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# Dissecting Thailand's International Trade: Evidence from 88 Million Export and Import Entries

by

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# Dissecting Thailand's International Trade: Evidence from 88 Million Export and Import Entries\*

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## Abstract

With a trade-to-GDP ratio of over 130 percent, Thailand is one of the most open emerging market economies in the world. Through a transactional-level database of over 88 million customs entries, this paper provides a comprehensive picture of the dynamic evolution of Thai international trade, highlighting both the intensive as well as extensive margins. Focusing on exports and exporting firms, we document the highly concentrated, specialized and fragile nature of export activity.

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## Introduction

In recent years the focus of the international trade field has shifted from countries and industries towards firms and products. This is for a very good reason. It is at the firm level that decisions and actions are taken that actually drive trade flows. The relevant decision unit, be it in scaling an existing activity up or down, expanding product variety or moving into new markets is at the firm level. This contrasts with traditional trade theory that focuses on comparative advantage of countries and typically assume a representative firm, at least within each industry. These assumptions have become problematic in light of the enormous degree of heterogeneity among firms observed in the data.

The literature has also shown that the extensive margins of trade – that is, the number of firms that trade, the number of products they trade as well as the number of countries they trade with – are central to understanding the evolution of aggregate trade flows. This offers a complimentary dimension to the more traditional focus on intensive margins – that is, the value traded per firm, per product, or per country.

A clearer picture of the mechanisms through which the economy responds to trade therefore requires a disaggregated view of trade. This is particularly important from a policy perspective because understanding all the margins, intensive and extensive, along which the economy adjusts to trade is critical for assessing welfare implications. Disaggregated data helps identify potential winners and losers from trade-related developments and hence informs on their distributional implications on various dimensions including wage inequality, unemployment, and the political economy of trade.

Using this approach, we add to the literature by documenting the dynamic evolution of international trade in Thailand using transactional-level customs data supplemented by balance sheet information from all registered firms. To better understand internationally engaged firms, we examine the various dimensions of firm activities, including how many products they trade, how many countries they transact with, the concentration of trade across firms, and whether firms import as well as export. We also trace the evolution of these variables, as well as firm survival over time.

Thailand makes an interesting case to examine trade at this level of granularity for a number of reasons. Apart from being very open and highly integrated with the global economy, it is party to various free trade agreements as well as an integral part of the global production chain in certain key industries (eg. auto and computer parts). Regionally, Thailand is located at the centre of the vibrant Greater Mekong Sub-region with rapidly growing border trade. Finally, as an emerging economy whose impressive economic growth in the past decades has been fuelled by the export sector, Thailand epitomises a growth strategy emulated by many other developing countries.

This is the first time that Thai international trade has been examined from this granular perspective. The aim of this paper is to present the data, highlight key stylized facts, and illustrate the potential of further research. Our analysis reveals a number of striking observations, many of which are consistent with the evidence documented in developed economies. However, to our best knowledge, this is the first paper that systematically documents such evidence using the data from a developing country.

First, engagement in international trade is a rare activity: of the over 400,000 registered firms in 2015, only 5.7 percent exported while just over 10 percent imported. Alternatively, and taking into account many firms that both import and export, 88 percent of all registered Thai firms do not directly engage in any international trade activities.

Second, trade is extremely concentrated. The top 5 percent of firms account for 88 percent of total Thai exports in 2015. At the same time, the top 5 percent of products and markets made up for 77 percent and 67 percent, respectively, of all exports. The picture for imports is similar with the top 5 percent of firms, products and markets accounting for 90, 70, and 73 percent, respectively, of all imports. In terms of product and trading-partner intensity, we find that most importers as well as exporters tend to trade relatively few products and engage in trade with a relatively small number of countries. However, the small number of firms with the greatest product and trading-partner intensity account for the bulk of both exports and imports.

Third, trading firms are special. They differ substantially from purely domestic firms and tend to be larger, more capital intensive, more productive, and utilize more external finance (higher leverage). Among exporters, those that also import stand out from the rest along similar margins.

Fourth, there is a great deal of churning in Thai exports. In any given year, roughly one-third of exporters are new and an equal number exit the market. Looking at unique product-market-trader bundles, the degree of churn is even higher with the proportion of new and exiting bundles per year of over one-half.

Fifth, exporting relationships are extremely fragile. The likelihood of that an exporter or a given product-market-trader bundle remaining in the market for more than one year is roughly 30 percent. But those that survive generally blossom and account for a disproportionate share of total export value.

The rest of the paper is structured as follows. The first section describes the data. The second section provides a comprehensive account of Thai exports at the extensive and intensive margins, while the third section highlights the role of export firms and their characteristics. Section four describes the dynamic evolution of Thai exports, conducts growth decomposition along the intensive and extensive margins, and performs survival analysis. An Annex present results for imports and importing firms.

## 1. Data Description

The main data source of our analysis is a database of all trade transactions collected by the Thai Customs Department at the Ministry of Finance. These data cover all shipments of goods that crossed into or out of Thailand between 2001 and 2015. The key variables available include firm identification, destination/origin, commodity, value, currency, shipping method, point of entry/exit,

Table 1: Overview of Customs Data

Number of entries, items, and total value by year

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>Export</b>															
Number of entries (million entries)	2.02	2.25	2.54	2.76	2.97	3.17	3.34	3.37	3.27	3.46	3.68	3.66	3.76	3.95	3.97
Number of items (million items)	3.87	4.53	5.25	5.78	6.35	6.94	12.61	19.70	19.56	23.44	26.47	27.11	29.48	31.99	33.60
Average number of items per entry	1.92	2.01	2.06	2.09	2.14	2.19	3.78	5.85	5.98	6.78	7.20	7.41	7.84	8.09	8.46
Total value (trillion Baht)	2.79	2.85	3.26	3.82	4.33	4.86	5.27	5.82	5.17	5.82	6.74	7.07	6.90	7.32	7.24
<b>Import</b>															
Number of entries (million entries)	1.70	1.81	2.12	2.27	2.42	2.56	2.64	2.70	2.51	2.96	3.10	3.33	3.36	3.44	3.48
Number of items (million items)	3.88	4.15	4.97	5.44	5.94	6.34	7.35	21.43	22.05	27.97	29.77	34.17	36.79	37.96	40.67
Average number of items per entry	2.28	2.30	2.35	2.40	2.45	2.48	2.79	7.93	8.80	9.44	9.62	10.26	10.94	11.04	11.68
Total value (trillion Baht)	2.70	2.53	3.09	3.80	4.63	4.81	4.92	5.93	4.63	5.86	6.98	7.89	7.60	7.39	6.90

Number of traders by year

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total number of traders	44,251	48,352	54,101	57,644	60,716	61,945	66,505	81,212	87,026	87,834	92,674	97,404	98,647	93,221	95,320
Exporters	21,289	23,117	24,290	26,047	27,742	29,130	31,522	37,947	38,114	36,345	38,086	38,928	37,909	36,017	36,686
8,325	9,460	10,021	10,871	11,912	8,162	14,551	19,443	19,361	17,661	18,595	19,219	18,001	16,313	17,017	16,942
Importers	35,926	38,892	44,080	46,773	48,804	53,783	51,954	61,769	67,665	70,173	74,079	78,185	80,646	76,908	78,303
22,962	25,235	29,811	31,597	32,974	32,815	34,983	43,265	48,912	51,489	54,588	58,476	60,738	57,204	58,634	58,598
Hybrids	12,964	13,657	14,269	15,176	15,830	20,968	16,971	18,504	18,753	18,684	19,491	19,709	19,908	19,704	19,669

Number of products

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
<b>Export</b>															
4-digit	1,184	1,177	1,188	1,183	1,191	1,201	1,186	1,186	1,196	1,195	1,210	1,215	1,213	1,207	1,210
6-digit	4,384	4,429	4,461	4,487	4,555	4,551	4,633	4,555	4,576	4,586	4,725	4,917	4,825	4,768	4,769
8-digit	5,643	5,664	5,728	5,742	6,097	5,939	7,472	7,233	7,230	7,259	7,559	9,616	8,467	8,397	8,343
<b>Import</b>															
4-digit	1,214	1,218	1,223	1,232	1,229	1,231	1,236	1,214	1,213	1,217	1,221	1,217	1,214	1,217	1,218
6-digit	4,848	4,948	4,941	4,977	4,976	5,007	5,113	4,883	4,853	4,865	4,936	5,015	5,001	4,998	5,011
8-digit	6,391	6,436	6,421	6,539	6,785	6,713	10,025	7,774	7,680	7,702	8,510	8,890	8,818	8,807	8,828

tariffs and duties, as well as trade sanction and preferential measures. To export/import goods, traders submit entry forms to the customs department. Individual entry forms may contain many items to be shipped. Exporter/importers can be individuals or registered firms. We will use the term *trader* to designate the party engaged in the trade transaction. These can be registered firms or individuals.

Table 1 presents summary statistics of the data. The upper panel reports the number of entries, items per entry, and number of traders in each year of the sample. While the number of entries has increased steadily, the number of items per entry has increased even more rapidly, with an average entry containing around 9 items in 2015 compared to just under 2 in 2001. The total value of exports has increased by roughly 260 percent during this time, from 2.79 to 7.24 trillion baht. A similar picture obtains for imports. All in all, we have information on over 546 million items exported/imported from around 88 million entries over a span of 15 years.

The second panel of Table 1 shows the number of traders categorized according to whether they export, import, or both export and import. For the latter we will use the term *hybrids*. Under our definition, *exporters* equals *pure exporters* plus *hybrids*. The same applies for importers. Between 2001 and 2009, the number of exporters rose from 21,289 to 38,114. Since then, however, the number of exporters have actually declined to 36,686 in 2015. By contrast, the number of importers has risen steadily from 35,926 in 2001 to 78,303 in 2015, the bulk of this increase coming from pure importers. This may reflect the rise in small e-commerce importers and is suggestive of smaller entry barrier for imports.

The last panel of Table 1 provides the number of products based on various Harmonized System (HS) classifications. We will adopt the 6-digit classification scheme as it provides sufficiently fine product delineation while avoiding problems related to product reclassifications that would arise with a finer level of disaggregation. This yields 4769 export products and 5011 import products in 2015, both representing only modest growth over the sample.

