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EFIGE working paper 26
April 2010

Funded under the
Socio-economic
Sciences and
Humanities
Programme of the
Seventh
Framework
Programme of the
European Union.

LEGAL NOTICE: The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 225551. The views expressed in this publication are the sole responsibility of the authors and do not necessarily reflect the views of the European Commission.



The EFIGE project is coordinated by Bruegel and involves the following partner organisations: Universidad Carlos III de Madrid, Centre for Economic Policy Research (CEPR), Institute of Economics Hungarian Academy of Sciences (IEHAS), Institut für Angewandte Wirtschaftsforschung (IAW), Centro Studi Luca D'Agliano (Ld'A), Unitcredit Group, Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). The EFIGE partners also work together with the following associate partners: Banque de France, Banco de España, Banca d'Italia, Deutsche Bundesbank, National Bank of Belgium, OECD Economics Department.

Firm size and the extensive margin¹

László Halpern² and Balázs Muraközy³

Abstract

In this paper we rely on firm-product-destination level data to analyze Hungarian trade expansion between 1992 and 2003. We decompose export growth into the number of firms, the number of markets and products per firm, and analyze these dimensions by firm size. We also distinguish between new firms and continuing exporters. The results suggest that the majority of small exporters exit exporting after a few years, but the survivors grow very quickly in every dimension. Firm dynamics across size categories is intensive. Large exporters grow slowly, and macro shocks, destination market and product heterogeneity strongly affect their performance.

Keywords: export, extensive margin, firm size, transaction level data, Hungary

JEL: F12, L25

February 2010

¹ This paper is produced as part of the 'European Firms in a Global Economy: Internal policies for external competitiveness (EFIGE)', a collaborative project funded by the European Commission's Seventh Framework Programme (contract number 225551). It is part of the 'Center for Firms in the Global Economy (CEFIG)' network, too. The authors thank Emília Csiffáry for excellent research assistance.

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Introduction

Recent models of international trade building on firm-level heterogeneity have emphasized the role of the extensive margin, i.e. the change in the number of exporting firms or exported products resulting from trade liberalization (Melitz, 2003). On the empirical side, Bernard et al. (2007) estimated the relationship between gravity variables and both the extensive and intensive margins (export volume per product per firm) of US exports. Their results show that both the number of firms and the average number of exported products per firm are increasing in the partner country's GDP, but strongly decreasing in distance, while the intensive margin is increasing both in GDP and distance. Mayer and Ottaviano (2007) decomposed trade volume into a number of different margins for European countries. They showed that when explaining exports of a country, variation in the number of exporting firms is the most important predictor of exports across destination countries, followed by the number of exported products.

Eaton et al. (2007) use transaction-level data of Colombia to estimate export dynamics. They found that nearly half of exporting firms are new exporters every year, and that most of these firms exit in a few years. As these firms are usually very small, year-to-year changes in aggregate export volume are dominated by the sales of large and stable exporters. However, a few firms from every cohort of new exporters expand rapidly.

The aim of this paper is to decompose Hungarian export growth into the extensive and the intensive margins using firm-product-destination level data between 1992 and 2003. The detailed nature of our dataset makes possible to analyze different dimensions of the extensive margin. First, total exports can be decomposed into the number of firms (firm-extensive margin) and export volume per firm. Export volume per firm can be further decomposed into within-firm extensive margin and within-firm intensive margin. The extensiveness of firm-level export activities is reflected by the number of export markets served by a firm on average (destination extensive margin) and the number of products exported by the firm (product extensive margin). For a full decomposition, however, one also needs the number of firm-country pairs the firm exports to (within-firm extensive margin). A contribution of this paper is the analysis of all these margins of exporting, distinguishing between the margins of new and continuing firms as well.

Our second contribution is that we decompose trade growth and its margins by firm size to compare the export growth of different firms. This exercise uncovers some characteristic differences between small and large exporters. Small exporters are very likely to exit, but surviving small exporters grow quickly on average. As a result, while new exporters do not

add too much to export volume in the short run, their contribution to aggregate trade volume becomes very large in a longer term. Such stylized facts may help to explain firm-level exporting decisions, and suggest that different policies should be used for small and large exporters. The effect of firm size is also analyzed by Eaton et al. (2007) for Columbia. Our results are comparable to that study, and we show some interesting differences between the results for these two countries.

This time period for Hungary starts with the creation and foundation of basic institutions of a market economy and then continues with a macroeconomic stabilization to be followed by fast and deep trade integration with developed European economies. At the beginning of our sample period, Hungarian trade was still declining as a result of the collapse of the former Soviet market and transitional recession. At about 1994-1995, following macroeconomic consolidation and restructuring, Hungary began to integrate strongly into the EU single market, and started its period of strong export-led growth. At the end of the period the Hungarian economic growth slowed down due to macroeconomic mismanagement and lack of further structural reforms which went together with the full integration of the country into the EU, becoming a full member on 1st May 2004.

Data and methodology

The data used for our empirical analysis were obtained from the Customs Statistics. The dataset consists of *all Hungarian exports* between 1992 and 2003. One observation in the database is the export of product i by firm j to country k in year t .⁴

The product dimension of the dataset is highly disaggregated; it is broken down to 6-digit Harmonized System (HS) level. We define a product as a 6-digit category, although using more aggregated (4-digit) categories does not change our results. "Motor cars and vehicles for transporting persons" is an example for a 4-digit category, while "Other vehicles, spark-ignition engine of a cylinder capacity not exceeding 1,500 cc" is an example of a 6-digit category. Note that in most cases (like in the car example) further disaggregation of the data would not reduce the potential quality differences to zero within each category. As a consequence, during the following analysis we define a product as a 2-digit category because further disaggregation would yield too much similarity between categories. The dataset includes both export values and quantities at this highly disaggregated level, thus unit values can be calculated.

