

# Micro-Dynamics of Turkey's Export Boom in the 2000s<sup>#</sup>

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The World Bank

January 31 2014

## Abstract

This paper examines the micro-dynamics behind the dramatic export boom experienced by Turkey during the 2000s. Using disaggregated exporter-level customs data covering the universe of export transactions for Turkey during the period 2002-2011, we characterize firm-level dynamics in the export sector and we decompose export growth at the aggregate, sectoral, and destination market levels to identify the role of firm turnover, destination turnover, and product turnover. We show that year-to-year aggregate export growth is dominated by growth in continuous exporters, and for these, growth is dominated by exports to their continued destinations and of their continued products. However, the observed high degree of churning across firms, destinations, and products accounts for a substantial part of Turkey's export growth over longer periods. The patterns of micro-dynamics of export growth are verified across sectors and across groups of destination markets with some exceptions regarding exports to new emerging markets where net exporter entry plays a more critical role for export growth over longer periods.

**Keywords:** Export growth, Exporter dynamics, Entry, Exit, Intensive margin, Extensive margin, Turkey.

**JEL Classification codes:** C81, F14.

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<sup>#</sup> We acknowledge the generous financial support from the World Bank research support budget and the Knowledge for Change Program (KCP), a trust funded partnership in support of research and data collection on poverty reduction and sustainable development housed in the office of the Chief Economist of the World Bank ([www.worldbank.org/kcp](http://www.worldbank.org/kcp)). We thank three anonymous referees as well as Zhihong Yu (the associate editor) for comments that greatly improved the paper. We thank Turkstat President Birol Aydemir, and staff Doğan Böncü, Bülent Tungul, Şahin Çelik, Akın Bodur, Nusret Kılıç, Nilgün Arıkan and Sabit Cengiz Ceylan for allowing us access to the micro data and conduct the empirical analysis in their premises. The findings expressed in this paper are those of the authors and do not necessarily represent the views of the World Bank.

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## 1. Introduction

Sustained export growth is a major economic goal for most developing and developed economies. The link between strong export performance and strong growth performance is obvious in the case of China in the last two decades, following on the evidence for other East Asian economies in earlier decades. Following a shift in the theoretical trade literature to models where firm heterogeneity plays a critical role in shaping trade flows such as those of Melitz (2003) or Bernard, Eaton, Jensen, and Kortum (2003), a burgeoning empirical trade literature has explored the increased availability of very disaggregated exporter-level datasets from customs agencies and several stylized facts have been uncovered for multiple countries.<sup>1</sup> For example, studies such as Eaton, Eslava, Kugler, and Tybout (2008) for Colombia and Amador and Opromolla (2013) for Portugal document a tremendous degree of churning in export markets, with a large proportion of exporters in a given year not having exported in the previous year.<sup>2</sup> Understanding the micro-dynamics behind episodes of strong export growth is a first step in the direction of identifying the types of policies that may promote export growth. If new exporters experience fast growth and over time contribute as much to export growth as existing exporters then the key policies are those that promote survival and growth in export markets and may be as general as ensuring an appropriate macroeconomic framework (particularly in terms of the exchange rate) or as specific as ensuring access to finance and promoting technological upgrading. In contrast, if there is lack of dynamism in export markets, then the key policies are those to overcome the barriers of entering into export markets including for example those that refer to promoting access by local firms to information on foreign markets.<sup>3</sup>

In this paper we examine the micro-dynamics behind the dramatic export boom experienced by Turkey from 2002 to 2008 as well as the underlying forces for the strong contraction ensuing from the 2008-2009 global financial crisis and for the recovery thereafter. Turkish nominal exports grew by 265% between 2002 and 2008, a very strong performance compared to the average for peers in the same income group (Brazil, China, Mexico, and South

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<sup>1</sup> The datasets are sometimes referred to as ‘transactions-level’ trade datasets. See Bernard, Jensen, Redding, and Schott (2007, 2011) for reviews of the literature.

<sup>2</sup> See also Iacovone and Javorcik (2008) for Mexico; Andersson, Lööf, and Johansson (2008) for Sweden, Freund and Pierola (2010) for Peru; Masso and Vahter (2011) for Estonia, De Lucio, Mínguez-Fuentes, Minondo, and Requena-Silvente (2011) for Spain, Fabling and Sanderson (2012) for New Zealand, among others.

<sup>3</sup> Artopoulos, Friel, and Hallak (2011) argue that entry into export markets (for differentiated products) is very dependent on a thorough understanding of features and operations of foreign markets rather than on technological capabilities to design and manufacture products for export.

Africa) whose nominal exports grew by only 212%. Although the 2000s were marked by the explosive Chinese export growth subsequent to its WTO accession, that did not prevent Turkey from experiencing its boom in aggregate exports, even if Turkish exports of textiles and clothing to the EU and the US were hurt by that accession. Interestingly, Turkey was much more negatively affected by the global financial crisis than its income group peers as its aggregate export growth between 2002 and 2011 was 279% relative to 294% for its peers.<sup>4</sup> The 2000s were also a period when Turkey's exports experienced a structural shift away from traditional textiles and clothing towards machinery and metals, and a movement across destination markets with the EU and EFTA losing ground to new markets in the Middle East and North Africa (MENA) and in Europe and Central Asia.

Some of the rationales for the Turkish export boom of the 2000s are the abandonment of the currency peg after 2001 which allowed the Turkish lira to devalue (even though later in the 2000s the Turkish real exchanged rate appreciated), improved macroeconomic conditions more generally, improved 'competitiveness' of the Turkish economy captured in sustained increases in labor productivity while unit labor costs remained well below those of competitors, and the entry into force of the European Union-Turkey Customs Union which brought strong competitive pressure domestically.<sup>5</sup> In this paper we take the rationales for the episode of strong export growth as given and we provide stylized facts on the micro-dynamics behind this growth. Using very disaggregated exporter-level customs data from Turkey for the 2002-2011 period we characterize the firm-level dynamics in the export sector and we decompose export growth at the aggregate, sectoral, and destination market levels to examine the role of firm turnover, destination turnover, and product turnover.<sup>6</sup>

Our main findings are as follows. First, year-to-year aggregate export growth in Turkey is dominated by growth in exports of continuing exporters, i.e., the firm intensive margin. For these continuing exporters, year-to-year growth is dominated by exports to their continuing

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<sup>4</sup> These figures are based on WITS/COMTRADE data and the growth rates are calculated for each country as  $100 * \frac{X_{end\ year} - X_{2002}}{X_{2002}}$  where X designates nominal exports.

<sup>5</sup> See Aysan and Hacıhasanoglu (2007) for a macro perspective on the Turkish export boom in the 2000s and Erdal, Günçavdi, and S. Kayam (2012) for a sectoral perspective.

<sup>6</sup> While writing this paper we became aware of a study by Lo Turco and Maggioni (2012) which uses a subset of the same exporter-level data to examine the effects of the global financial crisis of 2008-2009 in Turkey by decomposing manufacturing exports into the contribution of the extensive and intensive margins at the firm and firm-product level. Our focus here is, however, different, as we are interested in understanding the export boom, and moreover we do not focus our analysis exclusively on manufacturing firms with more than 19 employees as that study does but rather we cover all exporters of manufacturing but also agricultural and mining products.

destinations, i.e., the destination intensive margin, and for these continuing destinations, year-to-year growth is dominated by exports of continuing products, i.e., the product intensive margin. However, very high degrees of firm entry and exit into export markets and of churning along destination and HS 6-digit and CN 12-digit product dimensions from year to year are also verified during both the export boom and the financial crisis and subsequent recovery.

Second, net exporter entry plays a more substantive role for Turkish aggregate export growth over the entire 2002-2008 period than it does for year-to-year growth. Similarly, the churning across destinations accounts for about a third of growth of continuing exporters over the 2002-2008 period and this percentage is even higher over the 2008-2011 period. The churning across new and dropped HS 6-digit products accounts for close to a quarter of growth of continuing exporters in their continuing destinations over the 2002-2008 period and an even larger percentage over the 2008-2011 period. The extensive margin along the more disaggregated CN 12-digit level accounts for the majority of growth of continuing exporters in their continuing destinations, revealing a substantial degree of experimentation and resource reallocation within Turkish exporters.

Third, the micro-dynamics of sectoral export growth reveal across all sectors a dominance of the firm intensive margin in accounting for growth year-to-year and over longer periods and a dominance of the destination intensive margin in accounting for growth of continuing exporters year-to-year and over longer periods. In all sectors, net exporter entry accounts for a larger proportion of growth over longer periods than of year-to-year growth, and net destination entry accounts for a larger proportion of continuing exporters' growth over longer periods than of year-to-year growth. The uniformity of patterns across sectors is a novel finding in the literature.

Fourth, the micro-dynamics of bilateral export growth shows, across all groups of destination markets, a broad preeminence of the firm intensive margin in accounting for growth year-to-year and over longer periods and a preeminence of the HS 6-digit product intensive margin in accounting for growth of continuing exporters year-to-year and over longer periods. Noteworthy exceptions are the importance of net exporter entry in accounting for growth in exports to new emerging markets of China and India over the 2002-2008 period and in exports to the EU and EFTA over the 2008-2011 period. In all groups of destinations, net exporter entry accounts for a larger proportion of growth over longer periods than of year-to-year growth and

net product entry accounts for a larger proportion of continuing exporters' growth over longer periods than of year-to-year growth during the export boom.

Fifth, the intensive and the extensive margins play a different role in explaining export growth for different cohorts of firms over the entire 2003-2011 period: churning across destination markets and churning across HS 6-digit products (for continuing destinations) is critical in explaining growth for the cohort of 2003 entrants that continue to export until 2011 but is less important in explaining growth for the 2002-2011 continuing exporters.

Two interesting differences emerge from the comparison of the stylized facts on the micro-dynamics of export growth in Turkey to those for other countries. First, the larger contribution of net exporter entry to growth over longer periods than to average year-to-year growth in Turkey is less dramatic than what is found for emerging economies in Latin America such as Costa Rica by Lederman, Rodriguez-Clare and Xu (2011), suggesting that the size of entrant and exiting exporters is less distant from the size of continuing exporters in Turkey than it is in Costa Rica since average entry and exit rates are of similar magnitude in the two countries (close to 30% per year). Second, the importance of churning across destination markets in accounting for growth of continuing exporters is substantially larger in Turkey than in Costa Rica, and may be linked to Turkey's larger economic size, level of development, and strategic geographical location.

Overall, our evidence points to a substantial degree of experimentation by Turkish firms of the export market per se, of new destination markets and new products by continuing exporters with high rates of entry and exit registered at all levels both in boom as well as in crisis and recovery, despite a dominance of the intensive margin in accounting for export growth. Our evidence of substantial trial and error is consistent with an important role of idiosyncratic uncertainty on the profitability of as well as of learning about export markets that have been incorporated into recent trade models on export dynamics with heterogeneous firms.

The rest of the paper is organized as follows. Section 2 describes the data and some summary statistics. Sections 3 and 4 examine the dynamics of Turkish export boom, one characterizes exporter dynamics and the other conducts a series of export growth decompositions. Section 5 discusses the theoretical mechanisms that can rationalize the findings. 6 concludes.

## 2. Data and Summary Statistics

We use data covering the universe of export transactions by all Turkish-based firms between 2002 and 2011 collected by the Turkish Customs Authority and transferred to the national statistical institute *Turkstat* for revision and cleaning before being used for policy or research purposes.<sup>7</sup> The variables included in the dataset are the identification code of the exporting firm, the year of the transaction, the exported product code at the HS 12-digit level, the destination market, the value of the transaction (in USD), and the quantity of the transaction (in kilograms).<sup>8</sup> Given that the exporting firm identification codes can be followed over time, our dataset is a panel of firms at the firm-product-destination-year disaggregation level. The export transactions cover agricultural, mining, and manufacturing products but we exclude from our analysis exports in HS Chapter 27 (hydrocarbons such as oil, petroleum, natural gas, coal).