*Table 1A: Product-Market-Trader Nexus*

	2001	2007	2011	2015
Number of product-market combinations (6-digit)				
Export	91,980	121,652	136,946	134,890
Import	66,908	81,304	89,549	95,432
Number of product-market-trader combinations (6-digit)				
Export	346,827	513,730	613,060	625,648
Import	630,078	908,172	1,121,423	1,273,785

Source: Thai Customs Department; Authors' calculation.

Finally, Table 1A provides the evolution of product-market (ie. PM or product *i* to market *j*) and product-market-trader (ie. PMT or product *i* to market *j* by firm *k*) *combinations* of Thai exports. Notable is the fact that even though the number of exporters and PMs declined between 2007 and 2011, the number of PMTs have continued to grow throughout our sample. For imports, there has been continued growth in all dimensions.

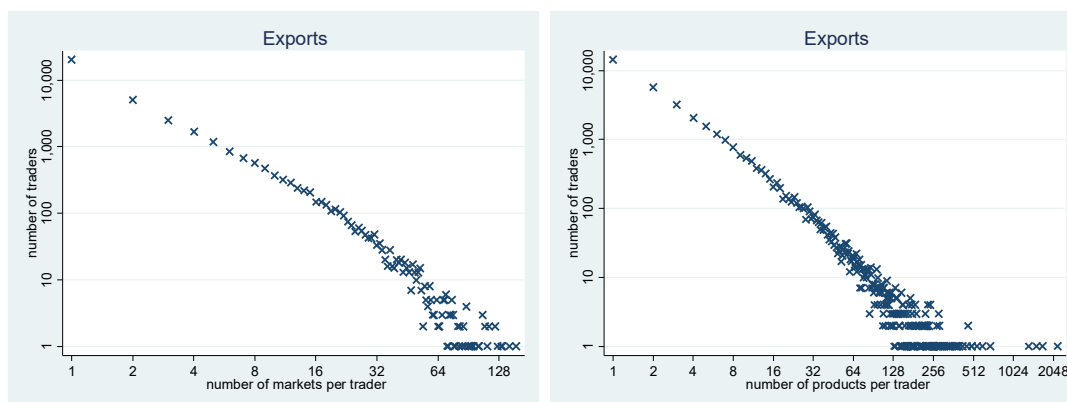
## 2. What, Where, Who? A Granular Perspective of Thai Exports

A unique feature of the customs data is that it provides information about the product, market, and trader nexus. We call this PMT (product-market-trader) level granularity. In later sections we will be more interested in the firm dimension which constitute only a subset of traders. In this paper we focus mainly on exports given its important role in the Thai economy. We will note results for imports when they are of particular interest with the full set of results presented in the Annex.

### 2.1 Extensive Margins

We begin by examining the extensive margin of Thai exports. The evolution of exports in terms of the number of export destinations, the number of products exported, and the number of exporters operating has been shown to be important in understanding aggregate export outcomes. Using French export data by firm and destination market, for example, Eaton et al. (2004) find that more than 60 percent of the variation in exports across markets of different size is explained by the extensive margin of the number of exporting firms. A better understanding of Thai exports therefore begins with the extensive margin.

Figure 1: Distribution of number of export markets/products per trader in 2015



Source: Thai Customs Department; Authors' calculation.

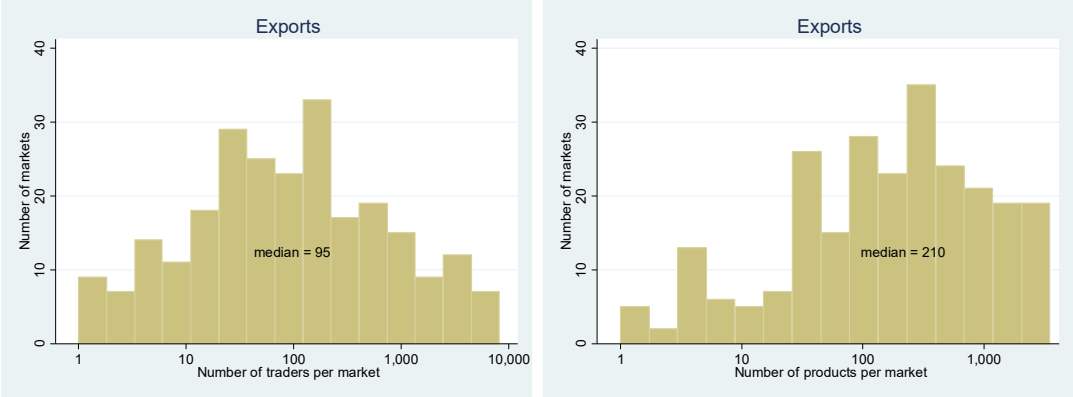
Starting from a *trader* perspective, Figure 1 plots the distribution of exporters based on the number of markets they serve (left panel) and the number of products they sell (right panel). The frequency with which more markets and products are served declines smoothly and monotonically to the point where at most a single trader serves a very large number. Exporters generally sell few products to very few markets and most export just a single product to a single destination. This suggests that the fixed cost of expanding products and markets is high.

Looking at the *market* perspective, Figure 2 shows the distribution of markets according to the number of traders per market and the number of products per market. While the number of traders per market is relatively small (median of 95 exporters per market), the number of products within a given market is relatively high (median of 210 products per market). This implies that traders are specialized in markets but diversified in products and is suggestive of high entry barriers – most export markets are dominated by few firms that sell many things. It is worth noting here that this picture is different for imports. As shown in Figure A2 in the Annex, the median number of products



imported per market is only 44 and the number of traders per market is even smaller (median of 15 traders per market).

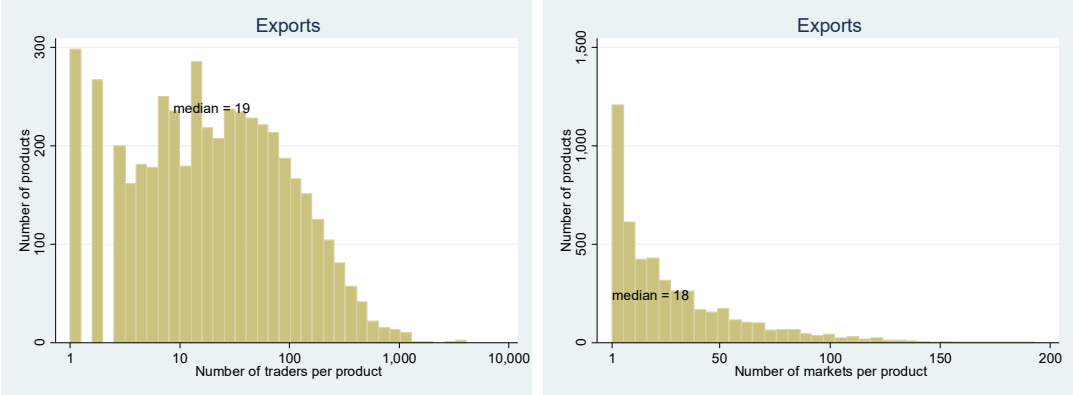
Figure 2: Distribution of number of export traders/products per market in 2015



Source: Thai Customs Department; Authors' calculation.

Finally at the *product* level, Figure 3 plots the distribution of products relative to the number of traders per product and the number of markets per product. The number of traders per product (left panel) is relatively small (median of 19 traders per product). At the same time, the right panel shows that most products are sold to few markets (median is 18 markets per product with bunching at 1). Thailand exports few “global” products. The fact that most products are market-specific suggests a high degree of specialization and with it, a high risk concentration – if a particular market is hit by a shock, the trader of that product cannot rely on export receipts from other markets to cushion the blow.

Figure 3: Distribution of number of export traders/markets per product in 2015 exports

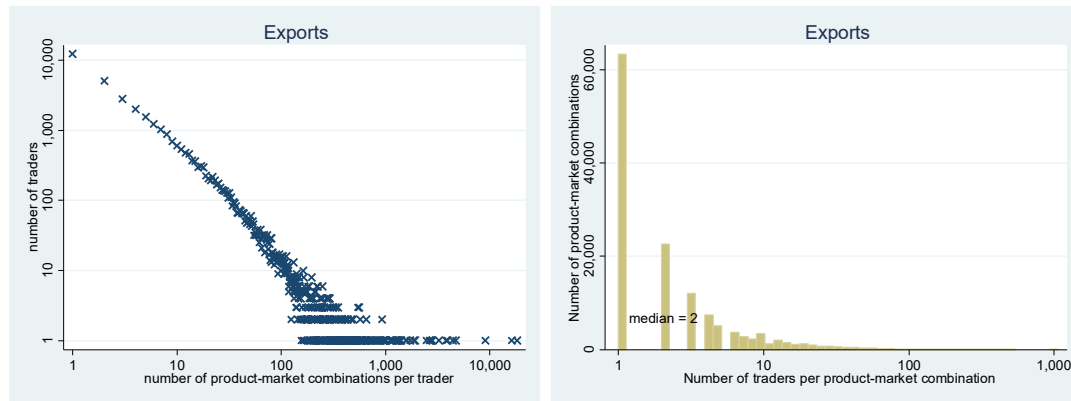


Source: Thai Customs Department; Authors' calculation.

We can also examine exports through the lens of product-market (PMs) *combinations*. The left-hand panel of Figure 4 shows the distribution of traders based on the number of product-market combinations that each trade. There is a very large variation in the number of PM combinations per trader, ranging from 1 to over 10,000 combinations. Most traders export just 1 PM bundle while a handful export over 1,000 bundles. The right-hand panel flips things around and shows the distribution of PMs based on the number of traders per PM. A striking finding is that for most PM bundles, there is just 1 trader! Thai exporters evidently don't compete with one another by exporting

the same product to the same country, resulting in a high degree of trader segmentation by PM bundle.

Figure 4: Distribution of product-market combinations in 2015



Source: Thai Customs Department; Authors' calculation.