⁴ A more detailed description of our data can be found in Békés et al. (2009).

The customs database can be merged with balance sheet data, which enables us to identify the industry where the firm operates mostly. We drop exports of individual entrepreneurs and individuals limiting our analysis to proper firms. In particular, we focus on manufacturing firms, as most trade theories are more easily applied in case of these firms than agricultural firms or wholesalers and retailers. We have calculated the results for these other sectors as well, and the results show that trade is even more dynamic in these sectors compared to manufacturing. However, the qualitative patterns are similar. Finally, to reduce noise, exports below US\$2000 will be discarded.

In terms of methodology, we follow Eaton et al (2007) in our baseline tables, and extend the approach to some extent in order to find more patterns, especially related to the product dimension of our dataset. The basic cross-sectional decomposition of total export volume in year t to country n , $X_n(t)$ has two components, the number of firms and the average export per firm:

$$\ln X_n(t) = \ln N_n(t) + \ln \bar{x}_n(t),$$

where $N_n(t)$ is the number of exporting firms, and $\bar{x}_n(t)$ is the average export revenue of these firms.

As we are more interested in the dynamic rather than the cross-sectional role of the extensive margin, following Eaton et al. (2007) we further decompose export growth into the share of continuing, entrant and exiting firms.

$$\begin{aligned} & \frac{X_{nHU}(t) - X_{nHU}(t-1)}{[X_{nHU}(t-1) + X_{nHU}(t)]/2} = \\ & \left(\frac{\sum_{j \in CN_n^{t-1,t}} [x_n(j, t-1) + x_n(j, t)]/2}{[X_{nHU}(t-1) + X_{nHU}(t)]/2} \right) \left(\frac{\sum_{j \in CN_n^{t-1,t}} [x_n(j, t) - x_n(j, t-1)]}{\sum_{j \in CN_n^{t-1,t}} [x_n(j, t-1) + x_n(j, t)]/2} \right) \\ & + \frac{NEN_n^{t-1,t} \bar{x}_n(t-1)}{[X_{nHU}(t-1) + X_{nHU}(t)]/2} + \frac{\sum_{j \in EN_n^{t-1,t}} [x_n(j, t) - \bar{x}_n(j, t-1)]}{[X_{nHU}(t-1) + X_{nHU}(t)]/2} \\ & - \frac{NEX_n^{t-1,t} \bar{x}_n(t-1)}{[X_{nHU}(t-1) + X_{nHU}(t)]/2} - \frac{\sum_{j \in EX_n^{t-1,t}} [x_n(j, t) - \bar{x}_n(j, t-1)]}{[X_{nHU}(t-1) + X_{nHU}(t)]/2} \end{aligned}$$

where $X_{nHU}(t)$ denotes Hungarian exports to country n in year t , and $x_n(j, t)$ is the export of firm j to country n . $CN_n^{t-1,t}$ represents (pairwise) continuing firms that exported both in $t-1$ and t , $EN_n^{t-1,t}$ denotes (pairwise) entrants, which did not export $t-1$ but exported in t , and $EX_n^{t-1,t}$ is (pairwise) exiting firms, which exported in $t-1$ but did not in t . $NEN_n^{t-1,t}$ and $NEX_n^{t-1,t}$ represents the number of entrants and exiting firms, respectively.

The left-hand side of the equation measures the growth of Hungarian exports to country n in year t . The first line of the right-hand side is the contribution of continuing firms. It is decomposed into two terms. The first term represents the share of these firms in year t , while the second one is the export growth of these firms.

The second line shows the contribution of pairwise entrants. The first term in this line shows the potential contribution of entrants if these new firms had the same average export volume as those of the average firm in $t - 1$. The second term describes the size difference between year t entrants and the year $t - 1$ average firm. The third line represents the contribution of exiting firms. Similarly to entrants, it is composed of two terms: (i) what would be the contribution of exiting firms if they had the same average export volume as those of the average firm in $t - 1$, and (ii) the term correcting for the difference in export revenue.

Results

First, we decompose trade growth into three components: entrants, continuing and exiting firms. Secondly, for continuing and exiting firms, we repeat this exercise for each size quintile to see how firm size affects differences in the decomposition of export growth. We also investigate whether patterns are different for destination markets and products. Thirdly, by presenting a transition matrix, we assess how frequently firms move between quintiles. As a natural expansion of this, we calculate the trade growth of entrant cohorts, and show their contribution to the total Hungarian export volume in the long run. Fourth, we investigate further the firm-level trade growth by showing how firms expand the number of their export markets and exported products.

Firm level extensive and intensive margins of trade growth

Table 1 shows the number, total export revenue and average export revenue for entering, continuing, exiting and single-year firms in each year. Each of these measures of export performance increased steadily during the period under study. The number of exporters almost doubled from about 3000 to nearly 5800. Total trade volume increased by 6, and as a result, the growth in average export by firm increased from about US\$ 2 million to 6.4 million. The extensive growth was more important until 2001, after which the number of exporting firms stabilized, but the export volume per firm still grew fast. Also, the Russian crisis led to a decrease in the number of exporters in 1999 and slowed down the growth of total exports.

The table indicates deep churning: a large share of firms enters and exits every year. On average, firm entry was much larger than exit in seven years, but there is a break in 1999.

Following the Russian crisis, firm entry was relatively low, while exit remained about the same, so the latter almost outweighed the former. In 2000, firm entry rose while exit declined significantly, so the net entry increased. For the last two years, firm exit rose relatively high, while entry dropped and was outweighed by exit in 2001 and hardly bigger than exit in 2002. Entering and exiting firms are 5-10 times smaller than the average continuing firm. In some years, however, with the entry or exit of large firms, the average entering and exiting firm size becomes very large. It is also clear, that the overwhelming majority of exports is realized by continuing firms, and they are responsible for the majority of year-to-year export growth as well.