The cleaning procedures that we applied to the dataset are as follows. First, although the data is collected at the Combined Nomenclature CN 12-digit level and we will conduct some analysis at this level, we also aggregate it up to the HS 6-digit level which is a classification that is comparable to those used in other countries and will thus facilitate benchmarking of the stylized facts for Turkey. To our knowledge, our study uses the most disaggregated classification for products – the CN 12-digit level - among recent empirical studies relying on exporter-level customs data.<sup>9</sup> The HS 6-digit and CN 12-digit classifications were revised in 2007, i.e., during the sample period. We addressed these revisions by going through a process of “consolidation” among HS2002 and HS2007 classifications as detailed in Cebeci (2012) and briefly described in the Appendix. The basic principle of consolidation is to identify the HS codes related to each other that were split or merged with the modifications introduced by the 2007 classification, and to replace them with a single code for the entire period. The consolidated classification that we use in our analysis contains a unique number of HS 6-digit codes and CN 12-digit codes that are consistent across the entire period.

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<sup>7</sup> Note that the data is available to researchers but can be accessed only in *Turkstat*'s premises. The universe of export transactions is defined as all export transactions above 100 USD.

<sup>8</sup> The value of the transaction is provided as a Free on Board (FOB) figure.

<sup>9</sup> The other study using a highly disaggregated CN product classification we are aware of is that of Fabling and Sanderson (2010) for New Zealand for which products defined at the CN 10-digit level.

Second, Turkey uses the special trade regime which means that customs record the sales from inland to their own free zones/customs warehouses as exports.<sup>10</sup> We drop from our dataset the observations for sales to free zones since their ultimate destination is unknown and that makes these export transactions difficult to compare to the rest of the transactions.<sup>11</sup> Sales to free zones/customs warehouses represent about 2-5 percent of aggregate exports in Turkey. We also account for the changes in name that some statistical territories have undergone over time due to spatial divisions.<sup>12</sup>

After applying the cleaning procedures the dataset includes a total of 7.3 million firm-HS 6-digit product-destination-year observations (8.8 million firm-HS 12-digit product-destination-year observations) for the 2002-2011 period. To assess the quality of our dataset we compare the corresponding aggregate export flows versus the aggregate export flows available in the WITS/COMTRADE. The ratios indicate that the exporter-level dataset represents 100% of the export flows reported in WITS/COMTRADE, which is not surprising since both are sourced from the same institution *Turkstat*. Figure 1 shows Turkey's aggregate exports based on the exporter-level dataset. Turkey experienced very strong export growth, with nominal exports quadrupling over the 2002-2008 period. Nominal exports declined importantly with the global financial crisis in 2009, but recovered strongly in 2010-2011.<sup>13</sup> The qualitative pattern is similar for growth in real exports.

One important remark to make regarding our dataset is that by covering the universe of exporters it includes both firms that are producing the goods as well as firms that are just trading them (wholesalers or retailers). While this does not pose a problem per se, it should be kept in mind for the interpretation of most of our stylized facts on export growth which apply to the entire set of Turkish exporters - producers and traders.<sup>14</sup> The inclusion of wholesalers or retailers

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<sup>10</sup> The "special trade regime" considers transactions where the goods are sold from the domestic territory *only* to both third countries and free zones/customs warehouses of the origin country as exports. In contrast, the "General trade regime" considers transactions where goods are sold from any national territory (*including free zones*) to third countries only as exports (see p. 32 of United Nations, 2008).

<sup>11</sup> See p. 34 of United Nations (1998).

<sup>12</sup> The Former Republic of Yugoslavia was divided into Bosnia, Croatia and Serbia in 1996 and Serbia was further divided into Serbia and Montenegro in 2006. Some countries recognize Kosovo as an independent state rather than a part of Serbia since 2009. For technical and consistency purposes we treat Serbia, Montenegro and Kosovo as a single destination. While some other territories have undergone changes in names, those changes either occurred before the beginning of our sample period or do not involve the merger or separation of states (e.g., Zaire changed its name to Democratic Republic of Congo in 2006).

<sup>13</sup> The average annual growth rate of nominal exports during the 2002-2011 period was 16%.

<sup>14</sup> Most previous studies in the literature also consider the universe of exporters in a given country.

in the set of exporters can contaminate the results from sectoral export growth decompositions (that will be considered in Section 4.3) since wholesalers and retailers are just providers of services they are not producers of goods and often export products that are not produced but rather are imported. To overcome that problem we will consider for the sectoral export growth decompositions a sub-sample of the universe of exporters including just manufacturing firms, identified through a merger between the exporter-level customs dataset and the Turkish Structural Business Surveys (SBS) conducted by *Turkstat* annually.<sup>15</sup>

Table 1 provides summary statistics on the cleaned exporter-level dataset. The number of exporters in Turkey increases substantially from 30,219 in 2002 to 51,371 in 2011. These numbers are large relative to those in countries with similar GDP per capita, size in terms of GDP, or degree of openness (Cebeci, Fernandes, Freund, and Pierola, 2012). Over the sample period, Turkish exporters as a whole send more than 3,800 HS 6-digit products to more than 200 destinations. At the firm-level, the average exporter in Turkey exports 1.1 Million USD in 2002 and 2.5 Million USD in 2011. However, the distribution of average exports per firm is highly skewed - as is the case in most countries (Freund and Pierola, 2012) - since the median exporter in Turkey exports just 50,000 USD in 2002 and 125,000 USD in 2011. The shares accounted for by the largest exporters are indicative of a high degree of concentration across exporters: the top 1% of exporters (i.e., the largest 1% of exporters according to their export values) account for close to 60% of total exports in annually between 2002 and 2011, although this degree of concentration is not particularly high from a cross-country perspective (Cebeci, Fernandes, Freund, and Pierola, 2012).<sup>16</sup> Regarding diversification at the firm-level, the average number of CN 12-digit products per firm increased steadily from 9.2 in 2002 to 11.8 in 2011 and the average number of HS 6-digit products per firm increased steadily from 7.9 in 2002 to 10.4 in 2011 while the average number of export destinations per firm also increased steadily from 3.4 in 2002 to 4.4 in 2011.<sup>17</sup>

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<sup>15</sup> We obtained special access to the SBS for the purposes of this exercise. The SBS covers all manufacturing firms with at least 20 employees and a large sample of smaller firms with less than 20 employees. We drop smaller firms since it is not possible to follow them over time due to annual re-sampling done by the SBS. The exporter-level customs dataset and the SBS dataset are merged based on a firm identifier.

<sup>16</sup> Focusing on year 2007, data from the Exporter Dynamics Database shows that, the concentration of export sectors is much higher in Mexico, New Zealand, South Africa, or Spain than in Turkey.

<sup>17</sup> The median number of HS 6-digit products exported by firm was stable at 3 between 2002 and 2010 increasing to 4 in 2011, while the median number of destinations by firms was stable at 2 between 2002 and 2011.



Table 2 shows the composition of Turkey's aggregate exports across broad sectors and across groups of destination markets and the corresponding numbers of exporters.<sup>18</sup> Panel A shows that the major traditional export sector in Turkey - textiles and clothing - declined in importance from 2002 to 2011. A structural shift in Turkish exports towards exports of machinery and metals is also evident. The number of exporters per sector follows closely the patterns observed for the sectors' shares in total exports.<sup>19</sup> Panel B shows a structural shift in Turkey's export destination markets from 2002 to 2011, with the traditional EU and EFTA markets losing importance and newer markets in the MENA region as well as in Europe and Central Asia gaining importance. The numbers of exporters to regions other than EU and EFTA almost doubled between 2002 and 2011 while those to EU and EFTA increased by only 40% over that period.<sup>20</sup>

### **3. Dynamics of Turkish Export Boom: Characterizing Exporter Dynamics**

Our main objective in this paper is to understand the micro-dynamics behind the export boom experienced by Turkey in the 2000s. We want to assess the roles of the intensive margin - i.e., growth in the size of continuing exporters - versus the extensive margin - i.e., related to the entry and exit of exporters - which means to understand the role of churning among Turkish exporters in explaining the country's export boom. But we also want to understand the roles played by churning across destination markets and by churning across products exported. Before discussing the export growth decomposition and its results, it is necessary to characterize the firms in Turkey according to their status in the export market as continuing exporters, entrants, or exiters from year to year following the definitions provided below:

- Exporter<sub>t</sub>: a firm that exports in year t;
- Entrant<sub>t</sub>: a firm that does not export in year t-1 but exports in year t;
- Exiter<sub>t</sub>: a firm that exports in year t-1 but does not export in year t;
- Continuing exporter<sub>t</sub>: a firm that exports in both years t-1 and t;
- Survivor<sub>t</sub>: a firm that does not export in year t-1 but exports in both years t and t+1.

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<sup>18</sup> The broad sectors are defined in Appendix Table 1 based on the type of HS 2-digit products exported by the firms. While in terms of the share of total exports the broad sectors are mutually exclusive, they are not in terms of the number of exporters. That is, exporters that export multiple products belonging to different sectors will be counted multiple times.

<sup>19</sup> Incidentally this suggests that the average size of exporters does not change substantially across sectors over time.

<sup>20</sup> While in terms of the share of total exports the groups of destinations are mutually exclusive, they are not in terms of the number of exporters. That is, exporters that export to multiple groups of destinations will be counted multiple times.

Table 3 provides the number of firms and average exports per firm across their status in the export market.<sup>21</sup> In any sample year, about two thirds of firms are continuing exporters that exported also in the previous year. The number of continuing exporters increases steadily from 21,655 in 2003 to 36,529 in 2011. The rates of entry into and exit from the export market in Turkey are high, close to 30% but this degree of exporter churning is similar to that observed in other emerging markets (Cebeci, Fernandes, Freund, and Pierola, 2012). The number of entrants is consistently larger than the number of exiters in every year, though the gap between these numbers shrinks towards the end of the sample period. Both entrants and exiters exhibit substantially smaller average exports than continuing exporters.<sup>22</sup> Average exports per continuing exporter in Turkey almost doubled from 2003 to 2008 but declined in 2009 recovering thereafter in 2010-2011. Average exports per entrant and per exiter increased by 60% and 90%, respectively, during the export boom. While average exports per entrant remained almost unchanged after 2009, average exports per exiter increased dramatically between 2008 and 2009 suggesting that some large Turkish exporters stopped operating in export markets as a result of the global financial crisis.<sup>23</sup> Table 3 also shows that despite a large total number of exporters in Turkey each year, a substantially smaller number of continuous exporters exporting continuously between 2002 and 2011 (7,423) account for the bulk (on average 65%) of the country's annual exports.

Table 4 shows in the first column the share of total exports across the years accounted for by firms that were exporting in 2002, the first year of our sample (thus those are firms for which we cannot determine whether they are continuing exporters or entrants) and in the rest of the columns the share of total exports across the years accounted for by entrants into export markets in each year between 2003 and 2011. For all cohorts the share of export entrants increases in the first two or three years in export markets but generally declines thereafter: e.g., the cohort of entrants in 2003 account for 5.7% of total exports in 2003 but only 4.5% of total exports by 2011. Interestingly, entrants that survive in export markets for many years eventually account for an important share of total exports. For example, in 2011, 35% of total exports are accounted for

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<sup>21</sup> The first column reproduces the information on the total number of exporters in Turkey also shown in Table 1.