## 2.2 Intensive Margins

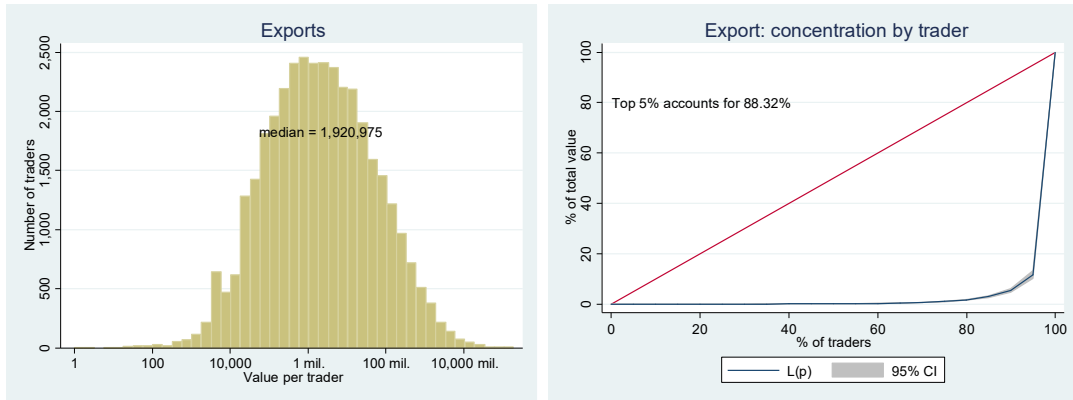
Turning to the intensive margin, we next examine the *value* of exports at the PMT level. The left-hand column of Figure 5 shows the distribution of traders, markets, and products in terms of their average values. For example, the median value exported per trader in 2015 is rather small at around 1.9 million baht. More striking is the information presented in the right-hand column of Figure 5. Here we show the degree of export concentration from the PMT perspective. No matter how you look at it, Thai exports is highly concentrated. The top 5 percent of traders, products, and markets account for 88, 67, and 77 percent, respectively, of total export value. A handful of traders, markets, and products make up most of aggregate export value.

At a more granular level, we can also look at the distribution based on product-market (PM) and product-market-trader (PMT) *bundles*. The top panel of Figure 6 shows that the typical value traded per PM bundle is quite small, at around 300,000 baht. More importantly, PM-level concentration is very high with the top 5 percent of PM bundles accounting for 90 percent of total exports. At the PMT-level, the concentration is even higher with around 92 percent of total export accounted for by the top 5 percent of PMT bundles. Thus not only are exports concentrated across exporters, but within each firm, activity is also very highly concentrated in a few PM bundles that account for much of each firms' exports.

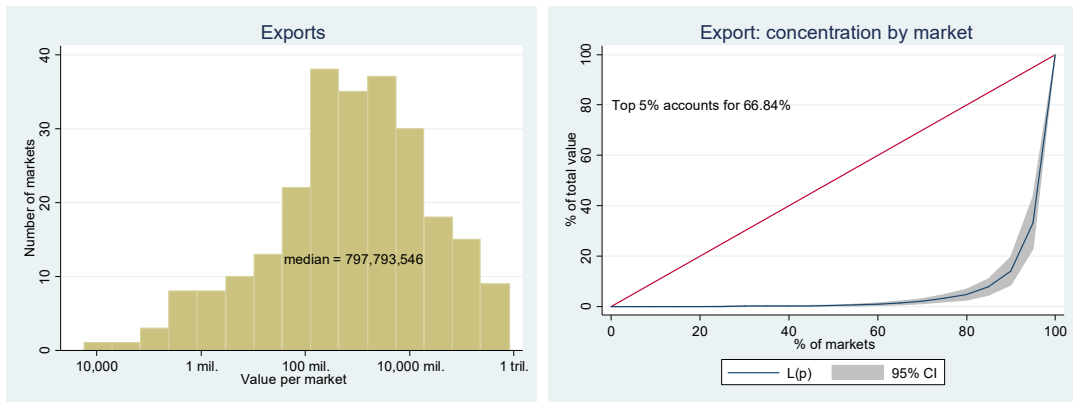
Such high levels of concentration have important implications for risk and shock transmission. It implies that idiosyncratic shocks specific to particular traders, markets, or products can have big repercussions on aggregate trade value. Indeed, Giovanni et al. (2014) shows that for French exports, firm-specific shocks explain a substantial share of aggregate export fluctuations. This comes not just from the direct impact of large firms, but also through the indirect linkages across firms. The high concentration at the PM and PMT levels are particularly worrisome because idiosyncratic shocks at this level can seem isolated (eg. problem with exports of a particular machine component to one market by a single producer) can have widespread repercussions on total exports. A corollary is that aggregate tools, such as monetary policy, may not be well suited to dealing with export fluctuations driven by idiosyncratic shocks to firms or unique PM and PMT bundles.

Figure 5: Intensive Margins (2015)

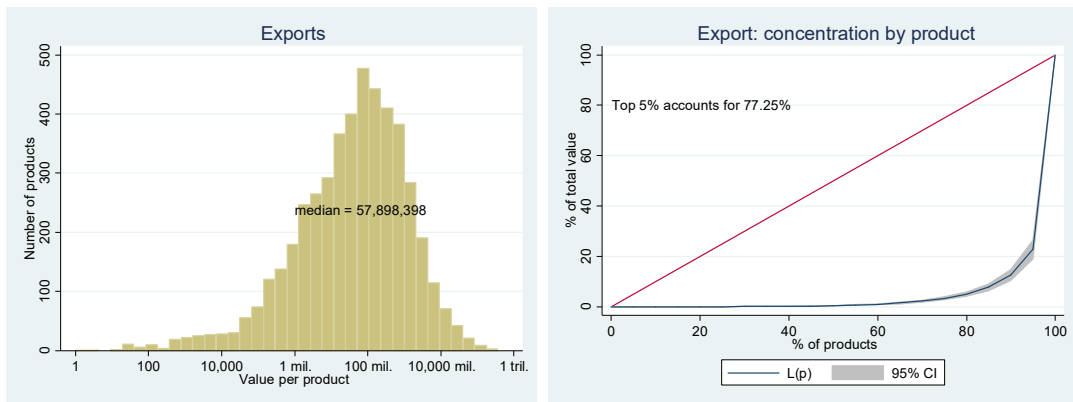
Distribution of average export value per trader



Distribution of average value per market



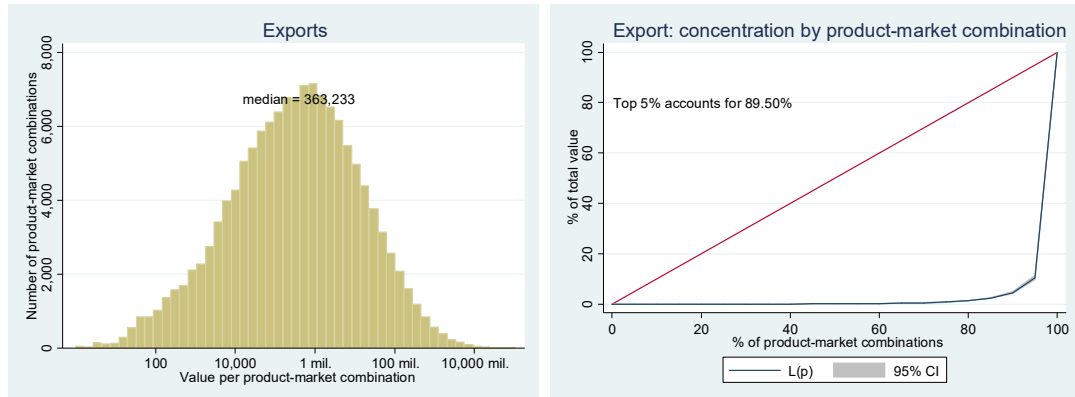
Distribution of average value per product



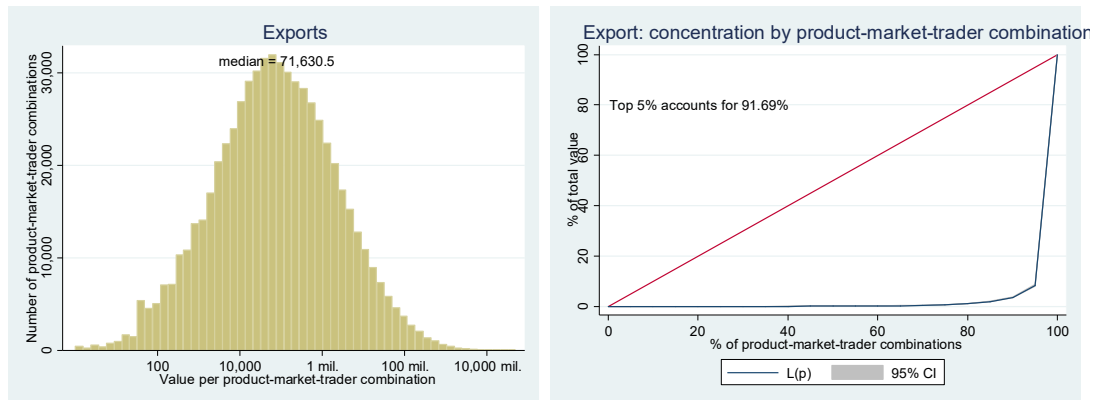
Source: Thai Customs Department; Authors' calculation. Note: The right column shows Lorenz curves for exports. If every trader, market, and product accounted for the same share of exports, the plot would lie on the diagonal equality line.

Figure 6: Intensive Margins by PM and PMT Bundles (2015)

Distribution of average export value per product-market combination per trader



Distribution of average export value per product-market-trader combination



Source: Thai Customs Department; Authors' calculation. Note: The right column shows Lorenz curves for exports. If every trader, market, and product accounted for the same share of exports, the plot would lie on the diagonal equality line.

### 2.3 The Product-Market-Trader Nexus

Combining the information on both the extensive and intensive margins, the top panel of Table 2 shows the distribution of traders based on the number of products exported and the number of destination markets, while the bottom panel presents a similar breakdown based on the share of export value. The table reveals a number of striking observations.

The number of destination countries served by the average exporter is small: 55.3 percent of Thai traders export to a single market in 2015, though these exports represent just 4 percent of total export value. By contrast, traders exporting to five or more destinations account for around 20 percent of exporters but 90.1 percent of export value.

A similar picture emerges with respect to the number of products exported. In 2015, 39.2 percent of exporters exported a single product abroad though these account for a mere 4.9 percent of aggregate export value. Exporters of 30 or more products accounted for just 5.7 percent of all exporters but as much as 55 percent of total export value.

