posit:

Hypothesis 1: *Large firms show a stronger exit response to changes in import competition from low-cost countries than small firms.*

It is important to stress that the arguments just presented do not imply that inefficient small firms would not be sanctioned by trade liberalization. Rather, we expect this sanctioning to be more related to a different type of import competition, mostly originating from trade with more similar and closer countries of the EU. Moreover, there may be important indirect effects from low-cost import competition making large firms more efficient and as a result more competitive on the EU domestic markets, thus increasing the pressure on small firms. As discussed later in the paper, our data indeed show that the exit rate of small firms is very high, about seven times bigger than for large firms.

Different studies have shown that firms re-optimize their product mix as a consequence of falling trade costs and rising imports from low-cost countries (Bernard et al., 2006; Altomonte and Barattieri, 2007; Bloom et al., 2011). The most recent theoretical models couple the product mix adjustment with a better exploitation of the core competences of firms (Eckel and Neary,

2010; Mayer et al., 2011). If domestic firms are able to substantially differentiate their products with respect to foreign competitors, a lower import-driven displacement can be expected (Greenaway et. al, 2008; Colantone and Sleuwaegen, 2010; Khandelwal, 2010). As shown already by Caves (1981), the differentiation of products leads to increasing levels of intra-industry trade (IIT) among countries, providing opportunities to develop new market-niches. In line with our previous arguments, we expect the role of product differentiation and associated IIT to be relatively more important for small firms than for larger ones. Hence:

Hypothesis 2 : *Ceteris paribus, firms exit relatively less from industries characterized by growing intra-industry trade. The negative impact on exit is more important for small firms than for larger ones.*

Another firm-strategy for coping with low-cost import pressure is that of moving to a more capital intensive production technology (Bernard et al., 2006). Such a shift typically entails high sunk costs, and thus scale enlargements and a consolidation of capacity within industries (Kessides, 1990). This is consistently predicted by all the previously quoted models of trade with heterogeneous firms (e.g. Melitz, 2003; Melitz and Ottaviano, 2008). As trade gets liberalized, the most productive and large firms grow by exporting and exploiting economies of scale, which typically involve a more capital intensive production technique. Moreover, as firm restructuring takes place, off-shoring of labor intensive activities to low-cost economies is often observed, along with a downsizing of the domestic supply network (OECD, 2007). These dynamics are expected to worsen the competitive position of small firms. In fact, small producers are less likely to implement a similar unbundling of activities at the global level, and they are more likely to be directly damaged by shrinking domestic supply chains. Consequently, in those industries where a stronger consolidation takes place, and where a switch to capital-intensive techniques provides an effective response to growing competition from low-cost countries, we can expect capital-intensive large firms to crowd out smaller players from the industry. Therefore we posit:

Hypothesis 3: *Ceteris paribus, the exit rate of small firms is higher in industries characterized by growing capital intensity.*

# 3 Data and empirical model

## 3.1 Data description and definitions

The empirical analysis is based on firm exit data from the Eurostat "Business Demography Statistics" database. In particular, we employ industry-level exit rates for eight European countries: Belgium, Denmark, Finland, Italy, Netherlands, Spain, Sweden and the United Kingdom.[2] We focus on the manufacturing sector, for the time-span: 1997-2003. Data are provided at the Eurostat NACE (Rev. 1.1) "sub-section" level of industry aggregation.[3] Sub-sections are identified

by two-character alphabetical codes (from DA to DN) and correspond to two-digit industries or aggregations of them (see Table 1).[4]

[Table 1 about here]

Exit rates in a given industry, country and year are defined as the ratio of exiting firms over the number of active ones. For each industry-country pair (and year) we could retrieve two separate figures, referring to the population of small and larger firms. At this purpose, the binding cut-off is set by Eurostat at the level of 20 employees. Data are comparable across countries and are constructed in order to identify "true" exits of firms. Indeed, as reported by Eurostat, firm exit figures reflect only real dissolution of enterprises. In practice, this is obtained by processing the full national business registers' data in order to identify and exclude those exits which are just due to mergers and take-overs. Changes of activities at the firm level are also not registered as exits from a given industry. Moreover, a company is excluded from the count of exits if it gets reactivated within two years.[5]

[Table 2 about here]

Table 2 provides some descriptive statistics referring to country-specific exit rates, on average over the time span, for the whole manufacturing sector. The cross-country average exit rate is 6.3%, with figures ranging from 4.8% in Sweden up to 9.8% in the UK. As one would expect, exit rates are much higher for small than for larger firms: 7.1% vs. 1% on average. This is consistent with previous empirical evidence (Geroski, 1995), and is in line with the theoretical idea of a passive learning process of firms within industries (Jovanovic, 1982). Ideally, given our research question and the theoretical motivation, it would have been interesting to work with more disaggregated data for large firms, i.e. separate exit rates for firms between 20 and 49 employees, 50 and 249, and larger. Unfortunately such exit data are not available. Nevertheless, Eurostat provides information on the distribution of firms across the latter size-categories, as well as the "1-9" and "10-19" classes. Tables 3 and 4 report the breakdown by country and by industry, respectively. As can be seen, small firms (below 20 employees) account for 85% of the total, on average. UK, Denmark, Belgium and the Netherlands display the largest shares of firms above 50 employees. The same can be said for the chemical (dg) and rubber and plastic (dh) industries. Table 5 reports descriptive statistics at the industry-country level, on average over time. This information will be used in the econometric analysis for some robustness checks.

[Tables 3, 4 and 5 about here]

In Table 6 the evolution of exit rates over time is displayed, on average across countries. The figures depict a pattern of increasing exit rates for both categories of firms. In particular, large firms' exit rates witness a three-fold increase between 1997 and 2003, moving from 0.4% to 1.3%. Such a pattern is difficult to explain by simply relying on the selection mechanisms

depicted by Melitz (2003) and the other theoretical models of trade with heterogeneous firms. In fact, large firms would be expected to perform relatively better in a context of deepening globalization, but this does not seem to be the case.

[Table 6 about here]

In the next sections, the relationship between exit dynamics and the evolution of trade exposure is investigated. At this purpose, we employ international trade data retrieved from the Eurostat COMEXT Database, from 1995 to 2003. As a first step, we proxy the extent of import pressure through an import penetration index, as in Davis et al. (1996). In particular, for each industry we compute the overall level of import competition as the following ratio: sectoral imports over the sum of domestic production and imports.[6] Figure 1 shows the evolution of this index at the country level, for the whole manufacturing sector, from 1995 to 2003. As it can be seen, import pressure is increasing in all the considered countries. The index moves from an average value of 0.29 to 0.33, with the highest increases witnessed by Belgium (from 0.40 to 0.49) and the Netherlands (from 0.39 to 0.45).

[Figure 1 about here]

These observations illustrate the general idea that manufacturing firms in the European Union have been facing increasing competition from foreign producers on the domestic markets. However, such a general import competition index does not say anything about "where" the increased import pressure is coming from. Thus, given the focus of our analysis, we have further decomposed the import competition index into two components: one representing import penetration from low-cost countries (impcomp-low) and the other referring to the remaining trading partners (impcomp-high). This is done, as in Bernard et al. (2006), by keeping at the numerator the value of imports from the two sets of countries alternatively. At this purpose, Table 7 shows the list of the 52 low-cost trading partners. It is the same as in Bernard et al. (2006), and includes China, India and other economies with a level of GDP per-capita lower than 5% of the US figure.