<sup>22</sup> The same is verified for the comparison of median exports of continuing exporters relative to median exports of entrants and exiters.

<sup>23</sup> This hypothesis is validated by our finding of unchanged median exports for exiters between 2008 and 2009.

by cohorts of exporters that entered from 2003 onwards and survived in export markets until 2011 (the other 65% are accounted for by the firms that were already exporting in 2002).

The evidence in Tables 3-4 of a very large number of entrants and exiters in every year that are small in terms of their exports and account for a small proportion of total exports is similar to that found for exporters in Colombia by Eaton, Eslava, Kugler, Tybout (2008) and Portugal by Amador and Opromolla (2013).

## 4. Dynamics of Turkish Export Boom: Export Growth Decompositions

### 4.1. Universe of Export Transactions

In order to assess the roles of continuing exporters, new exporters, and exiting exporters in explaining total annual export growth, we conduct a traditional decomposition following Eaton, Eslava, Kugler, and Tybout (2008), Bernard, Jensen, and Schott (2009), Lederman, Rodriguez-Clare, and Xu (2011), and Amador and Opromolla (2013) whereby Turkey's aggregate export growth between years  $t-k$  and  $t$  is decomposed as in:

$$\frac{X_t - X_{t-k}}{0.5(X_{t-k} + X_t)} = \left( \frac{0.5(X_{t-k}^C + X_t^C) * \frac{X_t^C - X_{t-k}^C}{0.5(X_{t-k}^C + X_t^C)}}{0.5(X_{t-k} + X_t)} \right) + \left( \frac{NE_{t-k} * \overline{X_{t-k}} + X_t^E - NE_{t-k} * \overline{X_{t-k}}}{0.5(X_{t-k} + X_t)} \right) + \left( -\frac{NX_{t-k} * \overline{X_{t-k}} - X_{t-k}^X - NX_{t-k} * \overline{X_{t-k}}}{0.5(X_{t-k} + X_t)} \right) \quad (1)$$

where  $X_t$  are exports in  $t$ ,  $\overline{X_{t-k}}$  are average exports (across exporters) in  $t-k$ ,  $C$  indexes variables for continuing exporters (active in export markets in both  $t-k$  and  $t$ ),  $E$  indexes variables for entrants (active in export markets in  $t$  but not in  $t-k$ ), and  $D$  indexes variables for exiters (active in export markets in  $t-k$  but not in  $t$ ), while  $NE$  and  $NX$  are the numbers of entrants and exiters, respectively. The first term in Eq. (1) captures the contribution of continuing exporters, i.e., the firm intensive margin, while the second and third terms capture the contributions of entrants and exiters to total export growth, i.e., the firm extensive margin.<sup>24</sup>

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<sup>24</sup> The first term is the product of the share of exports of continuing exporters and their average export growth. The second term is the sum of (i) the number of new exporters as a share of the average number of exporters in the 2 years and (ii) the deviation of the average exports of new exporters from the average exports of continuing exporters. The third term is the sum of (i) the number of exiting exporters as a share of the average number of exporters in the 2 years and (ii) the deviation of the average exports of exiting exporters from the average exports of continuing exporters.

Panel A of Table 5 presents the decomposition in Eq. (1) for year-to-year aggregate export growth between 2002 and 2011. During the export boom year-to-year growth was dominated by growth of continuing exporters: the firm intensive margin accounted on average for more than 80% of that growth. This pattern was unaltered - if anything it was strengthened - during the global financial crisis as year-to-year export growth in Turkey (negative in 2008-2009) was entirely dominated by the decline or slower growth of continuing exporters. This dominance of the intensive margin may appear as surprising given the impressive degree of exporter turnover documented in Table 3. However, it is easily rationalized once the relatively small size of entrants and exiters - also documented in Table 3 - is taken into account. Even if entrants and exiters experience (on net) very high growth rates, the much larger size of continuing exporters implies that over short time intervals the intensive margin dwarfs the extensive margin. In all years except 2009-2010 the positive contribution of entrants is larger than the negative contribution of exiters to year-to-year growth in Turkey, hence the contribution of net exporter entry is positive. Entry in gross terms contributes on average with 25% of growth - accounting for a particularly large share (a third) of growth in 2004-2005 and in 2005-2006 - and, not surprisingly, exit makes a large negative contribution to export growth in 2009-2010 at the peak of the global crisis. The importance of entry in gross terms suggests that, conditional on survival, entrants grow fast and may play a key role in aggregate exports over the longer-term, as we discuss next.

The last rows of Panel A of Table 5 show a decomposition of aggregate export growth over the entire 2002-2008 period and the entire 2008-2011 period. Continuing exporters that survive from 2002 to 2008 are the main contributors to the 113.9% total export growth over the period.<sup>25</sup> But new exporters in 2008 (not present in 2002) contribute with 38% of growth over the period, which is a higher proportion than the average of 25% that new exporters contribute to year-to-year growth. Continuing exporters accounted for most of the low aggregate export growth (3.6%) over the 2008-2011 period, despite tremendous exporter churning being verified. The negative contribution of exporter exit over the entire 2008-2011 period was very large though it was compensated by a strong positive contribution of new exporters, with the role of

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<sup>25</sup> Total export growth in the row labeled '2002-2008' of Panel A of Table 5 is obtained as  $X_{2008} - X_{2002} / 0.5(X_{2002} + X_{2008})$  (the dependent variable in Eq. (1)). Hence the percentage of 113.9% shown differs from the 265% discussed in Section 1 which was obtained as  $X_{2008} - X_{2002} / X_{2002}$ .

exit being more concentrated in the years up to 2010 while the role of new export opportunities for Turkish firms being stable throughout.

Given the importance of continuing exporters for export growth year-to-year and over longer periods in Turkey, it is crucial to understand how their growth comes about, namely whether they replicate ‘more of the same’ - serving their traditional destination markets with their well-established products - or whether churning across destination markets and products plays a role. Eq. (2) explores the role of destination dynamics for the export growth of continuing exporters:

$$\begin{aligned} \frac{X_t^C - X_{t-k}^C}{0.5(X_{t-k}^C + X_t^C)} = & \left( \frac{0.5(X_{t-k}^{CCD} + X_t^{CCD})}{0.5(X_{t-k}^C + X_t^C)} * \frac{X_t^{CCD} - X_{t-k}^{CCD}}{0.5(X_{t-k}^{CCD} + X_t^{CCD})} \right) \\ & + \left( \frac{NED_{t-k} * \overline{X_{t-k}^C}}{0.5(X_{t-k}^C + X_t^C)} + \frac{X_t^{CED} - NED_{t-k} * \overline{X_{t-k}^C}}{0.5(X_{t-k}^C + X_t^C)} \right) + \left( -\frac{NXD_{t-k} * \overline{X_{t-k}^C}}{0.5(X_{t-k}^C + X_t^C)} - \frac{X_{t-k}^{CXD} - NXD_{t-k} * \overline{X_{t-k}^C}}{0.5(X_{t-k}^C + X_t^C)} \right) \end{aligned} \quad (2)$$

where the variables and indexes are defined as above,  $\overline{X_{t-k}^C}$  are average exports of continuing exporters in  $t-k$ ,  $CCD$  indexes variables for continuing destinations (served by continuing exporters in both  $t-k$  and  $t$ ),  $CED$  indexes variables for new destinations (served by continuing exporters in  $t$  but not in  $t-k$ ), and  $CXD$  indexes variables for exiting destinations (served by continuing exporters in  $t-k$  but not in  $t$ ), while  $NED$  and  $NXD$  are the numbers of new and exiting destinations of continuing exporters, respectively. The first term in Eq. (2) provides the contribution of continuing destinations, i.e, the destination intensive margin, while the second and third terms provide the contributions of new and exiting destinations to export growth of continuing exporters in Turkey, i.e., the destination extensive margin.

Panel B of Table 5 presents the results from the decomposition in Eq. (2) for year-to-year growth. The destination intensive margin accounts for more than 80% of year-to-year growth of continuing exporters during the export boom. At the peak of the global financial crisis in 2008-2009 this percentage was even higher with the strong decline for continuing exporters being almost entirely driven by a decline in their exports to continuing destinations, most likely the EU countries which were experiencing a severe recession. The prominence of traditional destinations for continuing exporters persists as Turkey recovers from the crisis after 2009. However, it is crucial to note that while the net contribution of new and dropped destinations for export growth of continuing exporters is small throughout Panel B, the degree of churning across destinations is very high. In 2004-2005 and in 2005-2006 exports to new destinations in gross terms represent

60% of the export growth of continuing exporters, though this is counteracted by the negative contribution of dropped destinations which represents more than 40% of their export growth.

The last rows of Panel B of Table 5 show the decomposition of export growth of continuing exporters across the destination dimension over the entire 2002-2008 period and the entire 2008-2011 period. Continuing destinations served both in 2002 and 2008 account for the bulk of growth of continuing exporters over the export boom. But the net effect of venturing into new destinations and dropping (possibly less profitable) destinations by continuing exporters is very important, representing a third of their growth between 2002 and 2008. The major role of new destinations in gross terms suggests that the new destinations that do survive exhibit strong export growth subsequently. In the crisis and the subsequent recovery period of 2008-2011, a structural shift is observed with continuing destinations accounting for only 41% of export growth due to a reduction in the dominance of traditional markets such as the EU for continuing exporters and the emergence of new regional markets in the MENA region, as was documented at the aggregate level in Panel B of Table 2, and will be pursued further in Section 4.3.

Eq. (3) explores the role of product dynamics for the export growth of continuing exporters in their continuing destinations:

$$\begin{aligned} \frac{X_t^{CCD} - X_{t-k}^{CCD}}{0.5(X_{t-k}^{CCD} + X_t^{CCD})} &= \left( \frac{0.5(X_{t-k}^{CCDCP} + X_t^{CCDCP})}{0.5(X_{t-k}^{CCD} + X_t^{CCD})} * \frac{X_t^{CCDCP} - X_{t-k}^{CCDCP}}{0.5(X_{t-k}^{CCDCP} + X_t^{CCDCP})} \right) \\ &+ \left( \frac{NEP_{t-k} * \overline{X_{t-k}^{CCD}}}{0.5(X_{t-k}^{CCD} + X_t^{CCD})} + \frac{X_t^{CCDEP} - NEP_{t-k} * \overline{X_{t-k}^{CCD}}}{0.5(X_{t-k}^{CCD} + X_t^{CCD})} \right) + \left( -\frac{NXP_{t-k} * \overline{X_{t-k}^{CCD}}}{0.5(X_{t-k}^{CCD} + X_t^{CCD})} - \frac{X_{t-k}^{CCDXP} - NXP_{t-k} * \overline{X_{t-k}^{CCD}}}{0.5(X_{t-k}^{CCD} + X_t^{CCD})} \right) \end{aligned} \quad (3)$$

where the variables and indexes are defined as above,  $\overline{X_{t-k}^{CCD}}$  are average exports of continuing exporters in their continuing destinations in  $t-k$ ,  $CCDCP$  indexes variables for continuing products (exported by continuing exporters in both  $t-k$  and  $t$ ),  $CCDEP$  indexes variables for new products (exported by continuing exporters in  $t$  but not in  $t-k$ ),  $CCDDP$  indexes variables for exiting products (exported by continuing exporters in  $t-k$  but not in  $t$ ), and  $NEP$  and  $NXP$  are the numbers of new and exiting products of continuing exporters, respectively. The first term in Eq. (3) provides the contribution of continuing products, i.e., the product intensive margin, while the second and third terms provide the contributions of new and exiting products to export growth of continuing exporters, i.e., the product extensive margin. Note that the product entry margin in this case captures two different dimensions, (a) the introduction of entirely new

products (not exported in  $t-k$ ) as well as (b) the re-routing of products across destinations or the expansion of the set of destinations targeted by an already exported product.<sup>26</sup>

Panel C of Table 5 presents the decomposition in Eq. (3) focusing on HS 6-digit products. The product intensive margin accounted on average for 90% of year-to-year growth of continuing exporters in their continuing destinations during the export boom and that share increased to 97% at the height of the global financial crisis in 2008-2009, indicating that the traditional products sent by Turkish continuing exporters to their continuing destinations severely hurt by the recession explain almost entirely the strong decline (-22.1%) observed. Although on net the contribution of new products and dropped products is low throughout Panel C, there is a high degree of churning along the HS 6-digit product dimension. Particularly in 2004-2005 and 2005-2006 exports of new products in gross terms make up about 70% of growth of continuing exporters in their continuing destinations, though this is counteracted by a strong negative contribution of dropped products which make up around 60% of that growth.