Table 2: Distribution of Exporters and Export Value (2015)

Share of traders							
Number of products	Number of countries						All
	1	2	3	4	5-29	30+	
1	33.3%	3.2%	1.0%	0.6%	1.2%	0.0%	39.2%
2	8.0%	3.9%	1.3%	0.7%	1.5%	0.0%	15.4%
3	3.3%	2.0%	1.2%	0.6%	1.6%	0.0%	8.7%
4	1.9%	1.0%	0.7%	0.5%	1.4%	0.0%	5.6%
5-29	7.4%	3.1%	2.5%	2.0%	9.8%	0.7%	25.4%
30+	1.4%	0.4%	0.2%	0.2%	2.7%	0.8%	5.7%
All	55.3%	13.6%	6.8%	4.6%	18.1%	1.6%	100.0%

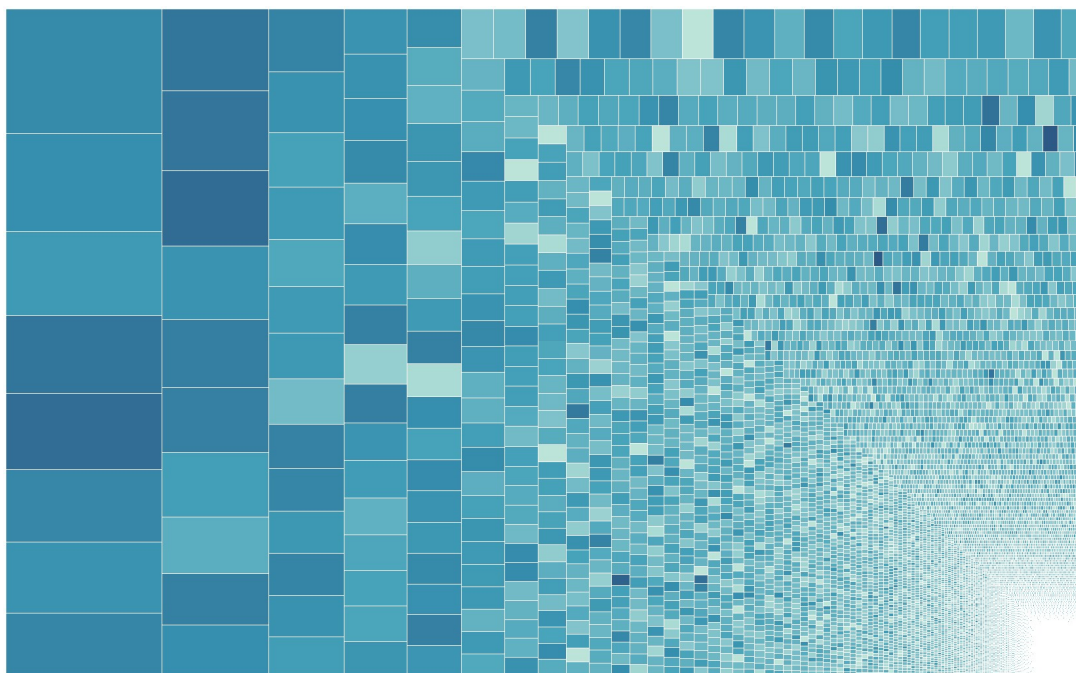
Share of value							
Number of products	Number of countries						All
	1	2	3	4	5-29	30+	
1	1.9%	0.9%	0.4%	0.2%	1.5%	0.1%	4.9%
2	0.4%	0.5%	0.3%	0.3%	1.7%	0.1%	3.2%
3	0.2%	0.3%	0.3%	0.2%	1.9%	0.5%	3.4%
4	0.2%	0.1%	0.1%	0.1%	2.0%	0.5%	3.0%
5-29	0.8%	0.6%	0.7%	0.5%	18.0%	9.9%	30.5%
30+	0.6%	0.2%	0.1%	0.2%	15.2%	38.7%	55.0%
All	4.0%	2.5%	1.9%	1.5%	40.2%	49.9%	100.0%

Source: Thai Customs Department; Authors' calculation.

Combining both margins together, 33.3 percent of all exporters export a single product to a single market but make up just 1.9 percent of export value. At the other extreme, the 0.8 percent of exporters exporting 30 or more products to 30 or more countries account for almost 40 percent of aggregate exports! This reflects the importance of multi-product/multi-market exporters in overall Thai exports. The small share of firms that dominate Thai exports are large in size and are relatively diversified across products and markets.

Figure 7 provides a concise summary of the landscape of Thai exports. The area of the picture represents the total value of Thai exports in 2015 and each box represents each exporter's share of total exports. The shade within each box depicts the number of product-market bundles that the respective exporter exports, with darker shades denoting higher number of bundles. If one divides the picture vertically into two parts, it is clear that the left half, which represents half of total exports, consists of only a handful of exporters who engage in a large number of product market bundles (the dark shades here represent around 1000 bundles). As one moves towards the bottom right, the number of exporters are large but they are very small and undertake much fewer PM bundles. Evidently, Thai exports is dominated by a few large exporters engaged in a large number of PM combinations.

Figure 7: A Mosaic of Thai Exports (2015)



Source: Thai Customs Department; Authors' calculation.

## 2.4 Sectoral and Regional Perspective

To obtain a clearer picture of how the extensive margin of trade matters in aggregate trade, we turn to summary statistics for the product-market-trader dimensions at the broader sectoral and regional levels. The top panel of Table 3 shows the breakdown of traders and products by broad regions in 2015. It reveals that in terms of the sheer number of exporters, ASEAN, EU, and Japan are the top 3 destination markets. Most of the traders in all regions export 5 or less products, though exporters to ASEAN and Japan appear to be relatively more diversified in terms of products sold.

The bottom panel of Table 3 presents the breakdown of the number of traders and markets by broad sector groupings. Here the bulk of traders are in Metals and Other Materials, Chemicals and Rubbers, and Machinery. All sectors have well-diversified export destinations. That said, across all sectors, most exporters export to just one market with Mineral Products having a particularly high concentration of single market exporters.

Finally, we examine the distribution of exporters along broad sectors and regions in combination. This is shown in Table 4A. Looking first at the first row, we can see that over 52 percent of traders export to ASEAN. Of these, the bulk are in Chemicals and Rubbers, Metals and Other Minerals, and Machinery. Indeed, these three sectors account for the bulk of exporters as we noted above (bottom row of Table 4A). The EU and Japan also account for a sizable share of trader involvement. It is instructive to compare the distribution of traders with the more traditional distribution of export value. The latter is shown in Table 4B. Wood and Leather Products account for a relatively low share of export value (2.3 percent) but over 21 percent of all exporters trade in this sector. A similar picture obtains for Textiles and Wearing Apparels. For both sectors, the disparity between value and share of traders is particularly stark for ASEAN. Of note is also the fact that while exports of Machinery is three times larger than Metals and Other Materials, the share of traders exporting goods in these sectors are almost the same.

Table 3: Summary Statistic by Broad Sectors and Regions

Broad Regions (2015)								
Country/Region	No. of traders	No. of products	Share of traders by no. of products					Total
			1	2-5	6-10	11-29	30+	
ASEAN	19,210	4,465	41.2%	34.5%	10.3%	8.9%	5.1%	100.0%
Australia	4,036	2,639	48.9%	35.3%	7.9%	5.9%	2.0%	100.0%
China	6,170	3,079	53.0%	34.9%	6.2%	4.6%	1.3%	100.0%
East Asia	5,910	3,025	51.3%	35.8%	7.2%	4.3%	1.4%	100.0%
EU	9,171	3,455	45.2%	36.3%	8.7%	6.9%	2.7%	100.0%
Hong Kong	5,220	2,980	52.2%	36.4%	6.2%	4.0%	1.2%	100.0%
India	4,351	2,694	51.7%	35.7%	6.8%	4.2%	1.6%	100.0%
Japan	8,152	3,514	43.6%	34.0%	9.7%	8.9%	3.8%	100.0%
US	6,676	3,074	46.5%	37.8%	7.9%	5.8%	2.1%	100.0%
Rest of the World	11,156	3,757	43.2%	36.6%	9.0%	7.5%	3.7%	100.0%
<b>Total/All regions</b>	<b>36,686</b>	<b>4,769</b>	<b>47.0%</b>	<b>32.3%</b>	<b>10.0%</b>	<b>7.4%</b>	<b>3.3%</b>	<b>100.0%</b>

Source: Thai Customs Department; Authors' calculation.

Broad Sectors (2015)								
Sector	No. of firms	No. of markets	Share of traders by no. of markets					Total
			1	2-5	6-10	11-29	30+	
Agricultural Products	5,562	207	64.2%	25.7%	5.8%	3.7%	0.6%	100.0%
Food	4,088	220	62.0%	23.3%	6.3%	6.2%	2.1%	100.0%
Mineral Products	1,877	132	77.9%	17.0%	3.4%	1.5%	0.2%	100.0%
Chemicals & Rubbers	12,554	226	58.7%	28.0%	7.0%	5.2%	1.2%	100.0%
Wood & Leather Products	7,780	218	66.4%	23.8%	5.1%	4.2%	0.5%	100.0%
Textiles & Wearing Apparels	8,965	227	71.8%	18.8%	4.3%	3.9%	1.1%	100.0%
Metals & Other Materials	12,676	224	59.3%	28.4%	6.9%	4.7%	0.7%	100.0%
Machinery	11,329	225	62.3%	27.0%	5.7%	4.0%	1.0%	100.0%
Transportation	4,272	214	68.9%	22.2%	4.6%	3.3%	0.9%	100.0%
Miscellaneous	9,394	227	69.4%	22.0%	4.3%	3.6%	0.7%	100.0%
<b>All Sectors</b>	<b>36,686</b>	<b>248</b>	<b>59.9%</b>	<b>26.5%</b>	<b>7.2%</b>	<b>5.2%</b>	<b>1.1%</b>	<b>100.0%</b>

Source: Thai Customs Department; Authors' calculation.