[Table 7 about here]

Import flows from the set of low-cost countries have displayed a five-fold increase between 1995 and 2003, and their share of total imports has doubled, moving from 4% to 8%, on average across the considered EU countries and industries (see Table 8). In particular, in 2003 low-cost countries accounted for 30% and 22% respectively of total imports of leather and textile products, with these shares rising up to 44% in the Netherlands and 28% in the UK. As a result, when considering the dynamics of the two import competition indexes described above, we find that "impcomp-low" has more than doubled over the time period: from 0.016 in 1995 to 0.035 in 2003 (on average across countries and industries). At the same time "impcomp-

high", although larger in magnitude, has grown only marginally: from 0.3 to 0.32. Thus, the increase in import competition from low-cost countries configures itself as "the" trade shock for manufacturing firms over the considered period. As additional suggestive evidence, in Figure 2 we plot the percentage change in the number of firms by different size-categories, between 1995 and 2003, first for all industries together and next, separately, for those industries displaying the largest low-cost share of imports (10% and above). The figure suggests that the number of firms is decreasing sharply in industries where low-cost competition is more intense. In line with Hypothesis 1, such a decrease appears to be relatively more pronounced for larger firms, i.e. above 20 employees. In the empirical analysis, while controlling for the overall dynamics of trade, we will focus in particular on the effects of imports from low-cost countries on firms of different size.

[Table 8 and Figure 2 about here]

As discussed in Section 2, a sharp increase of low-cost import competition in a certain industry-country observational unit can be interpreted as evidence that the industry is declining, as resources are reallocated across industries according to the comparative advantage of the country. Table 9 reports descriptive statistics on the average yearly changes in the share of total manufacturing value added (or employment) accounted for by each industry in each country, over 1997-2003.[7] The figures suggest that some industries are quickly shrinking, while others are growing in relative terms. For instance, an average yearly loss of 1.6 percentage points in the share of value added over seven years implies a total decline of the industry by 11.2 p.p. in the considered country, which is remarkable. In line with the expectations, when focusing on the bottom decile of industry-country pairs according to the change in value added or employment shares, it appears that the fastest shrinking industries tend to be those where import competition from low-cost countries is rising more rapidly, in particular textiles and electrical equipment. This information will be employed for some robustness checks in the econometric analysis.

[Table 9 about here]

Finally, the second hypothesis concerns the extent of product differentiation between domestic and foreign firms. At the empirical level, this is proxied through the Grubel-Lloyd (1975) index of intra-industry trade, which is computed as follows (Coucke and Sleuwaegen, 2008):

$$IIT_{ijt} = 2 * \frac{\min(M_{ijt}, X_{ijt})}{M_{ijt} + X_{ijt}} \tag{1}$$

where $M_{ijt}$ and $X_{ijt}$ represent, respectively, import and export flows for industry $i$ in country $j$ at time $t$.

$IIT_{ijt}$ ranges between zero and one. Increasing values of the index represent higher levels of intra-industry trade, which point to growing product differentiation between domestic and foreign producers within the same industry (Caves, 1981). For instance, following trade

liberalization, IIT might grow because domestic firms specialize in the production of more capital/skill intensive goods and other niche products, as shown by Bernard et al. (2006) for the US manufacturing.

### 3.2 The empirical model

Our econometric strategy follows standard industry-level entry and exit rates modeling procedures (see especially the various contributions in Geroski and Schwalbach, 1991). In particular, our empirical model employs as a dependent variable the industry-level exit rate, and relates it to changes in import competition.[8] This approach follows from comparative statics analysis in a standard model of industry equilibrium, where the number of firms is negatively affected by a shock of increased import competition, thus entailing a positive impact on the exit rate.[9] In line with the theoretical discussion in Section 2, we distinguish between small and large firms as belonging to different strategic groups within each industry (Caves and Porter, 1977; Porter, 1980), and model their exit rates separately. Moreover, we also distinguish between imports originating from low-cost countries and other imports (of which the large majority consists of intra-EU imports).

The baseline estimating equation is as follows:

$$Exit_{ijt} = \beta_0 + \beta_1 \Delta ImpCompLow_{ij(t-1)} + \beta_2 \Delta ImpCompHigh_{ij(t-1)} \tag{2}$$

$$+\beta_3\ \Delta IIT_{ijt} + \beta_4\ Investment/Employees_{ij(t-1)} + \beta_5\ Z_{ij(t-1)} + \beta_i + \beta_j + \beta_t + \epsilon_{ijt}$$

$Exit_{ijt}$, the dependent variable, is the exit rate for industry $i$ in country $j$ at time $t$. As already anticipated, we run separate regressions for the exit rates referring to the population of small ($< 20$ employees) and larger firms ($\geq 20$ employees) within the same observational unit.

$\Delta\ Imp\ Comp\ Low_{ij(t-1)}$ represents the change in the index of import competition from low-cost countries between $t-1$ and $t-2$. The index is computed as explained in the previous section. This variable is crucial in the empirical test. However, we also need to control for the evolution of import competition with respect to all the remaining trading partners. This is done by including in the set of regressors $\Delta\ Imp\ Comp\ High_{ij(t-1)}$, which stands for the change in import competition from relatively wealthy countries.

$\Delta IIT_{ijt}$ is the change in the Grubel-Lloyd index of intra-industry trade between $t$ and $t-1$. As explained in the previous section, a positive variation in this indicator points to increasing product differentiation between domestic and foreign firms within the same industry.

$Investment/Employees_{ij(t-1)}$ stands for investment per person employed at the industry-country level. This variable is a proxy for the change in the industry's capital intensity as driven

by firms' investments (Khandelwal, 2010).[10] It has been retrieved from the Eurostat Structural Business Statistics Database.

$\beta_i$, $\beta_j$ and $\beta_t$ represent industry, country and year fixed effects. They are included in order to account for unobserved heterogeneity and time specific effects. This allows us to focus on the short-run effects of changes in trade, while conditioning for structural characteristics and long-run trends of specific industries and countries, together with cyclical effects. However, we still need to control for other possible sources of short-run turbulence. At this purpose, we include a vector $Z_{ij(t-1)}$ of three further industry- (and country-) specific explanatory variables, which have been identified in the literature as significant determinants of firm exit. They are described in what follows.

First, many empirical studies have documented a positive correlation between firm exit in a period and previous entry in the same industry (Dunne et al., 1988; Siegfried and Evans, 1994; Mata and Portugal, 1994; De Backer and Sleuwaegen, 2003). A theoretical interpretation for this finding is provided by the carrying capacity models (Carree and Thurik, 1999), where new firms may drive incumbents out of the market thanks to the introduction of better products and more efficient technologies. We take this into account by including as a regressor the lagged entry rate, computed as the ratio of entering firms over total active ones in each industry-country pair. Consistent with the idea that large and small firms compete in different strategic groups (McGee and Thomas, 1986), we include the lagged entry rate of both small and large firms in each regression.