The last rows of Panel C of Table 5 show the decomposition of export growth of continuing exporters in their continuing destinations across the HS 6-digit product dimension over the entire 2002-2008 period and the entire 2008-2011 period. Continuing products account for 77% of growth of continuing exporters in their continuing destinations between 2002 and 2008 but the introduction of new products in gross terms plays a meaningful role, accounting for more than a third of that growth. This implies that the new products that survive see their export volumes grow fast subsequently. The thin export growth of continuing exporters in continuing destinations (1.6%) during the 2008-2011 period is entirely driven by the positive contribution of the net entry of products given that the growth of continuing products is negative (-1.2%).

Finally, we present in Panel D of Table 5 the decomposition in Eq. (3) focusing on CN 12-digit products. While continuing CN 12-digit products represent the bulk of year-to-year growth in continuing destinations by continuing exporters from 2002 to 2011, the role of net entry is much larger than in Panel C for HS 6-digit products. This can be rationalized by the fact that firms can innovate in their continuing destinations, introducing small variants of their products through a new CN 12-digit variety within the same HS 6-digit and dropping other varieties at relatively low cost. Interestingly, the last rows of Panel D of Table 5 show that over

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<sup>26</sup> More specifically, (b) entails the case of a product that is introduced by the firm in some of its continuing destinations but was already exported to other continuing destinations and the case of a product that was exported by the firm to exiting destinations and is now introduced to continuing destinations.

the entire 2002-2008 period continuing CN 12-digit products make up only 40% of growth in continuing destinations of continuing exporters while most of that growth is due to the churning across CN 12-digit products. During the crisis and recovery the pattern is even more extreme as growth of continuing exporters in their continuing destinations (1.6%) from 2008 to 2011 is entirely accounted for by net entry of CN 12-digit products given that exports of continuing CN 12-digit products decline (by -2.3%).

The evidence of a dominance of the firm intensive margin in accounting for year-to-year aggregate export growth (in Panel A of Table 5) is similar to what was shown for the U.S. by Bernard, Jensen, Redding, and Schott (2009) or Spain by Lucio, Minguez, Minondo, and Requena (2012), but also for emerging economies such as Colombia by Eaton, Eslava, Kugler, and Tybout (2008). However, the destination extensive margin makes a more important contribution for year-to-year growth of continuing exporters in Turkey (in Panel B of Table 5) than in Costa Rica where it accounts for 95% or more of that growth (Lederman, Rodriguez-Clare, and Xu, 2011). The role of the product intensive margin for growth of Turkish continuing exporters in their continuing destinations (in Panel C of Table 5) is similar to what is shown for Portuguese continuing exporters (Amador and Opromolla, 2013). Extensive margins are expected to contribute less to export growth year-to-year than over longer periods if entrant and exiting exporters are small, a fact which is clearly established for Turkey (in Table 3). Still, it is interesting to note that the difference in the contribution of net entry to growth over longer periods relative to its contribution to year-to-year growth in Turkey (38% versus 25% discussed above) is less dramatic than what is found for Costa Rica (Lederman, Rodriguez-Clare, and Xu, 2011).

#### **4.2. By Sectors**

The export growth decompositions discussed in Section 4.1 consider the universe of exporters in Turkey but the micro-dynamics underlying export growth may differ across sectors given the degree of heterogeneity in global demand, trade policies, technological developments, and other policies and shocks affecting the sectors over the 2002-2011 period. We present in Table 6 the decomposition of export growth in each of seven sectors along the firm dimension (applying Eq. (1) to each sector) in Panel A and along the destination dimension for continuing



exporters in each sector (applying Eq. (2) to the continuing exporters in each sector) in Panel B.<sup>27</sup> To our knowledge our study is the first to consider such sectoral decompositions. As discussed in Section 2, to overcome the potential contamination of results from sectoral export growth decompositions in the presence of wholesalers and retailers, we focus for this analysis on manufacturing firms with more than 20 workers, which are a sub-sample of the universe of exporters and are identified through a merger between the exporter-level customs data and the Turkish manufacturing survey data. Note that the results from the decompositions in Table 6 should be interpreted differently than those in Table 5. For a given sector, the extensive margin in Table 6 captures both firms that start or stop exporting altogether (as in Table 5) as well as firms that start or stop exporting products in that particular sector while being continuing exporters, entrants and/or exiters in other sectors.

For all sectors, year-to-year export growth is dominated by the growth of continuing exporters during the export boom, as shown by Panel A. The firm intensive margin accounts on average for 87% of year-to-year export growth in textiles and clothing and more than 93% in all other sectors.<sup>28</sup> This pattern is intensified in all sectors during the global financial crisis with year-to-year growth being entirely dominated by slow or negative growth for continuing exporters. During the export boom there is, however, some heterogeneity across sectors in the contribution of exporter entry in gross terms to year-to-year growth: entrants account for a very large proportion of growth averaging 60% in transportation but only 10% to 20% in the other sectors.<sup>29</sup>

The last rows of Panel A of Table 6 show that the firm intensive margin accounts for close to 70% of export growth over the entire 2002-2008 period in textiles and clothing and transportation and for more than 80% in all other sectors. Exporter entry in gross terms as well as net exporter entry represents a larger proportion of export growth over that longer period than of average year-to-year export growth in all sectors.

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<sup>27</sup> As mentioned in Section 2, we define sectors based on the products exported by the firm, not based on the economic activity of the firm. If firms export multiple products belonging to different sectors, then firms will enter the export growth decompositions of all the sectors to which their exported products belong.

<sup>28</sup> The particularly dominant role of the intensive margin found for export growth of this sub-sample of manufacturing exporters is likely related to the fact that these exporters are larger on average than the universe of exporters (all employ more than 20 workers) and larger exporters likely exhibit less churning than smaller ones.

<sup>29</sup> The percentage for transportation is based on growth until 2007 only since in 2007-2008 that sector exhibits an unusual pattern whereby negative export growth of -0.7% is more than fully accounted for by negative growth of continuing exporters of -1.2%, thus entry in gross terms of 4.1% represents -560% of export growth compensated by exit of -3.6% that represents 300% of export growth.

In all sectors year-to-year growth of continuing exporters is dominated by growth in exports to their continuing destinations during the export boom, as shown by Panel B of Table 6. The destination intensive margin makes up on average close to or more than 80% of year-to-year export growth of continuing exporters and the share is highest in agricultural and food products. At the peak of the global financial crisis in 2008-2009, the strong decline in exports to continuing destinations (which tend to be the EU markets) was particularly key in accounting for the strong decline in exports of continuing exporters that was verified in all sectors. There is some heterogeneity across sectors in the contribution of new destinations in gross terms to year-to-year export growth of continuing exporters during the export boom: they accounted on average for 40% of that growth in agricultural and food products, chemicals, and machinery but for a larger percentage in textiles and clothing (60%) and metals (80%).<sup>30</sup>

The last rows of Panel B of Table 6 show that the destinations served by continuing exporters both in 2002 and in 2008 make up from 46% (in textiles and clothing) to 82% (in other sectors) of their export growth over the entire 2002-2008 period. Across sectors, new destinations served by continuing exporters in 2008 that were not served in 2002 account for a rather similar proportion of continuing exporters' growth over the longer period as they do for average year-to-year growth. However, net destination entry represents a substantially larger proportion of growth over the longer period than of average year-to-year growth of continuing exporters in all sectors.

#### ***4.3. By Destination Markets***

Turkey experienced an interesting reorientation of its trade flows away from traditional export markets such as the EU and EFTA, as shown in Table 2. It is thus relevant to examine the forces dominating export growth in different destination markets during the 2002-2011 period. Table 7 presents the decomposition of export growth in each of four groups of destinations along the firm dimension (applying Eq. (1) to each group of destinations) in Panel A and along the HS 6-digit product dimension for continuing exporters serving each group of destinations (applying

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<sup>30</sup> The percentage for transportation is also high based on growth until 2007 only since in 2007-2008 that sector's continuing exporters also exhibit an unusual pattern whereby negative export growth of -1.2% is more than fully accounted for by negative growth of continuing destinations of -1.8%, thus entry of new destinations in gross terms of 6.8% represents -590% of export growth compensated by exit of destinations of -6.2% that represents 350% of export growth of continuing exporters.

Eq. (3) to the continuing exporters in each group of destinations) in Panel B.<sup>31</sup> To our knowledge our study is the first to consider decompositions of export growth to a comprehensive set of destinations.<sup>32</sup> Note that the results from the decompositions in Table 7 should be interpreted differently than those in Table 5. For a given group of destinations, the extensive margin in Table 7 captures both firms that start or stop exporting altogether (as in Table 5) as well as firms that start or stop exporting to that group of destinations while being continuing exporters, entrants and/or exiters in other groups of destinations.

For all groups of destinations, growth of continuing exporters dominates year-to-year export growth during the export boom in Panel A. The share of the firm intensive margin in year-to-year export growth ranges from 76% for the Rest of the World to 89% for Central Asia and Other Europe. This pattern is maintained during the global financial crisis, as the slow or negative growth of continuing exporters accounts entirely for year-to-year growth to all destinations. Exporter entry in gross terms represents 30% to 40% of year-to-year growth in exports to the EU and EFTA, to Central Asia and Rest of Europe, and to MENA. Entrants play a much more substantive role in accounting for export growth to the Rest of the World from 2004 onwards and particularly in 2006-2007 at the early stage of the global financial crisis when new exporters in Turkey likely began to focus more on export opportunities outside the country's traditional trading partners.

The last rows of Panel A of Table 7 show that continuing exporters present both in 2002 and in 2008 contribute with close to 60% of growth over the entire period in exports to EU and EFTA and to MENA and 70% in Central Asia and the Rest of Europe. The pattern described above for growth in exports to the Rest of the World between 2007 and 2008 is verified also over the entire 2002-2008 period as the churning across exporters accounts for 56% of that export growth. However, there is a dramatic change in the findings for some destinations over the entire 2008-2011 period. Export growth to the EU and EFTA (7.2%) is mostly driven by substantial exporter entry as growth of continuous exporters is actually negative (2.2%) while negative export growth to Central Asia and Other Europe (-3.4%) is mostly driven by substantial exporter exit since growth of continuous exporters is actually positive (1.4%). However, note that net

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<sup>31</sup> Note that firms may export to multiple countries belonging to different groups of destinations (as defined in Table 2). In such cases, firms will be counted multiple times as they will enter the export growth decompositions of all the groups of destinations to which they export products.

<sup>32</sup> Bernard, Jensen, Redding, and Schott (2009) provided results from a decomposition of export growth for a single group of destinations: from the U.S. to Asian countries.

exporter entry represents in all destination markets a larger proportion of growth over longer periods than of average year-to-year growth.