Table 4A: Share of Exporters by Region and Sector (2015)

	Agricultural Products	Food	Mineral Products	Chemicals & Rubbers	Wood & Leather Products	Textiles & Wearing Apparels	Metals & Other Materials	Machinery	Transportation	Miscellaneous	All sectors
ASEAN	7.2%	6.4%	3.7%	19.8%	8.8%	9.4%	16.3%	18.0%	6.8%	11.4%	52.4%
Australia	1.0%	1.3%	0.2%	3.2%	1.9%	2.1%	3.3%	2.1%	1.0%	2.0%	11.0%
China	2.3%	1.5%	0.4%	5.0%	2.4%	2.0%	3.9%	4.3%	1.2%	2.2%	16.8%
East Asia	2.3%	1.9%	0.4%	4.6%	2.4%	1.9%	3.9%	4.3%	0.8%	2.5%	16.1%
EU	2.7%	2.2%	0.3%	6.5%	4.9%	5.3%	8.1%	6.2%	2.0%	5.9%	25.0%
Hong Kong	1.7%	1.5%	0.1%	3.4%	1.7%	1.5%	5.2%	2.7%	0.4%	2.0%	14.2%
India	0.6%	0.6%	0.3%	3.8%	1.3%	1.6%	4.3%	3.1%	1.0%	1.7%	11.9%
Japan	2.1%	1.9%	0.5%	7.1%	4.5%	6.0%	7.6%	6.4%	2.1%	5.1%	22.2%
US	2.2%	1.6%	0.3%	4.4%	3.3%	3.0%	6.0%	3.7%	1.2%	4.0%	18.2%
Rest of the World	4.5%	3.5%	0.8%	9.7%	5.6%	7.0%	9.3%	7.1%	3.2%	6.2%	30.4%
All regions	15.2%	11.1%	5.1%	34.2%	21.2%	24.4%	34.6%	30.9%	11.6%	25.6%	

Source: Thai Customs Department; Authors' calculation.

Table 4B: Share of Export Value by Region and Sector (2015)

	Agricultural Products	Food	Mineral Products	Chemicals & Rubbers	Wood & Leather Products	Textiles & Wearing Apparels	Metals & Other Materials	Machinery	Transportation	Miscellaneous	All sectors
ASEAN	1.3%	2.3%	3.4%	4.2%	0.6%	0.8%	2.5%	6.4%	4.0%	0.5%	25.8%
Australia	0.1%	0.3%	0.1%	0.5%	0.0%	0.1%	0.5%	0.7%	2.2%	0.1%	4.6%
China	1.5%	0.3%	0.4%	4.1%	0.6%	0.2%	0.3%	2.7%	0.2%	0.7%	11.1%
East Asia	0.2%	0.4%	0.1%	0.7%	0.2%	0.1%	0.3%	1.3%	0.1%	0.1%	3.6%
EU	0.4%	1.1%	0.0%	1.0%	0.1%	0.5%	1.1%	4.2%	1.2%	0.6%	10.2%
Hong Kong	0.3%	0.1%	0.0%	0.2%	0.1%	0.1%	1.2%	3.2%	0.0%	0.4%	5.5%
India	0.0%	0.0%	0.0%	0.7%	0.0%	0.1%	0.4%	0.9%	0.2%	0.1%	2.5%
Japan	0.6%	1.3%	0.1%	1.5%	0.1%	0.4%	1.1%	3.2%	0.5%	0.6%	9.4%
US	0.5%	1.1%	0.0%	1.3%	0.1%	0.6%	1.1%	5.4%	0.5%	0.6%	11.2%
Rest of the World	1.3%	1.3%	0.3%	1.9%	0.3%	0.8%	1.9%	3.5%	4.5%	0.4%	16.2%
All regions	6.1%	8.1%	4.5%	16.1%	2.3%	3.6%	10.5%	31.5%	13.4%	4.0%	100.0%

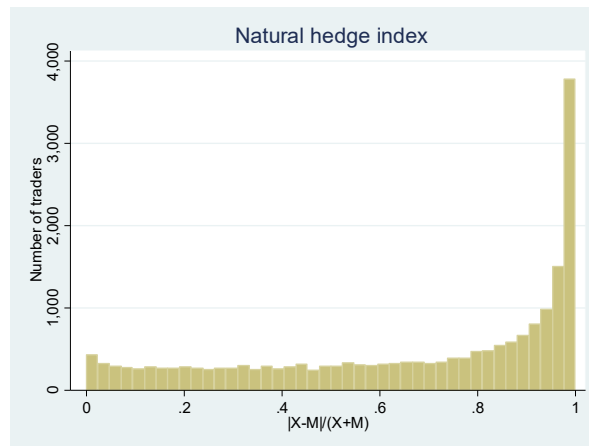
Source: Thai Customs Department; Authors' calculation.

## 2.5 Hybrids: Exporter – Importer

The literature has documented the fact that firms that simultaneously export and import typically exhibit the highest levels of performance (for example Bernard et al., 2007a,b). Thus we are also interested in the nature of trade and characteristics of these firms. To get a sense of the extent to which traders engage in both export and import, Figure 8 shows the distribution of traders in our sample based on their “natural hedge” ratios. This is calculated, for each trader, as the ratio of the absolute value of export minus import over total trade undertaken:  $|\text{Export} - \text{Import}| / (\text{Export} + \text{Import})$ . A ratio of 0 indicate that export and import are exactly equal, and hence perfect natural hedge. On the other hand, a ratio of 1 reflects that the trader engages exclusively only in one activity. Evidently, the bulk of Thai traders have no natural hedge, exporting or importing only. Of those that do both, many are skewed to the higher end of the index (low natural hedge).



Figure 8: Simultaneous Exporting and Importing



Source: Thai Customs Department; Authors' calculation.

Table 5 documents the overall role of hybrids. As of 2015, 53.6 percent of exporters also import while only 25.1 percent of importers also export. Strikingly, hybrid traders account for 93.3 percent of total export value and 89.7 percent of aggregate imports. Thus Thai international trade is overwhelmingly dominated by firms that simultaneously export and import. This is consistent with previous finding in the literature. Bernard et al (2009) document that over 50 percent of firms in the United States that import also export and these firms account for close to 90 percent of US trade.

Table 5: Exporter-Importer

	2001	2007	2011	2015
Number of hybrids				
Total	12,964	16,971	19,491	19,669
As % of exporters	60.9%	53.8%	51.2%	53.6%
As % of importers	36.1%	32.7%	26.3%	25.1%
Number of downstream production-chain exporters (DPE)				
Total	3,295	3,801	3,901	3,532
As % of exporters	15.5%	12.1%	10.2%	9.6%
As % of importers	9.2%	7.3%	5.3%	4.5%
Value traded by hybrids				
As % of total exports	92.4%	93.4%	92.5%	93.3%
As % of total imports	90.4%	92.1%	91.9%	89.7%
Value traded by downstream production-chain exporters (DPE)				
As % of total exports	27.6%	31.1%	30.2%	32.6%
As % of total imports	21.6%	31.3%	30.5%	26.7%

Source: Thai Customs Department; Authors' calculation.

Thai customs data allow hybrids to be further decomposed into traders that import intermediate products and export final goods – what we call “downstream production-chain exporters” (DPE). These traders are of interest because they are likely to be part of global production chain networks and, hence, engaged in high value added activity while at the same time being more exposed to fluctuation in the global economy. We define DPEs as traders whose majority of exports are final

goods and majority of imports are intermediate goods. Table 5 reveals that DPEs make up just 9.6 percent of all exporters in 2015 but account for 32.6 percent of total exports.

*Table 6A: Distribution of Hybrid Exporters and Export Value (2015)*

Share of traders							
Number of products	Number of countries						All
	1	2	3	4	5-29	30+	
1	1.3%	1.0%	0.3%	0.2%	0.3%	0.0%	3.2%
2	1.4%	2.8%	0.9%	0.5%	0.9%	0.0%	6.5%
3	1.0%	1.9%	1.4%	0.7%	1.2%	0.0%	6.2%
4	0.7%	1.3%	1.1%	0.7%	1.3%	0.0%	5.0%
5-29	3.5%	6.3%	6.4%	5.9%	25.3%	0.6%	48.1%
30+	0.8%	1.3%	1.5%	1.5%	22.8%	3.2%	31.0%
All	8.7%	14.6%	11.6%	9.5%	51.7%	3.9%	100.0%

Share of value							
Number of products	Number of countries						All
	1	2	3	4	5+	30+	
1	0.0%	0.0%	0.1%	0.0%	0.4%	0.0%	0.6%
2	0.0%	0.1%	0.2%	0.0%	0.2%	0.0%	0.6%
3	0.1%	0.1%	0.1%	0.1%	0.4%	0.0%	0.7%
4	0.0%	0.0%	0.0%	0.1%	0.4%	0.1%	0.7%
5-29	0.2%	0.3%	0.5%	0.5%	9.0%	2.9%	13.3%
30+	0.1%	0.2%	0.4%	0.6%	35.7%	47.4%	84.5%
All	0.4%	0.8%	1.2%	1.4%	46.0%	50.4%	100.0%

Source: Thai Customs Department; Authors' calculation.

We next present the distribution of hybrid and DPE exporters along combined extensive and intensive margins as we did before for overall exporters. Table 6A shows that most hybrids export 5 or more products to 5 or more destinations. This is in contrast to overall exporters, many of whom export just a single product to a single market as shown above. In terms of value, it is striking that the 3.2 percent of hybrids that export 30 or more products to 30 or more markets account for just under half of all exports by hybrid traders. Hybrid trade is dominated by a few large and well diversified traders. The general same message carries over to DPEs. As shown in Table 6B, the 5.2 percent of all DPEs that export 30 or more products to 30 or more markets account for 64.3 percent of total exports by DPEs.

### Stylized Fact 1: Trade is Highly Concentrated

The overall message of this section is that Thai international trade is extremely concentrated. A handful of the largest traders, the largest markets and the most intensively exported products account for much of Thai exports. From a trader perspective, most export is undertaken by a small number of well diversified traders exporting a large number of products to a large number of countries. These traders invariably also import.

There are many possible explanations for this. The unequal distribution of trade could reflect the large differences in productivity across firms. This could be exacerbated by a high degree of substitutability between good varieties so that small productivity differences across firms, which translate into small different prices leads higher-priced varieties to exit the market. Alternatively there could be economies of scale in distribution and marketing, or market-specific and product-specific sunk costs that favour high productivity firms when it comes to expanding across markets and products. Whatever the reason, very high concentration implies that risk and shock transmission are also concentrated on a few pressure points. What happens to a few firms can have large aggregate impact.