[Table 1 around here]

Table 2 presents the decomposition of export growth for total Hungarian exports. The first column shows total growth. Between 1992 and 1993 exports were still declining with 11% as a consequence of collapsing eastern export markets and strong domestic transformational recession. From 1994 onwards, however, massive export growth began, with reaching its peak in 1996, increasing by 28% (in US\$ terms). Column 2 shows the share of continuers. In 1993, this was 85%, small relative to 97-98% at the end of the period. The latter number suggests that continuers are responsible for the overwhelming majority of export volume. This does not seem to be unique in Hungary: Eaton et al. (2007) report very similar values for Colombia. Continuing firms were able to increase their exports robustly in every year, 1993 excepted, contributing with nearly 100% to total export growth in each year. In Colombia, in 3 of 9 years continuers' export decreased significantly, together with total exports.

Analysing the number of entering and exiting firms, we see some characteristic patterns. First, the number of entering firms was 7-8 percentage points larger than that of exiting firms until 2001, showing a very large increase in terms of the firm-extensive margin. In line with Table 1, the number of entrants and exiting firms was about equal in 2002 and 2003. In terms of absolute values, as can be expected, the share of entering firms decreased to a large extent; from 44% to about 20%. For exiting firms this measure was smaller during our sample period, but decreased similarly. Thirdly, relative to Colombia the share of entering and exiting firms is low; Eaton et al (2007) report numbers between 35 and 45% for most years. Both entering and exiting firms are smaller than the average firm in the previous year. Here, however, it can be important that we restrict our attention to proper firms and drop export transactions below US\$2000.

We derive two main conclusions from this dynamic decomposition. First, in every year there is very significant entry and exit to exporting. Secondly, nearly 100 percent of year-to-year export growth comes from the intensive margin, the increasing exports of continuing firms.

[Table 2 around here]

The effect of exporter size

Eaton et al (2007) emphasize that Gibrat's law does not characterize export growth: smaller exporters increase their exports more than proportionally. Following their work, we decompose the export growth of continuing exporters by quintiles. Table 3 shows these results. Firms are classified to quintiles based on their export volume in year $t - 1$. Note that this calculation is based on firms exporting in year $t - 1$, so entry is not taken into account. This has the advantage that there is no composition effect. The table shows export growth of continuers corrected by exiting firms, and total export volume of firms in the different quintiles (averaged over year t and $t - 1$). Several patterns can be seen in this table. First, as shown for example by Bernard et al (2007) and Mayer and Ottaviano (2007) export revenues are highly skewed: in 2003 the contribution of the first quintile was US\$ 27 million, while it was above US\$ 31 billion for the largest quintile. Also, the results show that the total exports in the first quintile changed little during more than 10 years, while it increased nearly fivefold for the largest quintile. The increasing skewness of the exporter size distribution can also be observed in Colombia, although at a lower degree. The widening gap between the average first and fifth quintile firm can be interpreted as a confirmation of the intra-industry reallocation prediction of heterogeneous firm theories: as a result of trade liberalization, more productive firms are able to extend their export sales rapidly. While it is a possible explanation, the entry of multinational firms may have played a much more important role in practice. The composition of the largest quintile changed radically between 1992 and 2003. In 1992, firms in the top quintile were mainly state-owned post-socialist giants, but after 1996, the overwhelming majority consisted of multinational affiliates.

The numbers for trade growth strongly reject Gibrat's law. While the smallest exporters increased their exports well above 100 percent each year, the export growth of largest firms was between 5 and 15 percent in most years. One cannot see a clear trend in export growth for most quintiles, except for the two largest ones. In 1993, continuing firms suffered a decrease at these quintiles reflecting the loss of their main export markets. In more recent years, however, continuers in the top quintiles were able to increase their export volume steadily. Smaller firms, on the other hand, increased robustly their export volumes even in the early

years. This comparison shows the duality of the economy: former state owned firms struggled for survival, while dynamic small new exporters were able to enter foreign markets rapidly in this phase of transition.

The effect of exit seems to be qualitatively unimportant for most quintiles and years. However, it proved quite essential for the largest firms in the beginning of the period, when large exporters disappeared or were radically restructured.

[Table 3 around here]

These average patterns are similar for different destination markets, as can be inferred from Table 4. Small firms were able to increase their exports rapidly, well above 125% per year in each of the 10 most important destination markets (in terms of the number of exporting firms). The largest continuing firms were also able to increase their export volume on average to each country. In the top quintile the effect of multinationals is obvious: the largest export growth can be observed to countries from which large multinationals are present in Hungary: Germany, the Netherlands and France.

[Table 4 around here]

We have also decomposed export growth by the industry of the firm (Table 5). The distribution of firm size is very different in different industries. The textiles sector is different from the other industries, as export revenue in the first quintile of this industry is very large compared to other industries, but this is not the case for the largest quintile. As a result, skewness is low in textiles compared to other industries. Chemicals is the other extreme of the skewness distribution, where the smallest quintile exported 4 million USD, while the export volume of the largest quintiles was more than US\$ 2 billion on average. Theoretically skewness of the export distribution should be related to Pareto-k parameter of firm productivity distribution. Melitz and Ottaviano (2007, p 45.) calculates this for different industries in Italy and France. The estimated Pareto-k is low in textiles in both countries, which is in line with our results. The Pareto-k of chemicals is also low, however, especially in France, which would predict a relatively low skewness of export distribution in this industry. The large skewness of Hungarian chemical exports can be explained by the fact that a few very large pharmaceutical firms are operating in Hungary, affecting strongly size distribution in this sector.

In terms of export growth, there is no evident difference across industries in the lower quintiles: there is a rapid growth for smaller firms. The only exception is the textile industry, where the growth of 'only' 103 percent is significantly different from the growth rates in other industries, 120-140 percent. Industry differences are more pronounced for larger firms.