For all destinations, year-to-year growth of continuing exporters is dominated by the growth of their continuing HS 6-digit products during the export boom, as shown in Panel B. The HS 6-digit intensive margin accounts on average for at least 83% of year-to-year export growth for continuing exporters up to 2008. At the peak of the global financial crisis, a strong decline in exports of continuing HS 6-digit products was the major factor behind the strong decline in exports of continuing exporters to any group of destination markets. New HS 6-digit products in gross terms account on average for 50% of year-to-year export growth of continuing exporters serving the EU and EFTA and the MENA, and the proportion is a third for continuing exporters serving Central Asia and Other Europe. For export growth to the Rest of the World, 2004-2005 and 2006-2007 are exceptional years when new HS 6-digit products introduced by continuing exporters account for a substantially larger proportion.

The last rows of Panel B of Table 7 show that HS 6-digit products exported by continuing exporters in both 2002 and 2008 contribute with most of the growth of exports to all destinations over the entire period. In particular, the HS 6-digit product intensive margin accounts for 86% of export growth of continuing exporters to Central Asia and Other Europe. New products introduced by continuing exporters account for a smaller proportion of continuing exporters' growth over the entire 2002-2008 period than they do of their average year-to-year growth in all destinations due essentially to a stronger role of continuing products over longer periods than year-to-year. However, net product entry represents in all destinations a larger proportion of growth over longer periods than of average year-to-year growth.

#### ***4.4 Cohorts of Entrants into Export Markets and Continuous Exporters***

To characterize further the export boom in Turkey during the 2000s, we examine the evolution of destination and product dynamics for two cohorts of exporters - following the exercise conducted by Lederman, Rodriguez-Clare, and Xu (2011) and Amador and Opromolla (2013): the cohort of continuous exporters which export in 2002 and continue to do so uninterruptedly until 2011 and the cohort of entrants into export markets in 2003 that survive until 2011. By understanding how exports grow for cohort of entrants as its members survive and gain experience in the export market (relative to how exports for continuing exporters grow) this

exercise can help us understand why gross entry explains an important share of export growth over longer periods. The cohort of 2002-2011 continuous exporters includes 7,423 firms while the cohort of 2003 entrants includes 12,317 firms in 2003 but dwindles to 3,043 by 2011, as shown in Appendix Table 2.<sup>33</sup> These numbers complement the evidence provided so far of a high degree of experimentation in export markets - thus a low survival in export markets for many firms - even during a (mostly) export boom period. The entrants that do survive grow very fast, as shown by the steep increase over time in the average size of the survivors from the cohort of 2003 entrants in Appendix Table 2. The 2002-2011 continuous exporters also grow fast over the period, but not as fast as entrants before 2009.

We decompose export growth along the destination dimension and the HS 6-digit product dimension (for continuing destinations) for the cohort of 2002-2011 continuous exporters in Table 8 and for the cohort of 2003 entrants that survive until 2011 in Table 9. For 2002-2011 continuous exporters Panel A of Table 8 shows that the destination intensive margin accounts for 90% of their year-to-year growth but for a smaller proportion - 66% - of their growth over the entire 2002-2011 period. The product intensive margin accounts for 92% of year-to-year growth of 2002-2011 continuous exporters in their continuous destinations but also for just 66% of their growth in those destinations over the entire 2002-2011 period, as seen in Panel B of Table 8.

For the cohort of 2003 entrants that survive until 2011 the patterns are qualitatively similar but quantitatively different. Panel A of Table 9 shows that the destination intensive margin accounts for 80% of the year-to-year growth of the cohort of 2003 entrants but for just 50% of their growth over the entire 2003-2011 period. The product intensive margin accounts for 88% of year-to-year growth of the cohort of 2003 entrants in their continuous destinations but for less just 46% of their growth in those destinations over the entire 2002-2011 period, as seen in Panel B of Table 9.

Thus, over a longer period churning in destination markets and churning in HS 6-digit products (for continuing destinations) is critical in explaining export growth of the cohort of 2003 entrants but less so in explaining export growth of the 2002-2011 continuing exporters. This finding is aligned with that by Lederman, Rodriguez-Clare, and Xu (2011) for new exporters (that survive) in Costa Rica but contrasts to that by Amador and Opromolla (2013) new

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<sup>33</sup> By defining these cohorts as firms exporting until 2011, we are placing a somewhat stringent criterion on the selected exporters in that they need to have survived the global financial crisis, in addition to surviving during the export boom.

exporters (that survive) in Portugal for which the role of the intensive margin is more important than for continuing exporters.

## **5. Theoretical Mechanisms behind the Findings for Turkey**

Our findings on export micro-dynamics in Turkey show many firms entering export markets every year but many exiting the following year and only a few surviving over longer periods, experiencing in that case rapid growth. Entrants and exiters are small relative to continuing exporters and while they make a minor contribution to year-to-year aggregate export growth their contribution to export growth is important when longer periods are considered. Experimentation and selection also play a role for continuing exporters entering and exiting destination markets and introducing new products and withdrawing products in their continuing destinations both during the export boom as well as during the crisis and recovery.

In the context of recent trade models on export dynamics with heterogeneous firms, firm export entry, exit and survival decisions depend on the returns to the exporting activity (i.e., export revenues net of variable and fixed costs), on sunk entry costs, and on uncertainty arising for example from exchange rate fluctuations, changes in border taxes or transport costs, or demand shocks. Sunk entry costs are associated with the search and establishment of distribution and marketing networks in the foreign market(s), learning about export procedures and signing long-term export contracts.<sup>34</sup> The evidence of great churning in terms of exporters, destinations, and products for Turkey might suggest that the sunk entry costs into export markets per se, into new destinations or new products are small. But the estimates obtained by Roberts and Tybout (1997) and Das, Roberts, and Tybout (2007) suggest non-negligible sunk entry costs for firms to start exporting. Moreover, without sizeable sunk costs it would be difficult to rationalize the importance of continuing destinations and products for year-to-year growth of continuing exporters. The fact that the crisis brings little immediate change to the contribution of exporter exit to aggregate export growth in 2008-2009 increasing it only in 2009-2010 whereas it increases the contribution of exiting destinations and exiting products for the decline in growth of continuing exporters immediately in 2008-2009 would suggest that sunk costs related to

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<sup>34</sup> With no sunk entry costs firms would enter export markets when returns are positive and exit when they become negative, implying very rapid churning and almost no survival. With sunk entry costs, firms' export decisions depend on their previous exporting status, as firms already exporting can increase their export volumes without incurring in the sunk entry costs again.

destination and product dimensions might be smaller than those related to overall participation in export markets.<sup>35</sup> But this is a conjecture only due that cannot be empirically confirmed due to a lack of systematic estimates on sunk costs of experimentation along those disaggregate dimensions.

The high degree of churning can be reconciled with the presence of sunk costs in the context of several recent models such as Segura-Cayuela and Vilarrubia (2008), Freund and Pierola (2010), Albornoz, Calvo, Corcos, and Ornelas (2012), Akhmetova and Mitaritonna (2013), Eaton, Eslava, Jinkins, Krizan, and Tybout (2013), or Timoshenko (2013) which show an important role of idiosyncratic uncertainty for export market profitability and of learning about export markets. Despite their very different assumptions and features all models embody a period of experimentation and learning between entrants into the export market and foreign buyers during which firms resolve the uncertainty about their export market profitability based on their sales in the export market and then decide whether to continue and grow their shipment size or exit the export market. Our finding of important growth for the entrants that do survive in export markets for a long period is also aligned with the predictions from these models.

Focusing on uncertainty about the costs of exporting, the model of Freund and Pierola (2010) generates substantial entry and exit as a form of trial and error in the presence of sunk costs of entry. Firms learn about their cost of exporting upon entering the export and since they can exit if their costs are high, at most they experience a one-period negative shock while they face a future stream of positive profits if their costs are low. Thus, uncertainty generates high entry of firms into the export market to learn their potential due to the option value of continuing if the cost draw is low and high exit after one period for firms with a high cost draw.<sup>36</sup>

Focusing on uncertainty about demand, the models of Albornoz, Calvo, Corcos, and Ornelas (2012), Akhmetova and Mitaritonna (2013), and Eaton, Eslava, Jinkins, Krizan, and Tybout (2013) have firms entering the export market or particular destinations with small shipments to ‘test the waters’ and learn about their export market profitability and if successful grow their shipment size, otherwise exit. In particular Akhmetova and Mitaritonna (2013) allow firms to postpone paying the full sunk entry cost into export markets by first paying a smaller ‘testing cost’ that allows them to learn about the market by observing individual sales to a few

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<sup>35</sup> We thank a referee for suggesting this interpretation.

<sup>36</sup> Naturally this result depends on the costs of an export trial not being too high.

consumers while Albornoz, Calvo, Corcos, and Ornelas (2012) allow firm uncertain export market profitability to be correlated across destination markets. Thus, a firm may enter a market even if the corresponding expected profits are negative, because of the option value of expanding to additional markets if successful. Eaton, Eslava, Jinkins, Krizan, and Tybout (2013) explore how high rates of firm exit from new destinations and rapid firm growth conditional on survival in these destinations are generated by matches between buyers and sellers and their evolution over time and across markets.

Also focusing on uncertain demand but not on learning as a rationale for high export entry and exit and the movements in and out of certain destinations by ‘perennial’ exporters is provided by Blum, Claro, and Horstmann (2013) whose model has firms respond to stochastic demand shocks while operating under increasing marginal costs (due to their capital investments being fixed once demand shocks are realized). They define ‘perennial’ exporters as highly efficient firms that make sufficient capital investments to serve the domestic and the export market, regardless of the demand shock and ‘occasional’ exporters as less efficient, smaller firms whose export behavior varies with the demand shock. When domestic demand is relatively low, these firms' capital is under-utilized domestically thus they enter the export market to fully utilize it. When domestic demand is relatively high, these firms exit foreign markets and sell only domestically.<sup>37</sup>

The models above do not fully rationalize the importance of churning when destination and product dimensions are considered jointly neither do they help us understand why the patterns of growth for the cohort of 2003 entrants differ from those for continuing exporters in 2002-2011. This suggests the importance of developing new models of export dynamics where firms make choices regarding the destinations to serve and the products to export but where firm characteristics (e.g., productivity and/or quality) and buyer-seller relationships, among other factors, may determine the differences in dynamics across different types of firms.

## **6. Conclusion**

This paper examines the micro-dynamics behind the dramatic export boom experienced by Turkey from 2002 to 2008 as well as the underlying forces for the strong contraction ensuing

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<sup>37</sup> In the model the domestic market is more profitable (less costly).



from the 2008-2009 global financial crisis and for the recovery thereafter using a novel and rich exporter-level customs dataset. Growth in exports of continuing exporters accounts for the bulk of year-to-year growth from 2002 to 2011. For these continuing exporters, year-to-year growth is dominated by exports to their continuing destinations, and for these continuing destinations, year-to-year growth is dominated by exports of continuing products. However, there is a high degree of churning across firms, destinations, and products from year to year. More importantly, churning across exporters, destinations, and products accounts for an important part of Turkey's export growth over the entire 2002-2008 period. The patterns of micro-dynamics of export growth are verified across all sectors, a finding which is novel to the literature. These patterns are also mostly verified across groups of destination markets, a noteworthy exception being the greater prominence of net exporter entry in accounting for growth in exports over longer periods to the Rest of the World which includes emerging markets such as China and India. Finally, our evidence also shows that churning across destinations and across HS 6-digit products (for continuing destinations) is much more important to explain export growth over the entire 2003-2011 period for the cohort of 2003 entrants that continue to export until 2011 than for the 2002-2011 continuing exporters.