Total factor productivity has also been identified as an important determinant of firm exit. Indeed, more productive firms tend to display higher survival probabilities (Bernard et al. 2006, 2006a; Coucke and Sleuwaegen, 2008). In our regressions we control for the lagged growth in TFP at the industry level; however, the expected effect of this variable on sectoral exit is not obvious, as it crucially depends on the underlying distribution of firm-level productivity changes within the industry. In fact, the same variation in sectoral TFP can be generated by very diverse firm-level dynamics, with different implications on exit. Data on total factor productivity have been retrieved from the EU KLEMS database, which is maintained by a consortium of fifteen organizations in the EU, supported by the European Commission, the OECD and various National Statistical Institutes.[11] TFP is computed for each industry-country pair through a growth accounting exercise, by taking into account the output contribution of different categories of capital, labor, energy, materials and service inputs.[12]

The model is estimated through standard Least Squares Dummy Variables regressions, separately for small and larger firms. Results are presented in the next section.

# 4 Econometric results

Columns 1 and 2 of Table 10 report the baseline results referring to small and larger firms, respectively. Consistent with Hypothesis 1, we find that the exit of large firms is positively

related to increasing import pressure from low-cost countries, while the same does not hold true for small firms. In particular, an increase by 0.01 in the impcomp-low index is associated with higher exit of large firms by almost 0.47 percentage points, which represent about 47% of the average exit rate for this category of incumbents (1%). Instead, small firms seem to respond, to a lesser extent, to marginal increases in import competition from the set of relatively wealthy trading partners. In particular, an increase in the impcomp-high index by 0.01 is associated to higher exit of small firms by around 0.13 percentage points. In line with Hypothesis 2, an increase in intra-industry trade is significantly associated with lower exit, but only for small firms. Finally, consistent with Hypothesis 3, small firms appear to exit relatively more from industries characterized by increasing capital intensity, as proxied by investment per person employed.

[Table 10 about here]

In line with previous studies on displacement and replacement entry (Dunne et al., 1988; Siegfried and Evans, 1994; Mata and Portugal, 1994; De Backer and Sleuwaegen, 2003), exit is found to be positively related to previous entry. There is, however, a noteworthy difference between small and larger firms. Indeed, small firms' exit is related to previous entry of both small and larger competitors. Instead, the exit of larger firms is only associated to the entry of new large companies, and seems to be less related to changes in the fringe of the industry. This result is consistent with recent evidence by Coad and Teruel (2012) and Kokovin et al. (2011). Finally, in line with the literature on technological change and creative destruction within industries (e.g. Malerba, 2007), exit is found to be positively related to lagged sectoral TFP growth, but only for large firms. This might be seen as another indication that large and small firms belong to different strategic groups, and small firms are less directly affected by significant technological advances within industries.[13]

All the latter findings are confirmed in a regression where we pool exit data for small and larger firms. In particular, we include a dummy for small firms, and interact it with all the explanatory variables. The results are presented in Table 11. It is worth mentioning that the sum of the coefficients for $\Delta$ *Imp Comp Low*$_{ij(t-1)}$ and its interaction with the dummy *Small* is not statistically different from zero. Overall, as reported at the bottom of the table, the null hypothesis of equality of coefficients for the two categories of firms is rejected. This supports our approach of estimating the model separately for small and larger firms, in line with the idea that their exit may follow different regimes. Such an empirical strategy is maintained in the rest of the analysis.

[Table 11 about here]

In order to further characterize our main results, in columns 3 and 4 of Table 10 we differentiate between import competition originating from within vs. outside the European Union, that is "intra EU25" vs. "extra EU25". The results for small firms point again at the competitive

effects exerted by imports from similarly endowed neighboring countries (intra EU25). For large firms, instead, no statistically significant effects are found for both indexes of import competition. These findings reinforce our idea that the increase in import flows from low-cost countries has been the most relevant competitive shock for large European firms over the considered period, while small firms have been mostly affected by deepening market integration within the EU.

At this point, we need to address the potential endogeneity of the lagged changes in the import competition indexes, both with respect to low-cost economies and with respect to the other trading partners. We do so in columns 5 and 6 of Table 10, through instrumental variables regressions. Following earlier studies (Bernard et al., 2006; Khandelwal, 2010; Mion and Zhu, 2012; Bloom et al., 2011; Autor et al., 2013; Colantone and Crino', 2011) we use four excluded instruments: US import flows and US tariffs with respect to low-cost countries and the rest of the world. These instruments are meant to capture the variation in import penetration which is exogenous with respect to firm exit in the analyzed European countries and industries, and their construction is explained in what follows.

In order to obtain the US import flows instruments, we employ US bilateral trade data at the product level, as available from Feenstra et al. (2002). In particular, for each industry we sum the US import flows of all products either from low-cost trading partners ($US\ Import\ Low$), or from all the remaining trading partners, excluding each time the EU country to which the instrument refers ($US\ Import\ High$). We then use lagged changes (in logs) of these aggregates as instruments. They are supposed to capture the role of supply shocks that are specific to the trading partners, and exogenous with respect to the analyzed EU countries (Autor et al., 2013; Colantone and Crino', 2011). We use the same trade data by Feenstra et al. (2002) in order to construct the US tariffs instruments. Specifically, for each industry we compute the average tariff (as a percentage of the import flow) across all imported products either with respect to low-cost trading partners ($US\ Tariff\ Low$), or with respect to all the remaining trading partners, excluding again in each case the EU country to which the instrument refers ($US\ Tariff\ High$). We then use lagged changes in the average US tariffs as instruments. They are chosen for being correlated with the EU tariffs, but less exposed to endogeneity concerns stemming from a political economy argument related to lobbying activities of incumbent firms (Colantone and Crino', 2011). $US\ Import\ Low$ and $US\ Tariff\ Low$ vary across industries and years, while $US\ Import\ High$ and $US\ Tariff\ High$ vary also across countries.

The IV results confirm the OLS findings, and the exogeneity of instruments is supported by the Hansen test. Table 12 reports the relevant estimates from the first-stage regressions, both for $\Delta\ Imp\ Comp\ Low$ and for $\Delta\ Imp\ Comp\ High$.[14] As can be seen, the excluded instruments are highly significant, the coefficients' magnitudes are reasonable and the signs are consistent with the expectations. In particular, an increase (decrease) in US import flows (tariffs) with respect to low cost countries is associated to an increase in $Imp\ Comp\ Low$. Specularly, an increase (decrease) in US import flows (tariffs) with respect to wealthier trading partners is associated to an increase in $Imp\ Comp\ High$. To give an idea of the magnitudes, a 10% growth in US import

flows from low cost countries is associated to higher growth in *Imp Comp Low* by almost 0.002 (to be confronted with an average value of *Imp Comp Low* equal to 0.035 at the end of the sample).