*Table 6B: Distribution of DPEs and Export Value (2015)*

Share of traders							
Number of products	Number of countries						All
	1	2	3	4	5-29	30+	
1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2	0.9%	3.1%	0.7%	0.4%	0.6%	0.0%	5.6%
3	0.8%	2.2%	1.2%	0.8%	0.9%	0.1%	6.0%
4	0.5%	1.4%	1.2%	0.9%	1.6%	0.0%	5.6%
5-29	3.0%	6.1%	6.2%	6.1%	29.3%	1.2%	51.9%
30+	0.6%	0.9%	0.9%	1.0%	22.2%	5.2%	30.8%
All	5.7%	13.7%	10.2%	9.3%	54.6%	6.5%	100.0%

Share of value							
Number of products	Number of countries						All
	1	2	3	4	5+	30+	
1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
3	0.0%	0.0%	0.0%	0.2%	0.1%	0.0%	0.3%
4	0.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.3%
5-29	0.1%	0.1%	0.3%	0.3%	4.0%	1.5%	6.2%
30+	0.0%	0.1%	0.1%	0.1%	28.6%	64.3%	93.1%
All	0.1%	0.3%	0.4%	0.6%	32.9%	65.7%	100.0%

Source: Thai Customs Department; Authors' calculation.

### 3. Firms in Thai exports

Research in international trade increasingly emphasizes firm-level decisions in understanding the causes and consequences of aggregate trade. Drawing on empirical findings using micro-level data on plants and firms, the literature highlights heterogeneity in productivity, size, and other characteristics even within narrowly defined industries. This contrasts with the traditional approach which typically did not pay much attention to firms, and when they did they ignored within-industry heterogeneity. Given the importance of firm-level heterogeneity in understanding the macroeconomic consequences of various shocks, in this section we shift our focus to firms and examine the characteristics of trading firms. To do so, we supplement the customs data with the

Corporate Profile Financial Service (CPFS) data from Thai Department of Business Development at the Ministry of Commerce.

The CPFS database consists of annual financial statements submitted to the department by all registered firms in Thailand. Key available variables include firm identification, balance sheet items (total and sub-items of assets, liabilities, and equities), income statement items (revenues, expenses, and net income). The data also include information on the type of business and industry in which each firm operates, as well as registration year that allows us to calculate firm's age. Merged with trade data, CPFS data provides additional information on major characteristics of traders who are registered firms. Given the lag in data collection and compilation of CPFS, the sample of analysis in this section covers only 2004 to 2013.

### 3.1 Data Overview

Table 7 provides a snapshot of the overlap between the Customs Department dataset and that from CPFS. In 2013, there were a total of 98,647 traders. Of these just over half were registered firms. Thus a large portion of trading activity in Thailand is conducted by non-registered entities (individuals and firms). This, in part, reflects the large informal sector of the Thai economy. While the majority of pure exporters and importers are not registered, most hybrids are registered. In what follows, we focus only on registered firms.

*Table 7: Overview of Trading Firms (2013)*

	Registered firms	Non-registered traders	Total
Pure exporters	7,408 (7.5%)	10,593 (10.7%)	18,001 (18.2%)
Pure importers	28,282 (28.7%)	32,456 (32.9%)	60,738 (61.6%)
Hybrids	17,562 (17.8%)	2,346 (2.4%)	19,908 (20.2%)
Total	53,252 (54.0%)	45,395 (46.0%)	98,647 (100.0%)

Source: Thai Customs Department, Ministry of Commerce; Authors' calculation.

Taking the universe of registered firms as a starting point (435,121 firms), Table 8 shows that exporters are rare. Only 5.7 percent of all registered firms in Thailand engaged in exporting. Importing is also atypical with only 10.5 percent of firms importing (hybrids plus pure importers). Overall, an astounding 87.8 percent of Thai firms do not engage in *any* direct international trade! For manufacturing, exporting is less rare with 16.7 percent of firms engaged in exports.

Table 8: Overview of Thai Exporters, Registered Firms Only (2013)

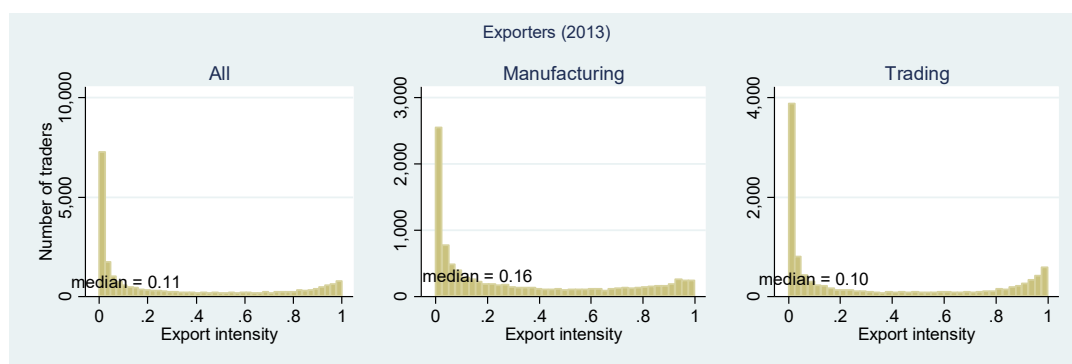
	All sectors	Manufacturing	Trading
Trading firms	53,252 (12.2%)	16,350 (26.4%)	29,843 (20.5%)
Exporting firms	24,970 (5.7%)	10,361 (16.7%)	12,253 (8.4%)
Pure exporters	7,408 (1.7%)	2,129 (3.4%)	4,456 (3.1%)
Hybrids	17,562 (4.0%)	8,232 (13.3%)	7,797 (5.4%)
Pure importers	28,282 (6.5%)	5,989 (9.7%)	17,590 (12.1%)
Domestic firms	381,869 (87.8%)	45,555 (73.6%)	115,788 (79.5%)
Total	435,121 (100.0%)	61,905 (100.0%)	145,631 (100.0%)

Source: Thai Customs Department, Ministry of Commerce; Authors' calculation.

### 3.2 Firm Characteristics

Given the uniqueness of exporting activity, we next ask if exporters are special by examining the balance sheet characteristics of export versus non-export firms. But before proceeding, it is useful to get a sense of how intensively firms export when they do actually undertake this rare activity.

Figure 9: Export Intensity of Export Firms (2013)

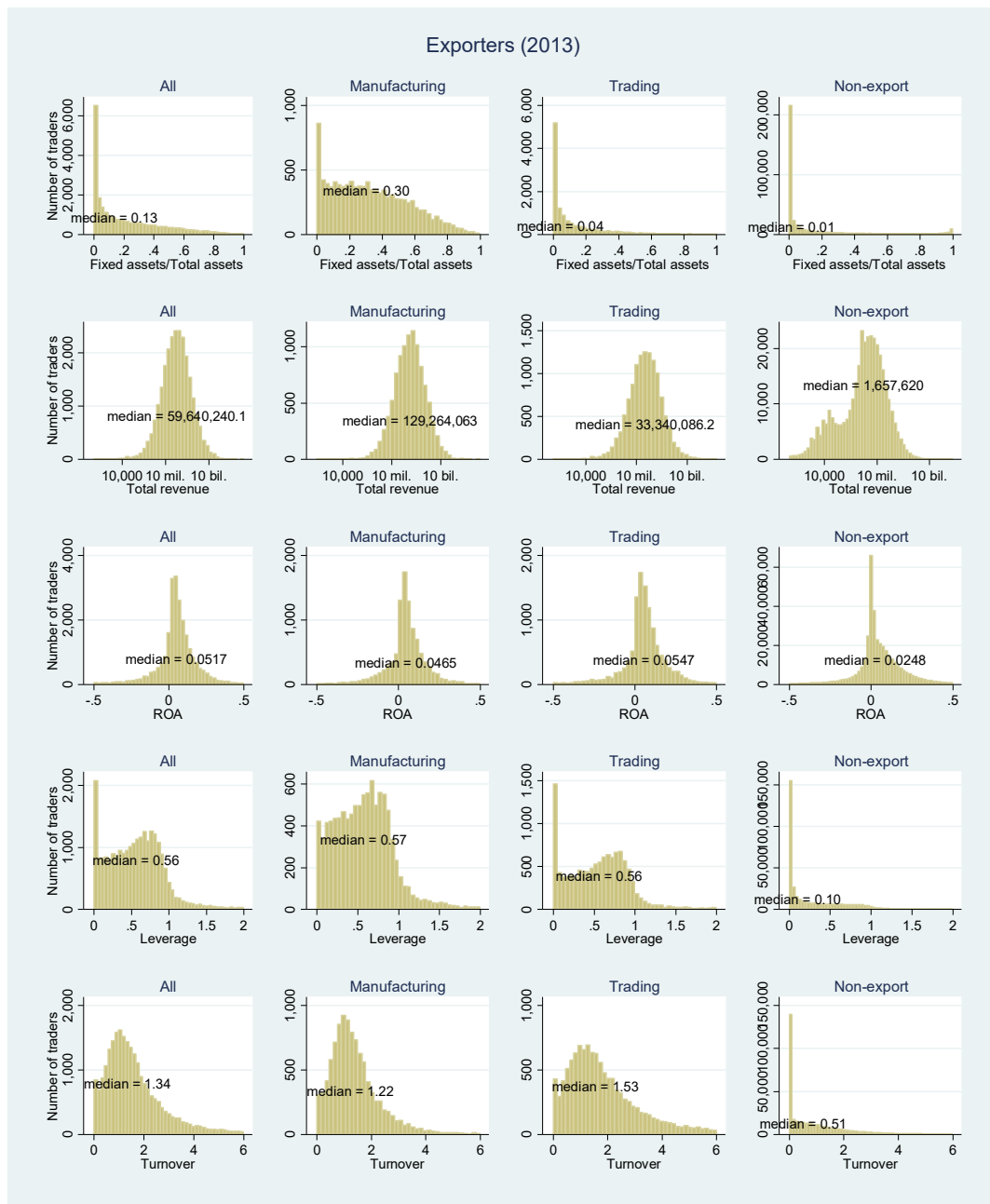


Source: Thai Customs Department, Ministry of Commerce; Authors' calculation.