Our evidence points to a substantial degree of experimentation by Turkish firms of the export market as well as of new destination markets and new products by continuing exporters both during the export boom as well as the crisis and recovery. Our evidence of important trial and error is consistent with an important role of idiosyncratic uncertainty on the profitability of exporting as well as of learning about export markets as modeled by as modeled, e.g., by Freund and Pierola (2010) or Albornoz, Calvo, Corcos, and Ornelas (2012).

From a policy perspective, an implication from the micro-dynamics underlying the Turkish export boom is that there is a need to better understand the drivers of export entry and exit choices at the firm, destination market, and product levels, how learning about export markets takes place, but also what helps survival in export markets, given the preeminence of the intensive margin. Assessing the roles of trade costs, exchange rate movements, and other policy dimensions for learning processes and for survival in export markets is a fruitful avenue for future research.

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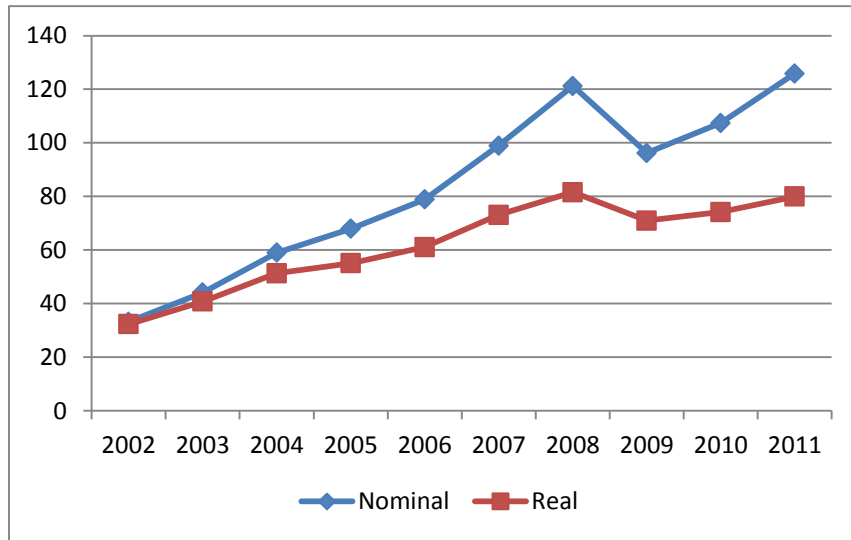
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### **Appendix: Consolidation of HS and CN Product Codes**

The HS 6-digit and the CN 12-digit classifications underwent revisions in 2007. The World Customs Organization (WCO) revises the HS classification on the basis of the value of trade realized under each product during the previous period. The revisions took two forms: i) two different product codes with low trade volume were converted into a single product code and ii) an existing product code with an increasing trade volume was split into various product codes. For example, HS 6-digit code 030269 (other fish, fresh or chilled, excluding fish fillets or other fish meat) which included swordfish and toothfish in the HS2002 classification was split into codes 030267 (swordfish), 030268 (toothfish), and 030269 (for other fish) in the HS2007 classification. These changes create problems for tracking trade volumes for certain products over time, in particular exports of swordfish under code 030267 would appear as a new export from 2007 onwards, while in reality they might have already been exported before but were recorded under code 030269. The process of “consolidation” among HS classifications that we used followed the basic principle of identifying the codes related to each other (e.g., codes that were split or merged with the modifications introduced in 2007) and to replace them with a single code for the entire period. In the example above, this resulted in the replacement of codes 030267 and 030268 by the code 030269 from year 2007 onwards. Hence, exports of products under these three codes are all included in exports of code 030269 from during the entire period from 2002 onwards. See Cebeci (2012) for further details on the methodology used in this consolidation. The paper along with a list of consolidated codes and concordances are available at <http://econ.worldbank.org/exporter-dynamics-database>.

**Figure 1. Turkey's Aggregate Exports - 2002-2011**



Source: Authors' calculations using exporter-level data from *Turkstat* and World Development Indicators.  
Note: real exports are nominal exports divided by the U.S. producer price index (in constant values of 1997).

**Table 1. Summary Statistics on Turkish Exporter-Level Dataset**

	Total Exports (Billion USD)	Number of Exporters	Number of HS 6-digit Products	Number of CN 12-digit Products	Number of Destinations	Average Exports per Firm (Million USD)	Median Exports per Firm (Million USD)	Share of Top 1% of Exporters (%)	Share of Top 5% of Exporters (%)	Average Number of HS-6 Products per Exporter	Average Number of CN-12 Products per Exporter	Average Number of Destinations Served per Exporter	Average Number of Exporters per HS-6 Product	Average Number of Exporters per CN-12 Product	Average Number of Exporters per Destination Served
<b>2002</b>	33	30,219	3,820	9,569	207	1.10	0.05	59	80	7.9	9.2	3.4	62	29	500
<b>2003</b>	44	33,938	3,895	9,889	209	1.30	0.06	59	80	8.5	10	3.6	74	34	578
<b>2004</b>	59	37,580	3,904	10,081	213	1.57	0.07	61	81	8.6	10.1	3.7	83	38	645
<b>2005</b>	68	40,203	3,931	10,124	209	1.69	0.08	60	80	8.8	10.2	3.8	90	41	726
<b>2006</b>	79	41,966	3,950	10,093	211	1.88	0.09	59	80	9.3	10.8	3.9	99	45	775
<b>2007</b>	99	45,818	3,968	10,103	211	2.16	0.10	59	80	9.6	11	3.9	111	50	846
<b>2008</b>	121	46,270	3,987	10,061	213	2.62	0.12	60	81	9.9	11.4	4.1	115	52	882
<b>2009</b>	96	46,944	3,998	9,572	216	2.05	0.11	56	78	10.1	11.4	4.1	118	56	885
<b>2010</b>	107	48,609	4,024	9,587	215	2.21	0.12	55	78	10.3	11.7	4.3	125	59	956
<b>2011</b>	126	51,371	4,040	9,556	215	2.45	0.12	55	78	10.4	11.8	4.4	132	63	1,041

Notes: Total exports and exports per firm are in nominal terms. Consolidated HS 6-digit and CN 12-digit classifications are used for the counts of products.

**Table 2. Turkish Exports across Sectors and Destination Markets****Panel A. By Sector**

	Share of Total Exports of Turkey in 2002 (%)	Share of Total Exports of Turkey in 2006 (%)	Share of Total Exports of Turkey in 2011 (%)	Number of Exporters in 2002	Number of Exporters in 2006	Number of Exporters in 2011
<b>Agricultural and Food Products</b>	11	10	11	3,562	4,442	5,474
<b>Chemical</b>	7	7	10	7,786	12,922	18,551
<b>Machinery</b>	14	16	16	9,232	15,081	20,751
<b>Metals</b>	14	17	20	7,361	12,393	17,148
<b>Transportation</b>	11	17	14	2,677	3,593	4,748
<b>Textiles and Clothing</b>	36	25	20	11,945	15,464	17,186
<b>Other</b>	8	8	9	10,514	16,004	20,937

**Panel B. By Destination Markets**

	Share of Total Exports of Turkey in 2002 (%)	Share of Total Exports of Turkey in 2006 (%)	Share of Total Exports of Turkey in 2011 (%)	Number of Exporters in 2002	Number of Exporters in 2006	Number of Exporters in 2011
<b>EU and EFTA</b>	61	60	49	20,595	27,669	29,471
<b>Middle East and North Africa</b>	14	18	25	11,765	18,337	26,013
<b>Rest of Europe and Central Asia</b>	8	10	12	7,258	12,303	19,771
<b>Rest of the World</b>	17	13	14	7,150	10,073	13,296

Notes: EU stands for European Union, EFTA stands for European Free Trade Area, and MENA stands for Middle East and North Africa. The HS chapters belonging to each sector used in Panel A are listed in Appendix Table 1.



**Table 3. Characterization of Firms across Status in Export Market**

	Number of Exporters	Number of Continuing Exporters	Average Size of Continuing Exporters (million USD)	Number of Entrants	Entry Rate (%)	Average Size of Entrants (million USD)	Number of Exiters	Exit Rate (%)	Average Size of Exiters (million USD)	Number of Survivors	Survival Rate of Entrants (%)	Average Size of Survivors (million USD)	Share of Continuing Exporters 2002-2011 in Total Exports (%)
<b>2002</b>	30,219												66
<b>2003</b>	33,938	21,655	1.97	12,317	36	0.21	8,610	28	0.13	7,005	57	0.29	66
<b>2004</b>	37,580	24,584	2.37	13,049	35	0.18	9,388	28	0.14	7,346	56	0.24	68
<b>2005</b>	40,203	27,156	2.50	13,105	33	0.20	10,477	28	0.16	7,263	55	0.28	67
<b>2006</b>	41,966	29,075	2.71	12,936	31	0.29	11,186	28	0.17	6,947	54	0.43	68
<b>2007</b>	45,818	29,790	3.30	16,085	35	0.33	12,221	29	0.20	9,250	58	0.45	68
<b>2008</b>	46,270	32,369	3.80	13,964	30	0.34	13,506	29	0.25	7,489	54	0.49	67
<b>2009</b>	46,944	32,975	2.89	14,046	30	0.32	13,358	29	0.27	7,939	57	0.46	63
<b>2010</b>	48,609	34,617	3.10	14,079	29	0.33	12,404	26	0.43	8,120	58	0.46	64
<b>2011</b>	51,371	36,529	3.48	14,929	29	0.34	12,167	25	0.24				63

Notes: The types of firms used in the table are defined as follows: (a) Entrant<sub>t</sub>: a firm that does not export in year t-1 but exports in year t; (b) Exiter<sub>t</sub>: a firm that exports in year t-1 but does not export in year t; (c) Continuing exporter<sub>t</sub>: a firm that exports in both years t-1 and t; and (d) Survivor<sub>t</sub>: a firm that does not export in year t-1 but exports in both years t and t+1. The number of continuing exporters from 2002 to 2011 whose share in total exports is shown in the last column is 7423. The rates shown in the table are defined as follows: (a) Entry rate<sub>t</sub>=number of entrants<sub>t</sub>/number of exporters<sub>t</sub>; (b) Exit rate<sub>t</sub>=number of exiters<sub>t</sub>/number of exporters<sub>t-1</sub>; and (c) survival rate of entrants<sub>t</sub>= number of survivors<sub>t</sub>/number of entrants<sub>t</sub>. Exports per type of firm are in nominal terms.

**Table 4. Share of Exports Accounted for by Entrant Cohorts**

Share of Aggregate Exports Accounted for by Cohorts (%)										
	Cohort of Exporters in 2002	Cohort of Entrants in 2003	Cohort of Entrants in 2004	Cohort of Entrants in 2005	Cohort of Entrants in 2006	Cohort of Entrants in 2007	Cohort of Entrants in 2008	Cohort of Entrants in 2009	Cohort of Entrants in 2010	Cohort of Entrants in 2011
<b>Export Year</b>										
<b>2002</b>	100.0									
<b>2003</b>	94.3	5.7								
<b>2004</b>	90.2	6.4	3.4							
<b>2005</b>	85.9	6.4	4.6	3.1						
<b>2006</b>	82.8	5.4	4.6	3.9	3.3					
<b>2007</b>	78.4	5.2	4.4	3.6	4.2	4.1				
<b>2008</b>	73.7	5.2	4.3	3.3	5.2	5.4	2.9			
<b>2009</b>	66.8	5.3	4.5	3.7	6.8	5.5	3.9	3.5		
<b>2010</b>	66.7	4.8	4.4	3.5	3.9	4.9	3.6	4.8	3.4	
<b>2011</b>	65.6	4.5	4.1	3.3	3.8	4.7	3.0	3.8	4.4	2.8

Note: every column shows year by year the percentage of aggregate exports that is accounted for by the cohort indicated in the heading of the column.