When comparing OLS and IV results in Table 10 (columns 1-2 vs. 5-6), we observe an increase in magnitude for the coefficients of the import competition variables. This is in line with earlier studies (e.g. Bernard et al., 2006; Khandelwal, 2010). A plausible explanation is that there is a simultaneity issue biasing the OLS coefficients down, as argued by Khandelwal (2010). Moreover, by using the above instruments, we may be identifying the effects relatively more on those observations where there is more action going on in terms of trade shocks over the sample, leading to higher coefficients. Finally, the increase in the estimates could also be due to measurement error, as discussed by Bernard et al. (2006) in a similar analysis on US data.

[Table 12 about here]

In column 7 of Table 10 we address an important issue related to the definition of large firms in our sample. In fact, due to the binding cut-off set by Eurostat, all firms with at least 20 employees are considered as being large. And yet, one could argue that some of the factors we propose as strengths of small firms may still apply, for instance, to firms between 20 and 49 employees. In Section 3.1 we have discussed the distribution of firms across multiple size-based categories: 1-9 employees, 10-19, 20-49, 50-249 and larger. In column 7 we use this information for a robustness check. In particular, we create a dummy *Very Large* for identifying the industry-country pairs where the share of "large firms" (i.e. $\geq$ 20 employees) with at least 50 employees is above the median, on average over time. We then interact this dummy with $\Delta$ *Imp Comp Low*$_{ij(t-1)}$, and use instrumental variables.[15] The estimated coefficient on the interaction is positive and statistically different from zero. This result is in line with our theoretical arguments, suggesting that low-cost import competition is indeed more relevant for the very large firms.

[Table 13 about here]

In Table 13 we present additional robustness checks, both for small and for large firms, always using instrumental variables. First, in columns 1 and 2 we include labor productivity growth by size class within each industry-country pair, instead of the overall TFP growth.[16] Indeed, the literature has extensively shown that productivity is a crucial determinant of firm survival, and is strongly correlated with firm size (Bernard et al. 2006, 2006a; Coucke and Sleuwaegen, 2008). Therefore, including size-specific labor productivity growth may provide a better control for efficiency dynamics. As can be seen, the main evidence on the effects of trade is not affected, while the coefficients for labor productivity are not significantly different from zero. This is not surprising. In fact, as discussed in the previous section, productivity is an important factor for survival at the firm-level. Hence, when using industry-level data, even if differentiated by size-class, the effect of productivity growth on the exit rates is ambiguous, as it depends on the

underlying distribution of firm-level efficiency changes.

In a recent article, Khandelwal (2010) shows that US firms are relatively sheltered from low-cost import competition when they operate in industries characterized by longer quality ladders, that is a greater scope for vertical differentiation. He develops a new methodology for estimating the quality of imported varieties of goods. In brief, higher quality for a variety is inferred from a market share premium with respect to other varieties, conditioning for the price. The quality ladder is then obtained as the difference between the highest and lowest quality for each good, and average industry-level figures are computed, which are then related to employment and output growth. In columns 3 and 4 of Table 13, we use the quality ladder data provided by Khandelwal (2010) at the industry-level to test for an equivalent moderating effect of ladder length on firm exit, in response to increasing low-cost import competition.[17] In particular, we interact $\Delta$ *Imp Comp Low*$_{ij(t-1)}$ with a *Long Ladder* dummy variable, which takes value 1 for industries characterized by a ladder length above the median value. Results do not show evidence in favor of a moderating effect, as the coefficients of the interaction are not significantly different from zero, while our previous findings are confirmed both for small and for large firms.[18]

Finally, one of the arguments behind Hypothesis 1 is that large firms would exit relatively more from declining industries as import competition from low-cost countries increases (Ghemawat and Nalebuff, 1985). In columns 5 to 8 of Table 13 we interact $\Delta$ *Imp Comp Low*$_{ij(t-1)}$ with two dummies identifying declining industries, either in terms of value added (*Declining VA*) or employment (*Declining Empl*). The dummies are created using information on the evolution of the share of total manufacturing value added/employment accounted for by each industry in each country (as summarized in Table 9). In particular, we identify as declining those industry-country pairs belonging to the bottom 10% of the distribution of value added/employment share changes over time. Both the interactions are positive and statistically significant only for large firms, thus providing further evidence in line with the expectations.[19]

## 5 Discussion and conclusion

Our results reinforce the idea that opening to international trade increases the competitive pressure on domestic firms, thus resulting in higher exit rates. This view has been emerging from the new theoretical models of international trade allowing for firm heterogeneity (e.g. Melitz, 2003; Bernard et al., 2003) and has been supported by a number of empirical studies, which have found the survival probabilities of domestic firms in industrialized countries to be reduced by increasing import competition, especially if the latter is driven by growing trade inflows from low-cost countries (Bernard et al., 2006; Coucke and Sleuwaegen, 2008; Bloom et al., 2011; Utar and Torres Ruiz, 2012). In this paper we add to the previous literature by showing, for the first time, that firms of different size might be affected differently by diverse sources of import competition. In particular, we find that large firms are very sensitive to the shock of increasing import competition from low-cost countries, while their smaller counterparts are more

affected by increasing import pressure from neighboring European countries or other relatively wealthy trading partners. Failing to take this dimension of analysis into account might result in empirical findings which are biased by the composition of the firms' sample. For instance, in a recent paper on Swedish firms, Greenaway et al. (2008) find that the probability of exit by closedown is increased the most by rising import competition from non-OECD countries rather than from other OECD members. Moreover, the effect of import competition is not found to vary across firms of different size. In the light of our findings, the latter results might be driven by the fact that the analyzed sample includes only firms with more than 50 employees.

Previous literature has put forward the view that firms of different size face different competitive conditions and operate in distinct strategic groups within the same industry (Porter, 1973-1979; McGee and Thomas, 1986; Coad and Teruel, 2012). Our paper provides the first evidence that a size-based partition of industries might also apply with respect to international competition. Indeed, we have shown that relatively large firms active in high-scale production display higher exit rates in response to increasing import competition from low-cost countries. Firms of lower size are instead more likely to be competing "at the margin" in niche markets, and thus are more affected by deepening trade integration with respect to EU members and other relatively wealthy trading partners. Therefore, when assessing the impact of international trade on industry dynamics, firms of different size seem to fall in distinct strategic arenas, where they face foreign competition of a different nature. This finding is consistent with recent theoretical and empirical work emphasizing the distinction in strategic behavior between large and small firms following external shocks affecting the competitive environment (Kokovin et al., 2011; Coad and Teruel, 2012).

Our results have important implications for strategic planning at the firm level, as the identification of competitive threats is a crucial step for any decision making managerial process. The evidence suggests that especially large firms have to be pro-active in identifying and reacting to the sources of competition from developing countries, where producers can compete on a high scale by benefiting from lower labor costs and more flexible business regulations. For this purpose, re-locating part of the production chain abroad and/or out-sourcing intermediate inputs from foreign low-cost producers have been shown to be effective strategies for improving the survival perspectives of manufacturing firms in Europe (Coucke and Sleuwaegen, 2008; Mion and Zhu, 2012). The relevant competitors for small European firms seem instead to be more localized in relatively wealthy partner countries, in particular within the EU. This finding is in line with the fact that small enterprises typically adopt a more regional strategic focus, aimed at defending and developing their specific market niches. Indeed, our empirical results show that small firms tend to display lower exit rates when intra-industry trade is increasing, thus pointing to a positive role for product differentiation in raising their survival probabilities.