Figure 9 shows that export intensity, measured as the ratio of exports to total sales, takes a median value of 0.11. That is for the median firm, export sales accounts for just 11 percent of total revenue. Moreover, there is concentration near zero and one. This indicates a bi-polar characteristic of Thai export firms: either firms specialize in export or they just dabble in it. Many do just the latter. Export intensity for exporters in manufacturing and trading sectors broadly display a similar pattern (middle and right panels). We look at manufacturing and trading exporters separately given the difference in the nature of their underlying economic activity: manufacturing firms mainly produce physical

commodities that are sent abroad, while trading firms are intermediaries who provide trading services.

Figure 10: Firm Characteristics – Exporters versus Non-exporters

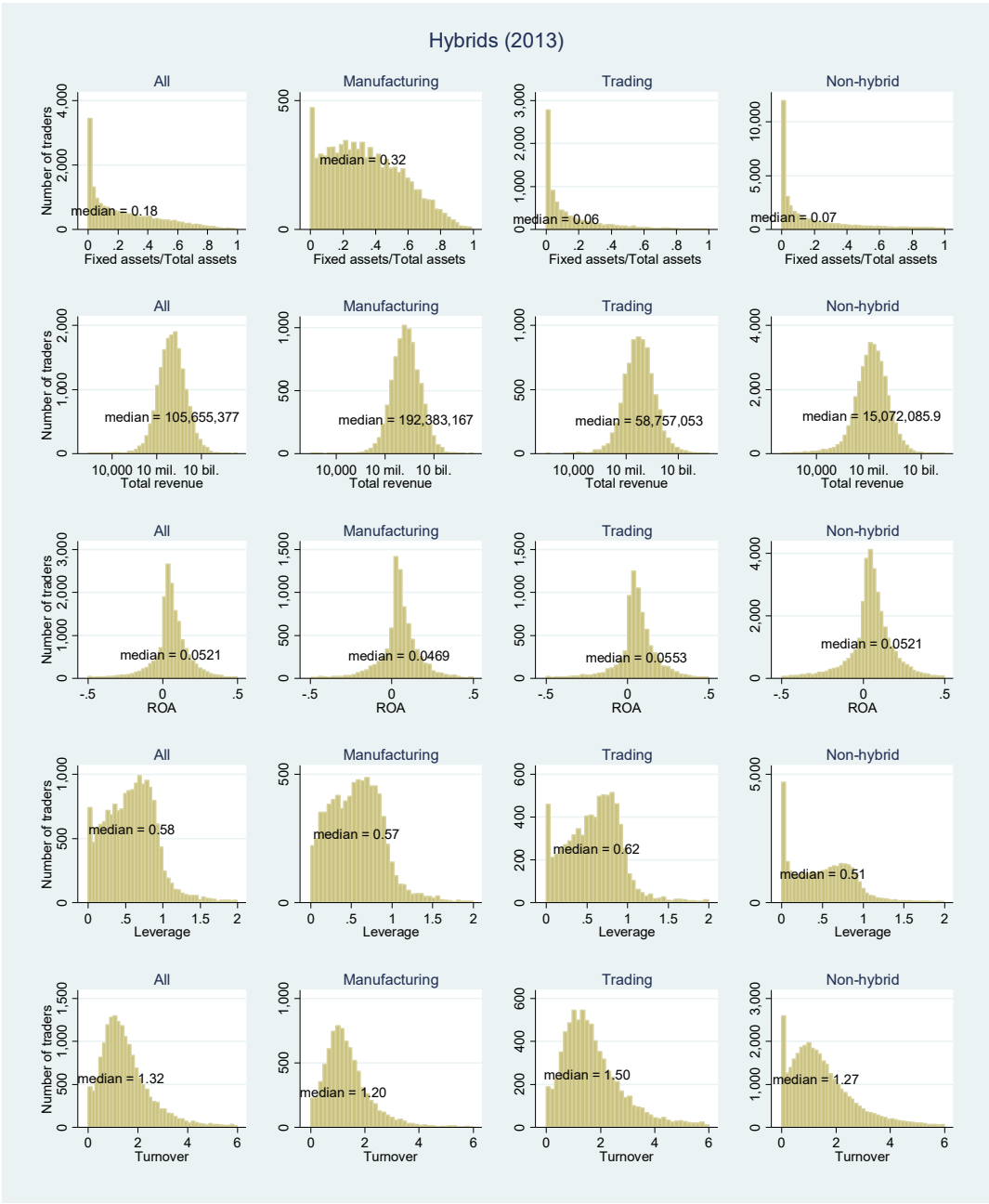


Source: Thai Customs Department, Ministry of Commerce; Authors' calculation.

Figure 10 depicts the distribution of export compared to non-export firms along a number of dimensions (first and last columns). Looking at median values, it is apparent that exporters tend to be i) more capital intensive (higher ratio of fixed assets to total assets); ii) larger (higher revenue); iii) more profitable (higher return on asset); iv) have greater excess to external finance (higher leverage ratios); and v) more efficient (higher turnover ratio measured as the ratio of revenue to

asset). Not surprisingly, manufacturing exporters tend to be larger and more capital intensive relative to trading exporters, though the latter tend to have higher return on assets.

Figure 11: Firm Characteristics – Hybrids versus Pure Exporters



Source: Thai Customs Department, Ministry of Commerce; Authors' calculation.

In light of our observation above that hybrid exporters play a very important role in Thai exports, we present the above comparison also for hybrid versus pure exporters in Figure 11. With the exception of return on assets, the same pattern emerges. Hybrids are distinguished from other exporters in terms of size, capital intensity, efficiency, and leverage.

In terms of scale, Table 9 shows that exporters that serve greater number of products and markets generally have higher return on assets and higher turnover ratios. Thus not only are the firms that dominate export bigger and more diversified, they also tend to be more efficient as their scale grows.

*Table 9: Distribution of Exporters and Their Balance Sheet Attributes (2013)*

Median ROA							
Number of products	Number of countries						All
	1	2	3	4	5+	30+	
1	4.59%	4.06%	4.30%	4.16%	4.34%	3.19%	4.46%
2	4.23%	4.77%	4.36%	4.94%	3.82%	2.23%	4.39%
3	4.78%	5.31%	5.01%	4.32%	4.11%	4.73%	4.71%
4	5.79%	5.72%	5.51%	5.67%	5.01%	5.71%	5.49%
5-29	5.58%	5.04%	6.04%	6.35%	5.42%	5.42%	5.54%
30+	9.49%	8.06%	6.85%	7.11%	6.69%	7.90%	7.50%
All	4.78%	4.94%	5.07%	5.48%	5.16%	6.06%	4.99%

Median Turnover Ratio							
Number of products	Number of countries						All
	1	2	3	4	5+	30+	
1	1.35	1.38	1.35	1.57	1.41	1.92	1.36
2	1.30	1.40	1.36	1.56	1.36	0.88	1.35
3	1.48	1.35	1.39	1.23	1.37	1.27	1.38
4	1.30	1.43	1.47	1.50	1.36	1.72	1.40
5-29	1.62	1.44	1.43	1.39	1.34	1.28	1.40
30+	3.82	2.22	1.64	2.01	1.54	1.62	1.75
All	1.41	1.41	1.42	1.45	1.38	1.42	1.40

Source: Thai Customs Department; Authors' calculation.

## Stylized Fact 2: Exporters Are Rare

The observations documented in this section indicates that exporters constitute a very small fraction of all registered Thai firms. This is consistent with data for other countries and points to the importance of entry costs to trade. Bernard et al. (2007), for example, documents the fact that of the 5.5 million firms operating in the US in 2000, only 4 percent export.

A caveat is that we have adopted a strict definition of international trade. A firm is deemed an exporter if it sells a good overseas. But many more firms may be supplying intermediate inputs that goes into those final exports even though they themselves do not export directly. Thus the importance of trade and the involvement of domestic firms in international trade will be understated by looking only at direct exporters. The same applies to imports. Big retailers such as Tesco-Lotus may buy directly from foreign suppliers but many smaller retailers are likely to purchase supplies from local wholesale distributors. Activity of these small retailers will thus not be counted as importers. Again, the strict definition of importers likely understates the extent of global engagement.



### Stylized Fact 3: Exporters Are Special

Export firms are different than domestic firms in terms of size, capital intensity, profitability, and efficiency. This is largely in line with previous findings in the literature (see Eaton et al. (2004) and Bernard et al. (2009) and references listed therein). This raises the natural question of whether these differences exist before they begin trade. That is, do better and larger firms self-select into international trade or does engagement in international trade over time make firms more efficient and grow. The overwhelming evidence in the literature is that these differences exist before entry (Bernard et al. 2007a). The heterogeneity among firms is systematically related to trade participation, with exporters larger and more productive than non-exporters even prior to entering export markets.

Most studies also find little or no evidence of improved productivity as a result of beginning to export, though an abundance of evidence indicates that firms entering export markets grow substantially faster in employment and output than non-exporters. Thus exporters are more productive, not as a result of exporting, but because only the most productive firms are able to overcome the costs of entering export markets. And once they export, conditional on surviving, they scale up faster than domestic firms. This has both positive and normative implications.

On the positive side, such microeconomic heterogeneity helps to explain macroeconomic outcomes. When entry costs falls, high-productivity trading firms survive and grow, while lower-productivity domestic firms are more likely to fail. This reallocation of resource across firms raises aggregate productivity both within sectors as well as for the economy as a whole and is an important source of welfare gains from trade.

On the normative side, entry costs appear to be the key barrier to trade. Rather than focusing policy on helping exporters improve, the emphasis should be ensuring that good firms are able to export. Entry barriers come in a myriad of forms, including tariffs, transport costs, distribution channels, marketing, unfamiliar regulation and other informational asymmetries. Overcoming these barriers individually is costly and there is a large potential role for governments to play in exploiting economies of scale and overcoming coordinating failures in these areas.

## 4. The Dynamics of Thai Exports

This section examines the dynamic evolution of Thai exports focusing on the extensive margin and longevity (survival) of export relationships, both at the trader and PMT levels.

### 4.1 Overview of Thai Export Dynamics

Moving to a dynamic setting requires further refinement of our definition of extensive and intensive margins. We begin by defining export relationships at two levels. At the *trader level*, a relationship is the occurrence of export activity of a particular trader in a given year. At the *PMT level*, a relationship is the occurrence of export activity in a particular product-market-trader bundle (ie. export of product  $x$  to market  $n$  by trader  $i$ ) in a given year. We define a relationship as “new” if it is less than 1 year old.