Large machinery firms (mainly multinational affiliates) were expanding their export volume with a robust 19 percent per year. The slowest growth in the larger quintiles can be observed for food and textiles, where – taking account of exit – export growth of firms exporting in $t - 1$ was -4 and -5 percent, respectively. This suggests that the duality between small and large firms was the most important in these industries: a steady decline in export revenues of large firms was paralleled with strong export growth of small firms.

[Table 5 around here]

We were interested whether product-level heterogeneity is related to the pattern of export growth. For this, we decomposed export growth by the homogeneity of the product using the liberal classification of Rauch (1999). The results are shown in table 6. There is a very large difference in terms of skewness by homogeneity. The ratio of total exports of the largest to the smallest quintile is 180 for homogeneous products, 337 for reference priced goods and 457 for differentiated goods. Productivity distribution in the homogeneous goods industries has a lower skewness parameter, reflecting smaller firm size differences.

Similarly to previously examined dimensions of heterogeneity, export growth differences by product homogeneity are less obvious for smaller firms than for larger ones. In the bottom quintile average export growth of firms already exporting in year $t - 1$ is 123% per year for homogeneous goods and it is 137% for differentiated goods. In the top quintile, on the other hand, average growth was 2% for homogeneous, 6% for reference priced and 15% for differentiated goods in the largest quintile. The difference in growth rates explained by exit was more than twice as much for homogeneous than for differentiated goods. These results document the fundamental restructuring in Hungarian exports; the declining importance of homogeneous goods was driven by a low growth of exports by continuing firms and significant exit of large homogeneous-goods exporting firms. This was, however, paralleled by the strong growth of small homogeneous good exporters.

[Table 6 around here]

Firm dynamics across quintiles

It is important to see how individual firms increase their exports and at what frequency they move across quintiles. Table 7 shows the transition matrix for the quintiles of export: what is the probability that a firm in quintile i at $t - 1$ will be in quintile j in year t ? It is also interesting to see the probability that a firm stops exporting. For this, we include a non-exporting category, consisting of firms which exported for at least one year between 1992 and 2003, but did not export in that year. The matrix is an average of the transition probabilities in all sample years, thus it shows average annual probabilities.

The most obvious characteristic of the matrix is its persistence: firms are likely to remain in the quintile where they are. It is not surprising, that the two most persistent quintiles are the top quintile and the non-exporting category. Generally, persistence decreases with firm size, which can be explained by the large probability that firms exit from exporting altogether: this is 48% for firms in the bottom quintile, 26% for firms in the second quintile, and there is even a probability of 7% that the largest exporters quit the export market every year. These exiting probabilities are even larger in Colombia, where there is a 76% probability that firms in the first quintile stop exporting, and this probability is 10% for firms in the top quintile.

'Upward mobility' is also important. Small exporters in the first quintile face a 24% chance to move up to a larger quintile, compared to 28% probability of staying in quintile 1. It is less likely that larger exporters move up, but its probability is still significant: for example, firms in the third quintile move up with a probability of 19%.

[Table 7 around here]

Earlier results have shown that small exporters grow very fast, but their contribution is quite small in the year of their entry. It is very natural to ask: how much these firms contribute to aggregate export growth in the long run? Following Eaton et al (2007), we analyse the evolution of different cohorts of exporters in Table 8. The first cohort, firms already exporting in 1992, includes all firms which started exporting in that year or earlier.

Similarly to the transition matrix, the table confirms the extensive churning of exporters over time; from the cohort entering in 1993, only about 34% exported in 2003. Compared to Colombia, however, churning is relatively low; there only 8% of the cohort entering 1997 continued exporting until 2005. Surviving firms, on the other hand, were able to increase their export volume massively. Exporters entering in 1993 and 1994 exported a similar amount on average than firms already exporting in 1992 (and possibly much earlier).

These numbers show the dominance of the extensive margin of firms in the long run. First, the total export of firms already exporting in 1992 increased by only 56% compared to the 480% increase in total export volume. These firms contributed only by 27% to total exports in 2003, and the remaining 73% was realized by the firms that started exporting after 1992.⁵ As a comparison, the contribution of firms already exporting in 1996 was 76.5% to total exports in 2003. Structural change and rapid trade liberalization in Hungary led to an export growth mainly driven by the entry of new exporters, the firm-level intensive margin. This is not only

⁵ This is not only a characteristic of manufacturing firms. The result for all exporters is strikingly similar: 26.7%.

a result of very early entering firms. Firms entering after 1994 contributed 42% to total export volume in 2003.

[Table 8 around here]

Within-firm extensive margins

In the previous subsection we have analysed how the total export volume of continuing firms changed. In this subsection, we decompose these firms' export growth to see how they extended the number of their export markets and the export products. We will categorize firms according to the number of their export markets/exported products in year -1 , and calculate the growth in the number of these variables for each group separately. Finally, we calculate the within-firm extensive margin, i.e. the number of destination-product pairs the firms export to, and decompose it in a similar way.

Table 9 shows how the most important firm-level variables were related to the firm-level extensive margin in 2003. The variables are real value added per employee, capital-labour ratio and the number of employees in relative terms, compared to the industry average. As a comparison, the table also includes all firms, which did not export in 2003, using balance sheet data.

The largest differences can be observed in terms of number of employees followed by value added. Also, there is a strict sorting of firms by these variables both in terms of the number of export markets and number of products. In terms of capital-labour ratio, there is only a strict sorting of firms in terms of destination-product pairs, rather than the two components of the within-firm extensive margin.

[Table 9 around here]

Table 10 shows how continuing firms exporting to different numbers of destinations increased the number of their export markets in the following year. The average number of export markets per firm does not follow any clear trend, which is surprising given the fundamental changes in Hungarian trade structure.

Like in earlier tables, Gibrat's law does not seem to apply. Continuing firms exporting to only one market export to 1.4 markets in the next year, while the growth is only 0.6 for firms exporting to at least 11 markets.