Finally, our findings provide also important insights for policy makers concerned about the drawbacks of globalization on domestic producers in developed countries. In particular, starting from the established fact that increasing import competition determines higher exit rates of domestic firms in the short-run, our contribution provides a deeper understanding of the un-

derlying adjustment dynamics. Indeed, we have shown that not all the import flows affect all firms to the same extent. These insights provide useful elements for tailoring public policies to the real needs of heterogeneous firms, in such a way that the adjustment to globalization is accommodated efficiently.

Our analysis reveals that small firms may continue to play a crucial role for economic growth in a context of rising import competition from low-cost countries. In our interpretation, this is due to the flexibility of small firms and their ability to develop specific niches on the internationalizing markets. Further research efforts, employing firm-level data, should explore these issues deeper. For instance, better insights on the adjustment dynamics could be obtained through case-studies, by focusing on firm-level managerial choices. Moreover, it would be interesting to assess to what extent our empirical results are specific to the case of the European Union, where a pervasive economic integration process has been shaping the competitive environment already since the sixties. Finally, the role of country-specific labor and product market institutions in this context should also be analyzed.

## Notes

[1]See Mion and Zhu (2011) for a notable exception.

[2]The selection of countries is driven by data availability.

[3]NACE (Rev 1.1) is the European classification of economic activities, corresponding to ISIC (Rev 3.1).

[4]Two sub-sections have been excluded from the analysis: "manufacturing of coke, refined petroleum products and nuclear fuel" (DF) and "manufacturing n.e.c." (DN). In the first case, the choice is due to the specific nature of the industry, whose dynamics are essentially driven by legal changes and natural factors, rather than trade. The other sub-section constitutes a "catch-all" residual category for heterogeneous activities (from the manufacturing of furniture to recycling), which would raise problems when trying to relate firm exit to the evolution of import competition at the industry-level.

[5]More details can be found on the Eurostat metadata documents: http://epp.eurostat.ec.europa.eu

[6]Domestic production data are retrieved from the Eurostat Structural Business Statistics Database.

[7]Based on data from the Eurostat Structural Business Statistics Database.

[8]It is important to stress that this approach is different from a firm-level modeling strategy, where the hazard rate or the exit probability of a firm are related to the industry-specific level of import competition, as done for instance by Bernard et al. (2006).

[9]In a free-entry industry equilibrium, the operating profit of the marginal entrant is equal to the fixed cost of setting up a new firm. In mathematical notation, we have that: $\pi(Q, M, N) = F$, where $Q$ stands for the market size, $M$ indexes imports, and $N$ represents the number of local firms. This closing condition makes the number of firms an implicit function such that: $\left(\frac{\partial \pi}{\partial Q}\right) dQ + \left(\frac{\partial \pi}{\partial M}\right) dM + \left(\frac{\partial \pi}{\partial N}\right) dN = dF$. From here, assuming $dQ = dF = 0$,

we have: $dN = -\frac{\left(\frac{\partial \pi}{\partial M}\right)}{\left(\frac{\partial \pi}{\partial N}\right)} dM$. Since $\left(\frac{\partial \pi}{\partial M}\right) < 0$ and $\left(\frac{\partial \pi}{\partial N}\right) < 0$, the latter implies that the number of firms declines as import flows increase ($dM > 0$). This in turn entails a positive impact of import competition on the exit rate.

[10] A more precise measure of the change in capital intensity (e.g. accounting for employment adjustments) would have been obtained by looking directly at changes in the ratio of capital stock to total employment. This was not possible due to data availability.

[11] Further information is available on the EU KLEMS website: http://www.euklems.net/index.html

[12] Detailed information on the methodology and employed variables is available in the document "EU KLEMS growth and productivity accounts (Version 1.0). Part I Methodology".

[13] The results for both small and large firms are confirmed when performing outlier robust estimations (using the *rreg* command in Stata), with remarkably stable outcomes. For large firms we have also performed a Tobit estimation, to account for left-censoring (i.e. exit of large firms equal to zero in some years for a few industry-country pairs). The findings are not different and indicate no bias. All these results are available upon request.

[14] In particular, the reported first-stage results refer to the first IV regression in Column 5 of Table 10. For convenience of exposition, we do not report the very similar first-stage results for all the other IV regressions.

[15] We thank an anonymous referee for suggesting this and other robustness checks.

[16] In particular, we employ data on value added per person employed, retrieved from the Eurostat Structural Business Statistics Database.

[17] Quality ladder data are provided by Khandelwal (2010) at the SIC-2digit level, in Table 2 of his article. In most cases there is a one-to-one correspondence with the NACE sub-sections. In four cases we have taken an average of the ladder value across two SIC-2digit industries, namely for sub-sections "db", "de", "dj" and "dl". As discussed by Khandelwal (2010), variations in the length of the quality ladder across industries are predominantly driven by technological differences, which justifies the use of US-based measures in our analysis.

[18] We do not include the linear term of the *Long Ladder* dummy, as that is subsumed by the industry fixed effects. Similar results, available upon request, are found when the *Long Ladder* dummy is set equal to 1 for industries in the top 25% of the ladder length distribution.

[19] Similar results are obtained when the two dummies are set equal to 1 for industry-country pairs in the bottom 25% of the distribution of share changes. They are available upon request.

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**Figure 1: Variation in import competition: 1995-2003**