**Table 5. Export Growth Decomposition****Panel A. Across Firms**

	Aggregate Export Growth	Continuing Exporters	New Exporters	Exiting Exporters
2002-2003	28.1	24.3	6.5	-2.8
2003-2004	29.0	27.2	4.3	-2.5
2004-2005	13.6	11.9	4.1	-2.5
2005-2006	15.2	12.7	5.0	-2.5
2006-2007	22.7	19.7	5.8	-2.8
2007-2008	20.3	19.1	4.3	-3.1
2008-2009	-23.1	-24.0	4.2	-3.3
2009-2010	10.9	11.7	4.5	-5.3
2010-2011	15.9	14.2	4.1	-2.5
2002-2008	113.9	78.7	43.0	-7.8
2008-2011	3.6	3.8	13.2	-13.5

**Panel B. For Continuing Exporters Across Destinations**

	Growth of Continuing Exporters	Continuing Destinations	New Destinations	Exiting Destinations
2002-2003	24.3	20.6	8.6	-5.0
2003-2004	27.2	23.5	8.1	-4.5
2004-2005	11.9	10.2	7.2	-5.4
2005-2006	12.7	10.4	7.6	-5.4
2006-2007	19.7	17.0	8.1	-5.5
2007-2008	19.1	13.7	10.4	-5.0
2008-2009	-24.0	-22.1	7.3	-9.2
2009-2010	11.7	10.2	7.3	-5.8
2010-2011	14.2	12.8	7.1	-5.8
2002-2008	78.7	51.6	33.7	-6.5
2008-2011	3.8	1.6	13.3	-11.0

**Panel C. For Continuing Exporters' Continuing Destinations Across HS 6-digit Products**

	Growth of Continuing Exporters' Continuing Destinations	Continuing HS 6-digit Products	New HS 6-digit Products	Exiting HS 6-digit Products
2002-2003	20.6	19.5	7.6	-6.4
2003-2004	23.5	20.8	8.3	-5.6
2004-2005	10.2	9.6	7.1	-6.5
2005-2006	10.4	8.9	7.5	-6.0
2006-2007	17.0	15.2	7.7	-5.8
2007-2008	13.7	12.3	7.1	-5.8
2008-2009	-22.1	-21.7	6.9	-7.3
2009-2010	10.2	8.5	7.7	-5.9
2010-2011	12.8	11.7	7.2	-6.0
2002-2008	51.6	39.8	18.5	-6.7
2008-2011	1.6	-1.2	12.4	-9.7

**Panel D. For Continuing Exporters' Continuing Destinations Across HS 12-digit Products**

	<b>Growth of Continuing Exporters' Continuing Destinations</b>	<b>Continuing HS 12- digit Products</b>	<b>New HS 12-digit Products</b>	<b>Exiting HS 12-digit Products</b>
<b>2002-2003</b>	20.6	18.5	11.2	-9.1
<b>2003-2004</b>	23.5	19.3	12.5	-8.2
<b>2004-2005</b>	10.2	8.3	13.2	-11.3
<b>2005-2006</b>	10.4	8.7	14.8	-13.1
<b>2006-2007</b>	17.0	14.2	13.6	-10.8
<b>2007-2008</b>	13.7	12.3	10.1	-8.7
<b>2008-2009</b>	-22.1	-19.5	14.7	-17.3
<b>2009-2010</b>	10.2	7.1	12.4	-9.3
<b>2010-2011</b>	12.8	11.3	10.3	-8.7
<b>2002-2008</b>	51.6	31.1	33.0	-12.6
<b>2008-2011</b>	1.6	-2.3	23.2	-19.3

Notes: nominal export growth is considered in all rows in all panels. The formulas for the decompositions are described in Section 4.

**Table 6. Export Growth Decomposition for Different Sectors – Manufacturing Sub-Sample**

**Panel A. Across Firms**

	Total Export Growth	Cont. Exp.	New Exp.	Exiting Exp.	Total Export Growth	Cont. Exp.	New Exp.	Exiting Exp.	Total Export Growth	Cont. Exp.	New Exp.	Exiting Exp.	Total Export Growth	Cont. Exp.	New Exp.	Exiting Exp.	Total Export Growth	Cont. Exp.	New Exp.	Exiting Exp.	Total Export Growth	Cont. Exp.	New Exp.	Exiting Exp.				
	Agricultural and Food Products				Chemicals				Machinery				Metals				Textiles and Clothing				Transportation				Other			
2002-2003	26.5	24.5	3.2	-1.2	26.9	25.2	2.4	-0.6	47.3	46.2	2.1	-1.0	27.6	26.7	2.4	-1.5	29.8	26.1	4.8	-1.1	10.5	9.8	2.8	-2.2	45.9	44.9	2.9	-1.9
2003-2004	33.3	32.1	1.8	-0.6	28.1	27.0	1.8	-0.8	22.8	22.0	2.5	-1.8	54.7	52.7	3.1	-1.1	27.5	23.3	5.7	-1.5	15.5	13.6	4.2	-2.3	46.5	46.1	2.1	-1.6
2004-2005	27.8	27.0	1.8	-1.1	15.7	15.0	1.9	-1.2	19.2	17.9	2.7	-1.3	5.6	4.3	3.2	-1.9	16.0	13.4	5.1	-2.5	1.5	1.9	2.4	-2.9	15.6	13.8	2.1	-0.3
2005-2006	-5.0	-5.6	2.1	-1.4	21.7	20.7	2.0	-1.0	24.3	21.2	4.5	-1.5	24.8	24.1	1.6	-0.9	11.2	9.7	4.2	-2.8	10.7	6.5	7.5	-3.3	23.2	22.4	2.5	-1.8
2006-2007	13.5	13.4	2.5	-2.5	23.1	21.6	2.4	-0.9	33.6	31.7	3.0	-1.2	25.8	24.8	2.5	-1.4	28.5	26.6	5.3	-3.4	15.6	15.6	3.5	-3.5	31.9	29.5	3.5	-1.1
2007-2008	17.7	18.6	1.4	-2.3	22.4	22.3	1.4	-1.3	15.2	15.8	2.1	-2.7	41.5	40.4	3.9	-2.8	26.6	22.1	6.4	-2.0	-0.7	-1.2	4.1	-3.6	16.7	15.4	2.5	-1.2
2008-2009	-7.9	-8.6	1.7	-1.0	-17.2	-17.1	1.3	-1.5	-23.4	-24.2	2.3	-1.6	-50.0	-49.5	1.1	-1.6	-22.2	-22.6	3.0	-2.7	-9.0	-11.4	6.6	-4.1	-37.7	-37.5	2.0	-2.2
2009-2010	8.1	9.1	1.3	-2.3	23.2	22.5	1.4	-0.8	12.1	13.5	1.5	-2.9	16.7	16.7	2.0	-2.0	12.0	11.9	2.4	-2.2	11.6	13.0	1.8	-3.2	3.7	7.7	1.2	-5.3
2010-2011	19.2	17.6	2.4	-0.8	20.0	20.1	0.6	-0.6	16.4	15.7	2.1	-1.4	22.5	22.6	1.0	-1.1	8.2	9.3	1.6	-2.7	11.8	11.8	2.2	-2.2	11.2	10.7	2.4	-1.9
2002-2008	103.5	83.7	28.5	-8.7	119.9	97.3	25.7	-3.1	135.0	109.7	27.1	-1.8	144.5	123.2	24.6	-3.3	121.1	80.7	45.5	-5.1	51.8	36.0	34.7	-18.8	144.2	130.8	14.1	-0.8
2008-2011	19.3	19.4	6.5	-6.6	26.0	24.5	4.6	-3.1	5.1	7.5	4.5	-6.8	-11.7	-10.7	4.2	-5.1	-2.1	1.0	7.7	-10.8	14.4	16.1	11.3	-13.0	-23.2	-20.5	2.5	-5.2

**Panel B. For Continuing Exporters Across Destinations**

	Export Growth of Exp.	Cont. Destin.	New Destin.	Exiting Destin.	Export Growth of Exp.	Cont. Destin.	New Destin.	Exiting Destin.	Export Growth of Exp.	Cont. Destin.	New Destin.	Exiting Destin.	Export Growth of Exp.	Cont. Destin.	New Destin.	Exiting Destin.	Export Growth of Exp.	Cont. Destin.	New Destin.	Exiting Destin.	Export Growth of Exp.	Cont. Destin.	New Destin.	Exiting Destin.				
	Agricultural and Food Products				Chemicals				Machinery				Metals				Textiles and Clothing				Transportation				Other			
2002-2003	24.5	18.8	10.7	-4.9	25.2	22.4	7.9	-5.1	46.2	40.5	10.3	-4.6	26.7	21.9	14.5	-9.6	26.1	21.8	12.4	-8.0	9.8	8.4	6.1	-4.7	44.9	40.5	6.3	-1.9
2003-2004	32.1	29.1	9.3	-6.2	27.0	24.1	8.0	-5.1	22.0	17.3	8.7	-4.0	52.7	39.9	18.5	-5.6	23.3	17.6	11.8	-6.0	13.6	11.0	7.6	-4.9	46.1	42.5	4.8	-1.2
2004-2005	27.0	24.5	7.7	-5.1	15.0	12.1	7.8	-4.9	17.9	14.3	8.7	-5.2	4.3	6.2	10.6	-12.4	13.4	9.7	10.4	-6.8	1.9	1.2	6.7	-5.9	13.8	12.9	3.6	-2.6
2005-2006	-5.6	-6.8	6.7	-5.5	20.7	18.0	8.1	-5.5	21.2	18.1	8.3	-5.2	24.1	18.2	14.0	-8.0	9.7	8.6	9.4	-8.2	6.5	4.1	8.3	-5.8	22.4	21.1	4.1	-2.8
2006-2007	13.4	12.7	6.5	-5.8	21.6	18.0	7.8	-4.1	31.7	27.2	8.0	-3.5	24.8	16.3	15.2	-6.8	26.6	19.6	14.3	-7.3	15.6	14.9	7.0	-6.3	29.5	27.8	4.7	-2.9
2007-2008	18.6	15.9	8.0	-5.4	22.3	19.0	7.8	-4.5	15.8	12.4	7.4	-4.0	40.4	30.6	16.7	-6.9	22.1	16.5	12.6	-6.9	-1.2	-1.8	6.8	-6.2	15.4	10.7	7.7	-3.0
2008-2009	-8.6	-10.0	7.1	-5.7	-17.1	-17.6	6.4	-5.9	-24.2	-23.9	6.6	-6.8	-49.5	-42.0	12.0	-19.5	-22.6	-21.2	10.7	-12.1	-11.4	-13.3	8.8	-6.9	-37.5	-36.7	4.9	-5.7
2009-2010	9.1	8.5	5.7	-5.1	22.5	19.5	6.8	-3.8	13.5	11.7	6.8	-5.0	16.7	15.5	10.9	-9.7	11.9	10.2	9.8	-8.1	13.0	11.0	7.0	-5.0	7.7	5.2	6.9	-4.4
2010-2011	17.6	14.9	6.8	-4.1	20.1	19.2	5.7	-4.8	15.7	13.5	7.4	-5.2	22.6	16.3	13.8	-7.4	9.3	7.1	9.1	-6.9	11.8	10.9	5.7	-4.7	10.7	10.8	2.7	-2.9
2002-2008	83.7	47.9	42.8	-7.1	97.3	66.4	36.9	-6.0	109.7	78.7	35.5	-4.5	123.2	69.7	60.6	-7.1	80.7	37.0	52.3	-8.6	36.0	20.4	29.3	-13.7	130.8	107.7	27.0	-3.9
2008-2011	19.4	13.8	16.2	-10.5	24.5	19.6	12.8	-7.9	7.5	5.5	12.3	-10.3	-10.7	-13.4	21.7	-19.1	1.0	-0.8	16.2	-14.4	16.1	9.7	17.8	-11.3	-20.5	-20.6	8.3	-8.2

Notes: nominal export growth is considered in all rows in all panels. The formulas for the decompositions are described in Section 4.