There is important variation over time. On the one hand, it is not surprising, that at the beginning of the period the number of export markets decreased strongly for large firms. On the other hand, this decrease was less pronounced for firms exporting to 6-10 countries than for firms exporting to more than 10 markets, showing that these large exporters were able to

keep their export markets to a larger degree even in such turbulent times. Parallel with this, continuing small firms were very fast in expanding the number of their export markets.

After the initial period of transition, the growth of small exporting firms slowed down significantly from 0.59 in 1994 to 0.31 in 2003, suggesting that a number of small exporters exported steadily to one export market. Cyclical effects seem to be more important for larger firms. In 1999, as the consequence of the Russian crisis, the number of export markets decreased for all firms, except the bottom two categories.

[Table 10 around here]

This analysis may be upward biased in the sense that firm exit is ignored. We present a transition matrix in Table 11 to get a more complete picture. Most entering firms go into 1 market only in the first year, but about 25% of new exporters start exporting to more than one market. Firms exporting to one market exit with a probability of 45%, and expand to new markets with a probability of 13%. Exporters selling in more markets exit with relatively high probability; even firms exporting to more than 10 markets exit from exporting with a yearly probability of 3%. Also, the matrix shows a ‘downward’ drift; with the exception of firms exporting to one market, all other firms are more likely to move downward than upward, suggesting, in line with Table 10, that large exporters are unlikely to expand the number of their export markets quickly.

[Table 11 around here]

The second dimension of the within-firm extensive margin is the average number of exported products, which is shown in Table 12. Remember, that these are quite aggregated, 2-digit product categories. The pattern by firm size is quite surprising; only small firms, exporting only one product increased the number of exported products every year on average. Firms exporting 2-5 products increased the number of products only in 4 years; larger firms reduced the number of their exported products in all years, with only one exception. For large firms, the decrease is very spectacular in 1993 and 1994, suggesting that restructuring led to a serious reduction in the number of their product lines.

[Table 12 around here]

These results are reinforced by the transition matrix of the number of products, which is shown in Table 13. Firms exporting more than one product decreased the number of exported products. For example, firms exporting 6-10 products face 7% probability of exit, 39% probability of reducing their exported product range and only 9% probability of moving to a higher category. These results are in line with the prediction of Bernard et al. (2006), that is,

as a result of trade liberalization firms drop their marginal products and concentrate on their core competencies.

Compared to the transition matrix for the number of destinations, two other differences can be observed. First, the probability that firms exporting at least 20 products exit in the next year is 11%, which is larger than the exit probability of firms exporting to a large number of markets, suggesting the greater importance of market-specific than product-specific fixed costs. Secondly, the persistence of the number-of-products transition matrix is stronger than that of the number-of-markets matrix.

[Table 13 around here]

Finally, Table 14 shows the growth of the within-firm extensive margin. Its behaviour is very similar to the pattern of the number of export markets. This measure declined from 26.5 in 1992 to 23.62 in 1999, and increased after it to 25.1. When decomposed by firm size, the growth is the largest in the bottom quintile, but it is decreasing with time. Its growth is negative in some years for the largest firms, especially in the beginning of the period and around the Russian crisis.

[Table 14 around here]

Conclusions

This paper analyzed Hungarian export growth between 1992 and 2003, concentrating on different dimensions of the extensive margin. One of our main aims was to present stylized facts for the relationship between firm size and elements of export growth.

The estimates show very strong dynamics in terms of entry and exit to exporting. The new entrants, however, are very small, and do not contribute too much to year-to-year export growth. New entrants are likely to exit in few years, but surviving new entrants grow quickly. This also means, that their share in total exports increases fast; in 2003, 73% of export volume was realized by firms which started exporting after 1992.

Hungarian exports are not characterized by Gibrat's law. Small exporters are growing very quickly, why trade growth of larger firms is smaller. When decomposing across destination countries, industries and products, we found small differences in growth rates of smaller firms, but significant heterogeneity for larger firms.

When analyzing firm-level exports in more details, we found similar patterns: surviving small firms are likely to export to new markets and introduce new export products. This growth was smaller for larger firms, and macro shocks (transition and the Russian crisis) affected them

strongly. Also, firms exporting the largest number of products consistently reduced the number of their exported product lines.

Some of our results are comparable with Eaton et al (2007) for Colombia, with the qualification, that we only considered proper firms and the manufacturing sector. The main patterns in the Hungarian data are in line with their findings, but there are some differences in the details. We have found less entry and exit, but stronger growth of surviving firms and an even larger effect of entry in the long run. Moreover, we found that larger firms are more likely to exit in Hungary than in Colombia. These differences can be a consequence of the specificities of transition or the extent of trade liberalization between Hungary and the EU market.

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Tables

Table 1.

Entering, exiting, continuing and single-year exporters, 1992-2003					
Number of firms					
	Entering	Continuing	Exiting	Single-year	Total
Year					
1992	-	-	-	-	3068
1993	949	1636	438	343	3366
1994	804	2119	466	335	3724
1995	673	2478	445	414	4010
1996	782	2688	463	351	4284
1997	792	3024	446	381	4643
1998	719	3296	520	472	5007
1999	578	3483	532	379	4972
2000	879	3693	368	342	5282
2001	689	3848	724	478	5739
2002	765	3785	752	519	5821
2003	-	-	-	-	5792
Total value of exports (million US\$)					
	Entering	Continuing	Exiting	Single-year	Total
Year					
1992	-	-	-	-	6348
1993	546	4810	281	45	5678
1994	525	6760	174	23	7481
1995	324	8860	377	65	9625
1996	1070	11300	273	67	12740
1997	416	15600	255	31	16328
1998	315	19600	319	27	20222
1999	327	19600	2390	25	22336
2000	1710	21200	485	83	23491
2001	415	25500	1500	21	27470
2002	331	29200	563	33	30079
2003	-	-	-	-	36856
Exports per firm (thousand US\$)					
	Entering	Continuing	Exiting	Single-year	Total
Year					
1992	-	-	-	-	2069
1993	575	2938	641	132	1687
1994	653	3190	372	70	2009
1995	481	3575	847	157	2400
1996	1362	4217	589	191	2974
1997	526	5167	571	81	3517
1998	439	5935	613	56	4039
1999	565	5626	4490	66	4492
2000	1941	5745	1318	242	4447
2001	602	6636	2067	45	4786
2002	433	7702	749	63	5167
2003	-	-	-	-	6363

Table 2.