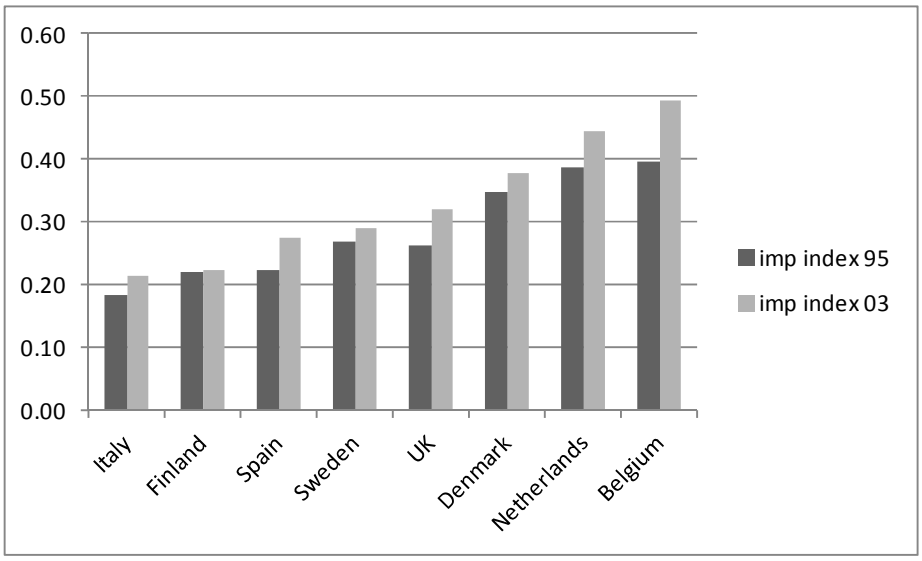


**Figure 2: Variation in number of firms by size-class: 1995-2003**

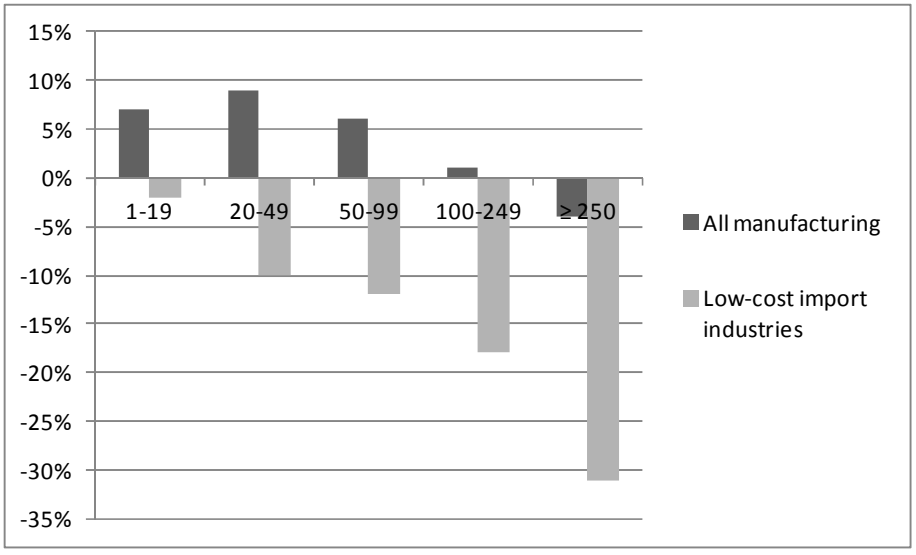

**Table 1: Nace (revision 1.1) manufacturing sub-sections**

| | |
|---|---|
| DA | Manufacture of food products, beverages and tobacco |
| | 15 Manufacture of food products and beverages |
| | 16 Manufacture of tobacco products |
| DB | Manufacture of textiles and textile products |
| | 17 Manufacture of textiles |
| | 18 Manufacture of wearing apparel; dressing and dyeing of fur |
| DC | 19 Manufacture of leather and leather products |
| DD | 20 Manufacture of wood and wood products |
| DE | Manufacture of pulp, paper and paper products; publishing and printing |
| | 21 Manufacture of pulp, paper and paper products |
| | 22 Publishing, printing and reproduction of recorded media |
| DF | 23 Manufacture of coke, refined petroleum products and nuclear fuel |
| DG | 24 Manufacture of chemicals, chemical products and man-made fibres |
| DH | 25 Manufacture of rubber and plastic products |
| DI | 26 Manufacture of other non-metallic mineral products |
| DJ | Manufacture of basic metals and fabricated metal products |
| | 27 Manufacture of basic metals |
| | 28 Manufacture of fabricated metal products, except machinery and equipment |
| DK | 29 Manufacture of machinery and equipment n.e.c. |
| DL | Manufacture of electrical and optical equipment |
| | 30 Manufacture of office machinery and computers |
| | 31 Manufacture of electrical machinery and apparatus n.e.c. |
| | 32 Manufacture of radio, television and communication equipment and apparatus |
| | 33 Manufacture of medical, precision and optical instruments, watches and clocks |
| DM | Manufacture of transport equipment |
| | 34 Manufacture of motor vehicles, trailers and semi-trailers |
| | 35 Manufacture of other transport equipment |
| DN | Manufacturing n.e.c. |
| | 36 Manufacture of furniture; manufacturing n.e.c. |
| | 37 Recycling |

**Table 2: Exit rates - country averages**

| | Overall figures | Small firms (<20 empl) | Large firms (≥20 empl) |
|---|---|---|---|
| Country | Exit rate | Exit rate | Exit rate |
| Belgium | 5.7% | 7.0% | 1.1% |
| Denmark | 6.2% | 7.0% | 0.2% |
| Finland | 5.7% | 6.3% | 0.1% |
| Italy | 5.9% | 6.5% | 0.3% |
| Netherlands | 6.3% | 7.3% | 1.4% |
| Spain | 6.1% | 7.0% | 0.8% |
| Sweden | 4.8% | 5.2% | 0.5% |
| UK | 9.8% | 10.9% | 3.9% |
| Mean | 6.3% | 7.1% | 1.0% |

**Table 3: Distribution of firms (%) - breakdown by country**

| | Size class by number of employees | | | | |
|---|---|---|---|---|---|
| Country | 1-9 empl | 10-19 empl | 20-49 empl | 50-249 empl | ≥ 250 empl |
| Belgium | 0.73 | 0.09 | 0.09 | 0.06 | 0.02 |
| Denmark | 0.71 | 0.11 | 0.09 | 0.06 | 0.02 |
| Finland | 0.81 | 0.07 | 0.06 | 0.05 | 0.01 |
| Italy | 0.79 | 0.11 | 0.06 | 0.03 | 0.01 |
| Netherlands | 0.73 | 0.10 | 0.09 | 0.07 | 0.01 |
| Spain | 0.71 | 0.15 | 0.10 | 0.04 | 0.01 |
| Sweden | 0.84 | 0.06 | 0.05 | 0.04 | 0.01 |
| UK | 0.68 | 0.13 | 0.10 | 0.07 | 0.02 |
| Mean | 0.75 | 0.10 | 0.08 | 0.05 | 0.02 |

**Table 4: Distribution of firms (%) - breakdown by industry**

| | | Size class by number of employees | | | | |
|---|---|---|---|---|---|---|
| **Industry Description** | **nace** | **1-9 empl** | **10-19 empl** | **20-49 empl** | **50-249 empl** | **≥ 250 empl** |
| Manufacture of food products, beverages and tobacco | da | 0.735 | 0.119 | 0.079 | 0.047 | 0.018 |
| Manufacture of textiles and textile products | db | 0.813 | 0.088 | 0.062 | 0.033 | 0.005 |
| Manufacture of leather and leather products | dc | 0.809 | 0.090 | 0.067 | 0.031 | 0.004 |
| Manufacture of wood and wood products | dd | 0.831 | 0.083 | 0.055 | 0.026 | 0.004 |
| Manufacture of pulp, paper and paper products; publishing and printing | de | 0.824 | 0.085 | 0.053 | 0.030 | 0.009 |
| Manufacture of chemicals, chemical products and man-made fibres | dg | 0.612 | 0.110 | 0.114 | 0.108 | 0.046 |
| Manufacture of rubber and plastic products | dh | 0.628 | 0.145 | 0.123 | 0.088 | 0.015 |
| Manufacture of other non-metallic mineral products | di | 0.771 | 0.095 | 0.076 | 0.044 | 0.012 |
| Manufacture of basic metals and fabricated metal products | dj | 0.769 | 0.115 | 0.076 | 0.034 | 0.005 |
| Manufacture of machinery and equipment n.e.c. | dk | 0.718 | 0.113 | 0.098 | 0.057 | 0.012 |
| Manufacture of electrical and optical equipment | dl | 0.788 | 0.086 | 0.067 | 0.046 | 0.015 |
| Manufacture of transport equipment | dm | 0.726 | 0.099 | 0.085 | 0.067 | 0.026 |
| | Mean | 0.752 | 0.102 | 0.079 | 0.051 | 0.014 |