**Table 7. Export Growth Decomposition for Different Groups of Destinations**

**Panel A. Across Firms**

	Total Export Growth	Cont. Exporters	New Exporters	Exiting Exporters	Total Export Growth	Cont. Exporters	New Exporters	Exiting Exporters	Total Export Growth	Cont. Exporters	New Exporters	Exiting Exporters	Total Export Growth	Cont. Exporters	New Exporters	Exiting Exporters
	EU and EFTA				Central Asia and Other Europe				Middle East and North Africa				Rest of the World			
<b>2002-2003</b>	36.5	23.4	16.6	-3.5	29.6	25.9	5.9	-2.2	28.1	28.6	12.7	-13.2	14.2	10.5	9.0	-5.3
<b>2003-2004</b>	36.1	29.8	9.9	-3.6	28.5	27.1	3.9	-2.5	28.5	22.6	10.9	-5.0	23.9	21.9	8.2	-6.2
<b>2004-2005</b>	21.9	18.5	7.9	-4.5	12.0	10.1	4.2	-2.3	23.3	19.3	9.5	-5.5	4.5	3.4	8.5	-7.3
<b>2005-2006</b>	15.5	11.3	8.1	-3.9	14.0	12.2	4.8	-3.0	29.9	24.8	9.7	-4.6	9.3	6.8	9.0	-6.5
<b>2006-2007</b>	24.6	21.4	8.2	-5.0	22.8	19.6	5.5	-2.3	37.1	28.0	13.5	-4.4	4.1	3.4	11.1	-10.4
<b>2007-2008</b>	46.4	43.2	7.1	-3.9	7.1	6.8	3.6	-3.3	29.0	24.0	10.0	-5.0	29.5	17.6	18.4	-6.6
<b>2008-2009</b>	-15.2	-17.7	7.1	-4.6	-24.6	-24.1	4.0	-4.4	-42.4	-40.0	6.7	-9.0	-13.1	-11.7	7.3	-8.7
<b>2009-2010</b>	12.1	8.3	8.0	-4.1	7.2	10.8	3.9	-7.5	20.3	16.3	9.8	-5.8	15.4	14.8	7.5	-6.9
<b>2010-2011</b>	10.3	8.0	6.9	-4.5	14.1	13.5	3.0	-2.4	24.5	19.6	9.7	-4.8	24.9	22.1	8.2	-5.4
<b>2002-2008</b>	144.7	88.4	62.4	-6.2	103.4	72.1	39.9	-8.6	141.9	80.1	71.5	-9.8	80.9	35.8	60.8	-15.7
<b>2008-2011</b>	7.2	-2.2	21.7	-12.3	-3.4	1.4	10.9	-15.8	1.9	-4.5	23.0	-16.6	27.1	27.7	18.3	-18.9

**Panel B. For Continuing Exporters Across HS 6-Digit Products**

	Export Growth of Cont. Exp.	Cont. HS 6- digit Products	New HS 6- digit Products	Exiting HS 6-digit Products	Export Growth of Cont. Exp.	Cont. HS 6- digit Products	New HS 6- digit Products	Exiting HS 6-digit Products	Export Growth of Cont. Exp.	Cont. HS 6- digit Products	New HS 6- digit Products	Exiting HS 6-digit Products	Export Growth of Cont. Exp.	Cont. HS 6- digit Products	New HS 6- digit Products	Exiting HS 6- digit Products
	EU and EFTA				Central Asia and Other Europe				Middle East and North Africa				Rest of the World			
<b>2002-2003</b>	23.4	22.2	10.2	-9.1	25.9	24.4	5.2	-3.7	28.6	25.8	11.5	-8.7	10.5	9.1	7.2	-5.9
<b>2003-2004</b>	29.8	24.7	12.5	-7.5	27.1	24.6	5.5	-3.0	22.6	17.9	12.2	-7.6	21.9	20.7	9.1	-7.9
<b>2004-2005</b>	18.5	14.8	11.6	-7.8	10.1	9.5	4.5	-3.9	19.3	17.1	10.6	-8.4	3.4	2.9	6.9	-6.5
<b>2005-2006</b>	11.3	11.0	9.5	-9.3	12.2	11.1	4.4	-3.3	24.8	19.5	13.1	-7.8	6.8	4.2	8.8	-6.2
<b>2006-2007</b>	21.4	20.1	8.5	-7.2	19.6	19.2	4.6	-4.1	28.0	24.0	11.0	-6.9	3.4	3.0	6.8	-6.4
<b>2007-2008</b>	43.2	38.9	10.0	-5.7	6.8	6.1	4.4	-3.7	24.0	21.2	10.8	-8.0	17.6	13.9	9.0	-5.3
<b>2008-2009</b>	-17.7	-19.8	8.1	-6.0	-24.1	-23.5	3.7	-4.3	-40.0	-38.3	8.9	-10.6	-11.7	-14.7	9.7	-6.8
<b>2009-2010</b>	8.3	6.0	9.2	-6.9	10.8	10.4	3.9	-3.5	16.3	15.1	9.9	-8.7	14.8	13.3	6.3	-4.9
<b>2010-2011</b>	8.0	7.7	7.8	-7.6	13.5	12.5	4.2	-3.3	19.6	17.9	10.1	-8.5	22.1	20.4	7.0	-5.3
<b>2002-2008</b>	88.4	69.5	24.0	-5.1	72.1	61.8	17.3	-7.0	80.1	55.8	29.5	-5.1	35.8	29.3	16.1	-9.6
<b>2008-2011</b>	-2.2	-6.3	12.6	-8.5	1.4	-1.0	8.8	-6.4	-4.5	-3.1	12.9	-14.3	27.7	20.7	15.7	-8.7

Notes: nominal export growth is considered in all rows in all panels. The formulas for the decompositions are described in Section 4.

**Table 8. Export Growth Decomposition for Cohort of Continuous Exporters 2002-2011****Panel A. Across Destinations**

	<b>Growth of Continuing Exporters 2002-2011</b>	<b>Continuing Destinations</b>	<b>New Destinations</b>	<b>Exiting Destinations</b>
<b>2002-2003</b>	28.3	23.9	8.3	-3.9
<b>2003-2004</b>	33.3	29.7	6.6	-3.1
<b>2004-2005</b>	11.6	10.8	4.9	-4.1
<b>2005-2006</b>	15.8	13.9	5.8	-3.8
<b>2006-2007</b>	22.4	19.7	6.1	-3.4
<b>2007-2008</b>	17.6	13.3	7.4	-3.2
<b>2008-2009</b>	-28.1	-26.6	5.5	-7.0
<b>2009-2010</b>	12.8	11.9	4.9	-4.0
<b>2010-2011</b>	13.9	13.0	4.9	-4.0
<b>2003-2011</b>	113.1	75.0	48.5	-8.4

**Panel B. For Continuing Destinations Across HS 6-digit Products**

	<b>Growth of Continuing Exporters 2002-2011's Continuing Destinations</b>	<b>Continuing HS 6-digit Products</b>	<b>New HS 6-digit Products</b>	<b>Exiting HS 6-digit Products</b>
<b>2002-2003</b>	23.9	22.7	7.1	-5.9
<b>2003-2004</b>	29.7	26.5	7.9	-4.6
<b>2004-2005</b>	10.8	10.8	5.7	-5.7
<b>2005-2006</b>	13.9	12.2	6.5	-4.7
<b>2006-2007</b>	19.7	18.0	6.4	-4.6
<b>2007-2008</b>	13.3	11.9	5.9	-4.5
<b>2008-2009</b>	-26.6	-26.6	6.0	-6.0
<b>2009-2010</b>	11.9	10.0	6.6	-4.7
<b>2010-2011</b>	13.0	12.5	5.1	-4.7
<b>2003-2011</b>	75.0	49.6	32.2	-8.9

Notes: nominal export growth is considered in all rows in all panels. The formulas for the decompositions are described in Section 4.

**Table 9. Export Growth Decomposition for Cohort of 2003 Entrants****Panel A. Across Destinations**

	<b>Growth of Cohort of 2003 Entrants that Survive until 2011</b>	<b>Continuing Destinations</b>	<b>New Destinations</b>	<b>Exiting Destinations</b>
<b>2003-2004</b>	65.6	44.1	27.9	-6.4
<b>2004-2005</b>	20.1	15.9	18.0	-13.9
<b>2005-2006</b>	10.8	7.6	12.4	-9.2
<b>2006-2007</b>	28.7	23.3	14.7	-9.3
<b>2007-2008</b>	30.4	23.2	14.5	-7.2
<b>2008-2009</b>	-17.5	-17.9	10.5	-10.2
<b>2009-2010</b>	10.1	8.2	9.1	-7.2
<b>2010-2011</b>	14.4	13.3	6.7	-5.6
<b>2003-2011</b>	135.9	68.2	78.7	-11.0

**Panel B. For Continuing Destinations Across HS 6-digit Products**

	<b>Growth of Cohort of 2003 Entrants' Continuing Destinations</b>	<b>Continuing HS 6-digit Products</b>	<b>New HS 6-digit Products</b>	<b>Exiting HS 6-digit Products</b>
<b>2003-2004</b>	44.1	35.9	19.5	-11.3
<b>2004-2005</b>	15.9	13.4	12.5	-10.0
<b>2005-2006</b>	7.6	9.1	10.9	-12.4
<b>2006-2007</b>	23.3	16.8	16.0	-9.5
<b>2007-2008</b>	23.2	22.5	8.7	-8.1
<b>2008-2009</b>	-17.9	-16.2	8.9	-10.5
<b>2009-2010</b>	8.2	6.3	9.8	-7.9
<b>2010-2011</b>	13.3	11.3	11.9	-9.9
<b>2003-2011</b>	68.2	31.5	49.0	-12.3

Notes: nominal export growth is considered in all rows in all panels. The formulas for the decompositions are described in Section 4.



**Appendix Table 1: Definition of Sectors**

Sectors	HS Chapters
Agricultural and Food Products	01-24
Chemicals	28-40
Machinery	84, 85, 90-92
Metals	71-83
Transportation Vehicles	86-89
Textile & Clothing	41-43, 50-67
Other	25, 26, 44-49, 68-70, 93-97

**Appendix Table 2: Characterization of Cohorts of 2003 Entrants and 2002-2011 Continuous Exporters**

Export Year	Cohort of 2003 Entrants		Cohort of Continuous Exporters 2002-2011	
	Number of Firms	Average Export Value per Firm (million USD)	Number of Firms	Average Export Value per Firm (million USD)
2002			7,423	1.1
2003	12,317	0.2	7,423	2.0
2004	7,005	0.6	7,423	2.9
2005	5,728	0.8	7,423	3.5
2006	5,054	0.9	7,423	4.3
2007	4,422	1.2	7,423	5.7
2008	3,894	1.7	7,423	7.3
2009	3,473	1.5	7,423	5.6
2010	3,241	1.7	7,423	6.6
2011	3,043	2.0	7,423	8.1

Note: Exports per firm are in nominal terms.