Contribution of pairwise entry and exit to the growth of total manufacturing exports between $t-1$ and t							
		Contribution of pairwise continuers		Contribution of pairwise gross entry		Contribution of pairwise gross exit	
	Growth of exports	Continuers' share in t-1 exports	Growth of exports by continuers	Added number of firms	Exports of entering firms relative to the average	Dropped number of firms	Exports of exiting firms relative to the average
Year (t)	1	2	3	4	5	6	7
1993	-11%	85%	0%	44%	-35%	-34%	13%
1994	27%	93%	26%	29%	-21%	-20%	15%
1995	25%	97%	24%	26%	-21%	-19%	17%
1996	28%	93%	23%	24%	-14%	-18%	14%
1997	25%	97%	25%	24%	-21%	-17%	14%
1998	21%	98%	21%	23%	-21%	-16%	14%
1999	10%	98%	10%	18%	-17%	-19%	17%
2000	5%	91%	9%	24%	-16%	-18%	7%
2001	16%	98%	16%	20%	-19%	-12%	10%
2002	9%	97%	14%	21%	-20%	-20%	15%
2003	20%	97%	18%	19%	-15%	-20%	18%
1992-2003	141%	30%	112%	47%	77%	-21%	5%

Table 3.

Export growth by quintiles of value of exports in year t-1, continuing and exiting manufacturing firms															
Year	Export Growth Continuing Firms					Export Growth Continuing-Exiting Firms					Mean total exports between <i>t-1</i> and <i>t</i>				
	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5
1993	160%	76%	40%	15%	-5%	158%	70%	33%	1%	-28%	32	51	156	490	4990
1994	172%	126%	76%	48%	18%	171%	124%	74%	45%	12%	46	91	205	554	5410
1995	152%	82%	53%	35%	20%	151%	80%	51%	33%	17%	37	86	257	802	7180
1996	195%	150%	36%	51%	7%	194%	149%	35%	49%	2%	408	254	283	1050	8620
1997	141%	103%	38%	16%	23%	139%	102%	37%	15%	21%	39	130	294	953	12900
1998	129%	87%	48%	22%	20%	127%	86%	47%	21%	18%	34	119	324	1040	16600
1999	125%	53%	21%	7%	10%	123%	52%	20%	6%	8%	36	100	302	1080	19600
2000	94%	59%	30%	13%	7%	91%	57%	29%	12%	-5%	23	97	319	1060	20500
2001	111%	64%	18%	18%	16%	110%	63%	17%	17%	14%	24	89	281	1100	23800
2002	110%	52%	27%	13%	13%	107%	50%	25%	12%	7%	26	82	280	1090	27100
2003	108%	68%	36%	26%	17%	105%	66%	35%	25%	16%	27	102	307	1170	31100
Annual Average	136%	84%	39%	24%	13%	134%	82%	37%	21%	8%	67	109	273	944	16200

Table 4.

Export growth by quintiles of value of exports in year t-1, continuing and exiting manufacturing firms															
Ten most popular destinations. Annual Average 1992-2003															
Destination	Export Growth Continuing Firms					Export Growth Continuing-Exiting Firms					Mean total exports between t-1 and t (million US\$)				
	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5
Germany	139%	89%	31%	19%	12%	137%	87%	29%	16%	6%	27	72	136	413	5910
Austria	136%	83%	42%	26%	8%	132%	79%	37%	21%	1%	7	15	32	95	1380
Romania	142%	98%	64%	35%	8%	136%	92%	56%	27%	-2%	3	5	11	28	235
Italy	150%	88%	40%	17%	7%	147%	83%	36%	11%	-1%	8	17	39	103	870
Slovakia	138%	80%	51%	27%	15%	132%	73%	45%	21%	7%	3	4	8	20	193
France	143%	90%	42%	22%	16%	139%	86%	37%	16%	8%	5	12	23	60	783
Switzerland	126%	74%	46%	14%	2%	120%	68%	39%	7%	-6%	2	5	9	19	172
Czech Republic	128%	90%	50%	32%	9%	123%	85%	45%	28%	2%	2	5	10	29	275
The Netherlands	144%	85%	47%	31%	16%	140%	80%	41%	23%	3%	4	8	15	52	622
Poland	144%	102%	60%	34%	12%	140%	96%	55%	27%	5%	3	7	13	35	312

Table 5.

Export growth by quintiles of value of exports in year t-1, continuing and exiting manufacturing firms															
Manufacturing categories. Annual Average 1992-2003															
Manufacturing category	Export Growth Continuing Firms					Export Growth Continuing-Exiting Firms					Mean total exports between t-1 and t (million US\$)				
	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5
Food and Tobacco	129%	67%	35%	15%	4%	127%	64%	31%	9%	-4%	6	18	55	170	1140
Textiles	103%	35%	16%	6%	3%	102%	34%	14%	2%	-5%	14	43	112	258	1270
Wood, paper and printing	122%	66%	29%	14%	12%	117%	61%	24%	10%	6%	2	4	10	30	417
Chemical industry	132%	90%	30%	22%	11%	130%	88%	28%	20%	7%	4	9	20	82	2210
Other non-metallic products	117%	50%	46%	13%	5%	113%	47%	44%	10%	1%	1	2	7	27	228
Metal products	121%	59%	38%	22%	7%	118%	56%	34%	17%	0%	4	11	30	79	1020
Machinery	140%	106%	51%	39%	19%	138%	105%	49%	37%	14%	42	41	83	358	9510
Other manufacturing	126%	42%	21%	13%	7%	123%	39%	17%	7%	-3%	2	3	9	29	164

Table 6.