**Table 5: Distribution of firms (%) - descriptives at the industry-country level**

| Size Class | Obs. | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| 1-9 empl | 96 | 0.75 | 0.10 | 0.47 | 0.94 |
| 10-19 empl | 96 | 0.10 | 0.04 | 0.03 | 0.23 |
| 20-49 empl | 96 | 0.08 | 0.03 | 0.02 | 0.15 |
| 50-249 empl | 96 | 0.05 | 0.03 | 0.00 | 0.20 |
| ≥250 empl | 96 | 0.01 | 0.02 | 0.00 | 0.08 |

**Table 6: Exit rates - yearly averages**

| | Overall figures | Small firms (<20 empl) | Large firms (≥20 empl) |
|---|---|---|---|
| year | Exit rate | Exit rate | Exit rate |
| 1997 | 6.2% | 6.8% | 0.4% |
| 1998 | 6.4% | 7.3% | 0.9% |
| 1999 | 6.4% | 7.1% | 1.2% |
| 2000 | 6.3% | 7.0% | 1.0% |
| 2001 | 6.1% | 6.8% | 1.1% |
| 2002 | 6.4% | 7.2% | 1.2% |
| 2003 | 6.5% | 7.4% | 1.3% |

**Table 7: Low-cost trading partners**

| | | |
|---|---|---|
| Afghanistan | Ethiopia | Moldova |
| Albania | Gambia | Mozambique |
| Angola | Georgia | Nepal |
| Armenia | Ghana | Niger |
| Azerbaijan | Guinea | Pakistan |
| Bangladesh | Guinea Bissau | Rwanda |
| Benin | Guyana | Samoa |
| Bhutan | Haiti | Sao Tome |
| Burkina Faso | India | Sierra Leone |
| Burundi | Kenya | Somalia |
| Cambodia | Lao PDR | Sri Lanka |
| Central African Rep | Lesotho | St. Vincent |
| Chad | Madagascar | Sudan |
| China | Malawi | Togo |
| Comoros | Maldives | Uganda |
| Congo | Mali | Vietnam |
| Equatorial Guinea | Mauritania | Yemen |
| Eritrea | | |

**Table 8: Share of imports originating from low-cost economies (on average across the eight EU countries in our sample)**

| Industry Description | nace | Low-cost share 1995 | Low-cost share 2003 |
|---|---|---|---|
| Manufacture of leather and leather products | dc | 18% | 30% |
| Manufacture of textiles and textile products | db | 15% | 22% |
| Manufacture of electrical and optical equipment | dl | 2% | 7% |
| Manufacture of other non-metallic mineral products | di | 2% | 6% |
| Manufacture of rubber and plastic products | dh | 2% | 5% |
| Manufacture of wood and wood products | dd | 3% | 5% |
| Manufacture of machinery and equipment n.e.c. | dk | 1% | 4% |
| Manufacture of basic metals and fabricated metal products | dj | 2% | 4% |
| Manufacture of food products, beverages and tobacco | da | 2% | 2% |
| Manufacture of chemicals, chemical products and man-made fibres | dg | 1% | 2% |
| Manufacture of pulp, paper and paper products; publishing and printing | de | 0% | 1% |
| Manufacture of transport equipment | dm | 0% | 1% |
| | Mean | 4% | 8% |

**Table 9: Industry shares of total value added and employment in each country**

| Avg. yearly change in share of total: | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Value Added | 96 | 0.000 | 0.003 | -0.016 | 0.017 |
| Employment | 96 | 0.000 | 0.002 | -0.006 | 0.004 |

**Table 10: Econometric results**

Dependent variable: exit rate

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| Estimation Sample | Small Firms | Large Firms | Small Firms | Large Firms | Small Firms | Large Firms | Large Firms |
| Estimator | OLS | OLS | OLS | OLS | IV | IV | IV |
| *Δ Imp Comp Low (t-1)* | -0.1057 | 0.4692*** | | | -0.3918 | 0.6555** | 0.7287*** |
| | [0.129] | [0.148] | | | [0.430] | [0.270] | [0.206] |
| *Δ Imp Comp High (t-1)* | 0.1279** | 0.0386 | | | 0.4847*** | 0.1267 | 0.1555 |
| | [0.051] | [0.037] | | | [0.192] | [0.129] | [0.111] |
| *Δ IIT Index* | -0.0669*** | -0.006 | -0.0702*** | -0.0092 | -0.0755*** | -0.0064 | 0.0073 |
| | [0.025] | [0.018] | [0.027] | [0.021] | [0.028] | [0.016] | [0.018] |
| *Investment/Employees (t-1)* | 0.0004** | -0.0001 | 0.0004** | -0.00002 | 0.0006** | 0.00001 | -0.00001 |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| *Entry Rate Small (t-1)* | 0.1976*** | -0.0382 | 0.2057*** | -0.0543 | 0.1479** | -0.0408 | -0.0137 |
| | [0.049] | [0.037] | [0.050] | [0.040] | [0.059] | [0.037] | [0.044] |
| *Entry Rate Large (t-1)* | 0.4991** | 0.8215*** | 0.5354** | 0.7968*** | 0.4339* | 0.8144*** | 0.7477*** |
| | [0.207] | [0.222] | [0.216] | [0.223] | [0.237] | [0.220] | [0.195] |
| *TFP Growth (t-1)* | 0.0367 | 0.0591** | 0.0345 | 0.0743*** | 0.0422 | 0.0503* | 0.0006 |
| | [0.031] | [0.029] | [0.032] | [0.028] | [0.035] | [0.027] | [0.019] |
| *Δ Imp Comp Intra EU25 (t-1)* | | | 0.1545** | 0.0751 | | | |
| | | | [0.065] | [0.065] | | | |
| *Δ Imp Comp Extra EU25 (t-1)* | | | 0.0516 | 0.0569 | | | |
| | | | [0.078] | [0.057] | | | |
| *Δ Imp Comp Low (t-1)*Very Large* | | | | | | | 0.9615*** |
| | | | | | | | [0.350] |
| *Very Large* | | | | | | | 0.0007 |
| | | | | | | | [0.002] |
| *industry dummies* | yes | yes | yes | yes | yes | yes | yes |
| *country dummies* | yes | yes | yes | yes | yes | yes | yes |
| *year dummies* | yes | yes | yes | yes | yes | yes | yes |
| Observations | 297 | 292 | 297 | 292 | 297 | 292 | 292 |
| R2 | 0.86 | 0.81 | 0.86 | 0.79 | | | |
| Kleibergen-Paap F-statistic | | | | | 2.46 | 1.69 | 3.04 |
| Hansen test, p-value | | | | | 0.74 | 0.15 | 0.29 |

In columns 5 to 7, import competition variables are instrumented using: changes in US import flows and US tariffs with respect to low-cost countries and the rest of the world, and the 1995 levels of the import competition indexes. Robust standard errors are reported in brackets. ***, **, * = indicate significance at the 1, 5 and 10% level, respectively.