Export growth by quintiles of value of exports in year t-1, continuing and exiting manufacturing firms															
Rauch classification. Annual average 1992-2003															
Product category	Export Growth Continuing Firms					Export Growth Continuing-Exiting Firms					Mean total exports between t-1 and t (million US\$)				
	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5	Q1	Q2	Q3	Q4	Q5
Homogenous	130%	79%	47%	25%	2%	123%	71%	41%	18%	-11%	3	5	15	59	490
Reference-priced	145%	110%	53%	35%	6%	140%	106%	49%	32%	1%	7	13	28	121	2250
Differentiated	137%	95%	44%	23%	15%	135%	93%	42%	21%	9%	24	81	163	570	11100
Total	135%	85%	41%	24%	13%	134%	84%	39%	21%	7%	42	119	275	927	15700

Table 7.

Transition matrix for the quintile of exports to which a firm belongs						
Conditional probability of transiting from quintile of exports x in $t-1$ to quintile y in t						
Final quintile (y)	Initial quintile (x)					
	Non-exporting	1	2	3	4	5
Non-exporting	0.87	0.48	0.26	0.15	0.09	0.07
1	0.06	0.28	0.15	0.04	0.01	0.00
2	0.03	0.17	0.36	0.14	0.02	0.00
3	0.02	0.05	0.19	0.48	0.12	0.01
4	0.01	0.01	0.03	0.17	0.63	0.08
5	0.01	0.00	0.01	0.02	0.13	0.84

Table 8.

Firms by initial export year cohorts, 1992-2003													
Number of firms													
First year of report between 1992 and 2003													
Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total
1992	3068	-	-	-	-	-	-	-	-	-	-	-	3068
1993	2074	1292	-	-	-	-	-	-	-	-	-	-	3366
1994	1742	949	1033	-	-	-	-	-	-	-	-	-	3724
1995	1544	797	736	933	-	-	-	-	-	-	-	-	4010
1996	1413	733	632	590	916	-	-	-	-	-	-	-	4284
1997	1312	664	565	503	636	963	-	-	-	-	-	-	4643
1998	1243	620	545	493	519	661	926	-	-	-	-	-	5007
1999	1161	580	509	420	473	538	580	711	-	-	-	-	4972
2000	1092	560	475	382	418	499	507	433	916	-	-	-	5282
2001	1025	540	470	388	401	493	481	402	689	850	-	-	5739
2002	940	497	419	348	356	444	424	345	538	521	989	-	5821
2003	866	441	389	306	324	400	360	293	456	395	619	943	5792
Value of exports (million US\$)													
First year of report between 1992 and 2003													
Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total
1992	6350	-	-	-	-	-	-	-	-	-	-	-	6348
1993	5090	591	-	-	-	-	-	-	-	-	-	-	5678
1994	5630	1320	529	-	-	-	-	-	-	-	-	-	7481
1995	6480	1700	1090	352	-	-	-	-	-	-	-	-	9625
1996	7060	1990	1420	1690	578	-	-	-	-	-	-	-	12740
1997	8060	2270	2180	2460	966	403	-	-	-	-	-	-	16328
1998	8600	2410	3970	2900	1200	839	305	-	-	-	-	-	20222
1999	8530	2360	4930	3050	1180	1290	697	298	-	-	-	-	22336
2000	7850	2360	5480	2460	973	1050	826	898	1600	-	-	-	23491
2001	8050	3030	4930	2930	789	1110	1000	1230	3990	418	-	-	27470
2002	8320	4800	5160	2620	842	1160	1050	974	4030	787	329	-	30079
2003	9950	5050	6420	1660	1110	1490	1480	1300	5470	1010	638	1270	36856
Exports per firm (million US\$)													
First year of report between 1992 and 2003													
Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Total
1992	2069	-	-	-	-	-	-	-	-	-	-	-	2069
1993	2453	458	-	-	-	-	-	-	-	-	-	-	1687
1994	3234	1389	513	-	-	-	-	-	-	-	-	-	2009
1995	4196	2135	1485	378	-	-	-	-	-	-	-	-	2400
1996	4997	2710	2255	2865	631	-	-	-	-	-	-	-	2974
1997	6140	3413	3859	4884	1519	418	-	-	-	-	-	-	3517
1998	6918	3895	7285	5879	2306	1269	329	-	-	-	-	-	4039
1999	7349	4065	9688	7258	2503	2395	1201	419	-	-	-	-	4492
2000	7186	4222	11500	6444	2329	2099	1629	2074	1743	-	-	-	4447
2001	7851	5604	10500	7561	1967	2251	2082	3059	5790	491	-	-	4786
2002	8855	9665	12300	7524	2365	2617	2477	2822	7488	1511	333	-	5167
2003	11500	11400	16500	5410	3415	3733	4112	4453	12000	2568	1030	1350	6363

Table 9.