**Table 11: Econometric results - pooled regression**

Dependent variable: exit rate

| Estimation Sample | All Firms |
|---|---|
| *Small* | 0.0349*** |
| | [0.008] |
| *Δ Imp Comp Low (t-1)* | 0.4692*** |
| | [0.140] |
| *Δ Imp Comp Low (t-1)*Small* | -0.5750** |
| | [0.250] |
| *Δ Imp Comp High (t-1)* | 0.0386 |
| | [0.028] |
| *Δ Imp Comp High (t-1)*Small* | 0.0893* |
| | [0.050] |
| *Δ IIT Index* | -0.006 |
| | [0.018] |
| *Δ IIT Index*Small* | -0.0609** |
| | [0.030] |
| *Investment/employees (t-1)* | -0.0001 |
| | [0.000] |
| *Investment/employees (t-1)*Small* | 0.0005* |
| | [0.000] |
| *Entry Rate Small (t-1)* | -0.0382 |
| | [0.036] |
| *Entry Rate Small (t-1)*Small* | 0.2358*** |
| | [0.060] |
| *Entry Rate Large (t-1)* | 0.8215*** |
| | [0.245] |
| *Entry Rate Large (t-1)*Small* | -0.3224 |
| | [0.217] |
| *TFP Growth (t-1)* | 0.0591 |
| | [0.036] |
| *TFP Growth (t-1)*Small* | -0.0224 |
| | [0.037] |
| *industry dummies* | yes |
| *industry dummies*Small* | yes |
| *country dummies* | yes |
| *country dummies*Small* | yes |
| *year dummies* | yes |
| *year dummies*Small* | yes |
| Observations | 589 |
| R-squared | 0.95 |
| H0: All interactions and dummy small equal to zero, p-value | 0.000 |

Robust standard errors are reported in brackets. ***, **, * = indicate significance at the 1, 5 and 10% level, respectively.

**Table 12: First-stage results**

| | (1) | (2) |
|---|---|---|
| | Δ Imp Comp | Δ Imp Comp |
| Instrumented Variable | Low | High |
| *Δ US Import Low* | 0.0171*** | 0.0024 |
| | [0.006] | [0.014] |
| *Δ US Import High* | 0.0017 | 0.0243*** |
| | [0.002] | [0.007] |
| *Δ US Tariff Low* | -0.062*** | 0.0035 |
| | [0.022] | [0.058] |
| *Δ US Tariff High* | 0.004 | -0.1067** |
| | [0.014] | [0.043] |
| Observations | 297 | 297 |
| R2 | 0.49 | 0.35 |

Robust standard errors are reported in brackets. ***, **, * = indicate significance at the 1, 5 and 10% level, respectively.

**Table 13: Econometric results – robustness checks**

Dependent variable: exit rate

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Estimation Sample | Small Firms | Large Firms | Small Firms | Large Firms | Small Firms | Large Firms | Small Firms | Large Firms |
| Estimator | IV | IV | IV | IV | IV | IV | IV | IV |
| *Δ Imp Comp Low (t-1)* | 0.1496 | 1.3556*** | -0.3385 | 0.6284** | -0.9172 | 0.1073 | -0.5532 | 0.5507** |
| | [0.478] | [0.397] | [0.404] | [0.252] | [0.803] | [0.396] | [0.456] | [0.247] |
| *Δ Imp Comp High (t-1)* | 0.7054*** | -0.0147 | 0.4865*** | 0.1226 | 0.4915** | 0.1206 | 0.4580** | 0.1157 |
| | [0.243] | [0.160] | [0.181] | [0.125] | [0.234] | [0.127] | [0.186] | [0.139] |
| *Δ IIT Index* | -0.0535* | -0.0266 | -0.0737*** | -0.0076 | -0.0736** | -0.0053 | -0.0685** | 0.0005 |
| | [0.032] | [0.029] | [0.028] | [0.017] | [0.032] | [0.020] | [0.030] | [0.017] |
| *Investment/Employees (t-1)* | 0.0003 | -0.0001 | 0.0006** | -0.00002 | 0.0007** | 0.0001 | 0.0006** | 0.0001 |
| | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] | [0.000] |
| *Entry Rate Small (t-1)* | 0.1231* | -0.0175 | 0.1443** | -0.0382 | 0.1122 | -0.0711 | 0.1607*** | -0.027 |
| | [0.065] | [0.049] | [0.058] | [0.038] | [0.095] | [0.054] | [0.061] | [0.036] |
| *Entry Rate Large (t-1)* | 0.4279* | 0.8666*** | 0.5022** | 0.7722*** | 0.102 | 0.4981*** | 0.2329 | 0.5845*** |
| | [0.256] | [0.288] | [0.247] | [0.216] | [0.369] | [0.151] | [0.158] | [0.196] |
| *TFP Growth (t-1)* | | | 0.0546 | 0.0425 | 0.0045 | 0.0195 | 0.0062 | 0.0007 |
| | | | [0.039] | [0.028] | [0.056] | [0.026] | [0.040] | [0.032] |
| *Labor Productivity Growth (t-1)* | 0.0003 | -0.0016 | | | | | | |
| | [0.005] | [0.007] | | | | | | |
| *Δ Imp Comp Low (t-1)*Long Ladder* | | | -0.6749 | 0.427 | | | | |
| | | | [0.733] | [0.527] | | | | |
| *Δ Imp Comp Low (t-1)*Declining VA* | | | | | 2.8639 | 2.4690*** | | |
| | | | | | [3.464] | [0.549] | | |
| *Declining VA* | | | | | -0.0085 | -0.0055** | | |
| | | | | | [0.014] | [0.002] | | |
| *Δ Imp Comp Low (t-1)*Declining Empl* | | | | | | | 2.0449 | 2.6021*** |
| | | | | | | | [1.365] | [0.798] |
| *Declining Empl* | | | | | | | -0.0025 | -0.0056** |
| | | | | | | | [0.005] | [0.002] |
| *industry dummies* | yes | yes | yes | yes | yes | yes | yes | yes |
| *country dummies* | yes | yes | yes | yes | yes | yes | yes | yes |
| *year dummies* | yes | yes | yes | yes | yes | yes | yes | yes |
| Observations | 237 | 242 | 297 | 292 | 297 | 292 | 297 | 292 |
| Kleibergen-Paap F-statistic | 1.89 | 1.45 | 2.00 | 1.09 | 1.00 | 1.13 | 3.12 | 1.20 |
| Hansen test, p-value | 0.20 | 0.19 | 0.64 | 0.28 | 0.92 | 0.55 | 0.96 | 0.48 |

Import competition variables are instrumented using: changes in US import flows and US tariffs with respect to low-cost countries and the rest of the world, and the 1995 levels of the import competition indexes. Robust standard errors are reported in brackets. ***, **, * = indicate significance at the 1, 5 and 10% level, respectively.