Firms' characteristics and number of destinations, products and destination-product pairs in 2003					
Number of destinations	Mean(<i>ry</i>)	Mean(<i>rk</i>)	Mean(<i>rl</i>)	Mean(<i>l</i>)	Number of firms
0	0.84	1.08	0.38	16	8515
1	1.01	0.82	0.66	28	2600
2-5	1.20	0.86	1.51	69	2172
6-10	1.58	1.11	3.18	163	509
11-30	1.89	0.97	6.45	357	439
31-50	2.70	1.64	17.67	921	57
50+	3.51	3.51	44.87	2831	15
Total	1.00	1.00	1.00	48	14307
Number of products	Mean(<i>ry</i>)	Mean(<i>rk</i>)	Mean(<i>rl</i>)	Mean(<i>l</i>)	Number of firms
0	0.84	1.08	0.38	16	8515
1	1.05	0.83	0.69	29	2800
2-5	1.30	0.87	1.90	88	2423
6-10	1.71	1.31	5.69	314	446
11-20	1.71	1.05	13.52	769	114
21-50	5.22	0.32	53.36	3679	9
Total	1.00	1.00	1.00	48	14307
Number of destination-product pairs	Mean(<i>ry</i>)	Mean(<i>rk</i>)	Mean(<i>rl</i>)	Mean(<i>l</i>)	Number of firms
0	0.84	1.08	0.38	16	8515
1	1.00	0.86	0.50	21	1877
2-5	1.12	0.83	1.12	47	2338
6-10	1.43	0.95	2.09	103	726
11-50	1.68	1.02	5.21	277	767
50+	3.03	1.59	24.27	1425	84
Total	1.00	1.00	1.00	48	14307
<p><i>ry</i>, <i>rk</i> and <i>rl</i> are value added per employee, capital/labour ratio and number of employees in relative terms, i.e. ratio of firm <i>i</i> to sector <i>j</i>. <i>l</i> is number of employees.</p>					

Table 10.

Expanding exporting activity by number of destinations in year t-1, continuing firms						
Number of destinations	1	2	3 - 5	6 - 10	10+	Total
	Growth of number of destinations					Average number of destinations
Year						
1993	0.55	0.30	-0.07	-0.74	-0.34	4.07
1994	0.59	0.41	0.36	0.40	0.68	4.35
1995	0.49	0.42	0.23	0.34	0.72	4.61
1996	0.42	0.08	0.17	-0.05	0.19	4.56
1997	0.40	0.27	0.18	0.13	-0.23	4.58
1998	0.33	0.24	0.07	-0.11	-0.29	4.49
1999	0.32	0.10	-0.22	-0.06	-0.32	4.38
2000	0.32	0.21	0.20	0.14	0.18	4.52
2001	0.35	0.08	-0.02	0.11	0.14	4.45
2002	0.28	0.10	-0.06	0.12	-0.12	4.47
2003	0.31	0.16	-0.06	0.15	0.00	4.60
Annual Average	0.40	0.22	0.07	0.04	0.06	4.46

Table 11.

Transition matrix for number of destinations a firm sells to						
Conditional probability of transiting from exporting to x destinations in t-1 to y destinations in t						
Final number of destinations (y)	Initial number of destinations (x)					
	0	1	2	3-5	6-10	10+
0	0.87	0.31	0.17	0.11	0.09	0.07
1	0.09	0.51	0.25	0.08	0.01	0.00
2	0.02	0.12	0.34	0.17	0.02	0.00
3-5	0.01	0.05	0.21	0.49	0.21	0.01
6-10	0.00	0.00	0.02	0.14	0.53	0.10
10+	0.00	0.00	0.00	0.01	0.15	0.81

Table 12.

Expanding exporting activity by number of products in year t-1, continuing firms					
Number of exported products	1	2 - 5	6 - 10	11+	Total
	Growth of number of exported products				Average number of products
Year					
1993	0.45	-0.24	-1.50	-2.84	2.30
1994	0.48	-0.02	-0.98	-3.16	2.33
1995	0.48	0.08	-0.62	-0.36	2.48
1996	0.46	-0.09	-0.84	-1.41	2.48
1997	0.41	0.04	-0.40	-3.04	2.58
1998	0.40	-0.02	-0.53	-1.11	2.59
1999	0.33	-0.08	-0.47	-1.31	2.59
2000	0.32	0.02	-0.72	-1.05	2.63
2001	0.36	0.17	0.18	-0.88	2.75
2002	0.32	-0.02	-0.37	-0.51	2.76
2003	0.31	0.01	-0.35	-0.80	2.82
Annual Average	0.39	-0.01	-0.60	-1.50	2.57

Table 13.

Transition matrix for number of products a firm sells						
Conditional probability of transiting from exporting x products in $t-1$ to y						
Final number of products (y)	Initial number of products (x)					
	0	1	2-5	6-10	11-20	21-50
0	0.87	0.30	0.13	0.07	0.08	0.11
1	0.10	0.51	0.18	0.02	0.01	0.00
2-5	0.03	0.18	0.64	0.32	0.06	0.00
6-10	0.00	0.00	0.06	0.50	0.30	0.00
11-20	0.00	0.00	0.00	0.09	0.52	0.30
21-50	0.00	0.00	0.00	0.00	0.03	0.58

Table 14.

Expanded exporting activity by number of destination-product pairs in year t-1, continuing firms						
Number of destination-product pairs	1 - 4	5 - 9	10 - 20	21 - 44	45+	Total
	Growth of number of pairs					Average number of pairs
Year						
1993	0.61	-0.35	-1.22	-0.76	-2.90	26.54
1994	0.88	0.19	0.98	1.32	-2.09	26.96
1995	0.73	0.31	1.33	2.10	3.55	26.13
1996	0.59	0.29	0.22	0.27	-3.68	24.59
1997	0.53	0.47	0.21	-0.24	0.63	24.66
1998	0.46	0.24	0.18	0.26	-2.32	24.38
1999	0.33	0.02	-0.23	0.56	-4.36	23.62
2000	0.44	0.24	0.39	1.04	1.23	24.43
2001	0.40	0.42	1.36	1.50	3.72	25.35
2002	0.32	0.12	0.04	1.14	2.54	25.15
2003	0.34	0.13	0.29	0.43	1.32	25.14
Annual Average	0.51	0.19	0.32	0.69	-0.21	25.18