Table 10: Overview of Thai Export Dynamics

Annual Average	2001-2007	2007-2011	2011-2015	2001-2015
Growth in value	14.9%	7.0%	1.9%	11.4%
Growth in no. of products	0.9%	0.5%	0.2%	0.6%
Growth in no. of markets	0.0%	0.4%	1.6%	0.6%
Growth in no. of traders	8.0%	5.2%	-0.9%	5.2%
Growth in no. of PMT relationships	8.0%	4.8%	0.5%	5.7%
Fraction of new traders	33.3%	42.2%	37.2%	37.0%
Fraction of lost traders	26.6%	37.0%	38.1%	32.8%
Value-weighted fraction of new traders	1.9%	1.5%	1.8%	1.7%
Value-weighted fraction of lost traders	0.8%	0.8%	0.9%	0.8%
Fraction of new PMT relationships	61.5%	58.3%	52.4%	58.0%
Fraction of lost PMT relationships	54.7%	53.6%	51.9%	53.6%
Value-weighted fraction of new relationships	14.6%	8.4%	9.1%	11.3%
Value-weighted fraction of lost relationships	10.0%	7.3%	6.9%	8.4%

Source: Thai Customs Department; Authors' calculation.

Table 10 provides an overview of the dynamics of Thai exports from various dimensions. Of note is the steady decline in the growth of traders with the number of traders actually declining on average during 2011-2015. Similarly, growth in the number of PMT relationships has declined substantially. Both of these suggests that the degree of dynamism in Thai exports has fallen. The middle panel of the table provides a glimpse of the "churn" – traders entering and exiting the market – underlying Thai exporters. On average, around 40 percent of traders enter and exit market each year, though their contribution to total exports is very small: over 2011-2015 new traders account for roughly 1.8 percent of exports each year while those that exit make up just 0.9 percent. Looking at a more granular level, the bottom section of Table 10 shows that between 2011-2015, just over half of all PMT relationships are new and lost on average per year. These make up for around 7-9 percent of total exports.

A more aggregate perspective of the contribution of new traders in the evolution of Thai exports is shown in Table 11A which shows the yearly average fraction of new exporters over the 2011-2015 period broken down by broad sectors and regions. Over this period, ASEAN, China and Japan show the highest fraction of new entrants. In terms of sectors, Textiles & Wearing Apparels and Transportation stand out. Of particular note are the proportion of new exporters shipping Mineral Products and Textiles & Wearing Apparels to Japan, as well as Transportation goods to ASEAN and Hong Kong.

In terms of significance, Table 11B shows that during 2011-2015, Hong Kong and India were destinations where new exporters accounted for the largest fraction of export value. New exporters made up particularly high value contribution for Mineral Products to East Asia and India, as well as Metals & Other Materials to India. Comparing Tables 11A and 11B, it is striking that in Transportation and Textiles & Wearing Apparels, the proportion of new entrants are quite high yet their value contribution is very small. New entrants in these sectors are clearly very small.

Table 11A: Fraction of new traders (average 2011-2015)

	Agricultural Products	Food	Mineral Products	Chemicals & Rubbers	Wood & Leather Products	Textiles & Wearing Apparel	Metals & Other Materials	Machinery	Transportation	Miscellaneous	All sectors
ASEAN	41.9%	35.6%	43.6%	34.5%	44.8%	48.1%	41.4%	41.9%	55.5%	50.2%	35.6%
Australia	28.2%	24.5%	37.5%	32.4%	39.4%	44.4%	31.8%	37.8%	41.4%	44.4%	29.0%
China	37.7%	39.5%	40.8%	36.0%	41.5%	45.1%	45.9%	43.5%	51.5%	57.2%	36.2%
East Asia	35.1%	28.0%	38.7%	36.5%	45.6%	45.3%	43.7%	43.1%	48.9%	47.5%	33.9%
EU	33.5%	27.0%	47.0%	34.9%	38.5%	43.0%	32.6%	43.3%	44.0%	46.2%	30.6%
Hong Kong	31.1%	29.9%	42.5%	33.6%	41.8%	35.3%	30.4%	37.7%	54.7%	46.1%	29.0%
India	42.4%	35.7%	34.4%	36.7%	45.7%	48.2%	35.5%	40.2%	39.8%	49.2%	32.6%
Japan	28.9%	28.5%	52.3%	31.2%	40.5%	61.1%	36.3%	38.8%	34.8%	48.2%	35.9%
US	31.6%	21.3%	39.2%	35.5%	37.2%	42.7%	30.5%	39.9%	40.6%	47.3%	29.9%
Rest of the World	34.2%	30.6%	39.9%	33.7%	43.1%	43.8%	35.2%	41.0%	41.6%	47.6%	31.8%
All regions	37.5%	35.1%	43.1%	34.3%	42.5%	55.6%	36.7%	42.0%	50.2%	51.1%	37.2%

Source: Thai Customs Department; Authors' calculation.

Table 11B: Fraction of value traded by new traders (average 2011-2015)

	Agricultural Products	Food	Mineral Products	Chemicals & Rubbers	Wood & Leather Products	Textiles & Wearing Apparel	Metals & Other Materials	Machinery	Transportation	Miscellaneous	All sectors
ASEAN	7.5%	1.9%	0.5%	1.3%	3.7%	2.5%	12.5%	4.0%	1.8%	6.4%	2.7%
Australia	2.4%	0.8%	4.6%	1.9%	4.0%	2.9%	4.9%	4.3%	2.3%	8.4%	1.6%
China	8.3%	4.3%	2.7%	1.8%	4.5%	2.4%	13.6%	3.6%	4.0%	2.9%	2.9%
East Asia	5.9%	2.2%	15.7%	2.0%	4.2%	3.6%	6.4%	4.6%	3.9%	6.7%	3.8%
EU	3.5%	0.6%	6.7%	1.6%	2.7%	0.9%	2.8%	4.4%	1.7%	2.2%	2.5%
Hong Kong	7.6%	2.2%	2.9%	3.8%	1.8%	2.8%	10.2%	6.6%	14.0%	2.7%	6.8%
India	7.0%	9.6%	18.2%	2.7%	8.5%	3.6%	19.5%	4.5%	2.2%	9.4%	6.4%
Japan	4.7%	1.2%	6.5%	0.9%	8.8%	1.7%	1.8%	1.5%	1.8%	1.3%	1.2%
US	1.5%	0.7%	2.1%	1.2%	2.0%	1.1%	2.4%	3.7%	5.2%	3.5%	2.3%
Rest of the World	1.8%	0.7%	8.4%	1.1%	3.4%	1.6%	2.9%	1.9%	1.2%	2.9%	1.5%
All regions	3.1%	0.8%	0.8%	1.0%	3.0%	1.2%	3.3%	3.2%	0.9%	1.8%	1.8%

Source: Thai Customs Department; Authors' calculation.

## 4.2 Growth Decomposition

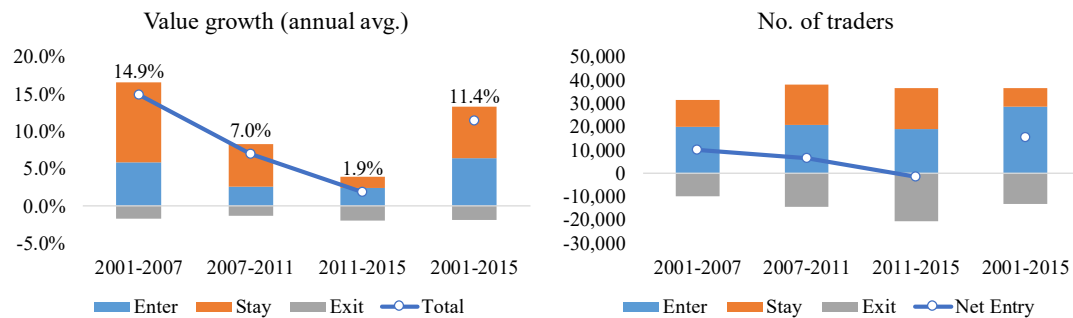
The decomposition of export growth can be carried out on a number of dimensions. Over a given period, the change in export value is driven by i) *existing* product, market, or traders – that is, those that were present in the base year as well as the last; ii) *new* product, market, or traders – those that entered during the period and remain until the end; and iii) *lost* product, market, or traders – those that were present in the base year but exit during the period. Of course, there may be product, market, or traders that enter and exit during the period, but these are awash when comparing end-to-end growth rates.

More precisely, we adopt the following definitions for  $k = \text{product, market, trader}$

- *Entry*  $\equiv$  new  $k$  that are present at end-date compared to start-date (eg. entry for 2011-2015 equals new  $k$  that are present in 2015 but not present at end-2010 – that is they represent new survivors);
- *Exit*  $\equiv$   $k$  that exit compared to start-date (eg. exit for 2011-2015 equals all  $k$  that were present in 2010 but not present at end-2015 – that is they represent lost incumbents);
- *Stayers*  $\equiv$   $k$  that are present at the beginning and end of the period (eg. stayers for 2011-2015 are those  $k$  that were present at end-2010 and end-2015);
- *Temporary Entrants*  $\equiv$  entrants that exit after the start-date and exit before the end-date (eg. temporary entrants for 2011-2015 are those  $k$  that entered and left during the period);

Given these definitions, we can proceed to decompose export growth. Note that the sum of entry and exit represents change on the net extensive margin while stayers reflects the intensive margin. Focusing at the trader level, Figure 12 shows that over time, the relative contribution of incumbent traders to export growth has steadily declined with new traders becoming more important. Exiting traders have also weighed more heavily. Over the 2011-2015 period, exports grew by 1.9 percent per year on average. This was underpinned by growth of 2.4 percent from entrants, 1.5 percent from stayers, and -2 percent from exits. The right panel of Figure 12 shows the absolute number of traders entering, exiting, and staying. Of note is that fact that over 2011-2015, the absolute number of traders fell as indicated by net entry (the sum of entry and exit) being negative.

Figure 12: Export Growth Decomposition at Trader Level



Source: Thai Customs Department; Authors' calculation.

Table 12 takes a closer look at the characteristics of exporters who enter, exit, and stay in the market over time. Since we are looking across ranges of years, for the stayers we list both the characteristic at the beginning and the end of the range. Compared to stayers, traders who enter and exit the export market tend to be much smaller – both in terms of export value and size of fixed assets – export few products to fewer markets, and have lower return on assets. This is consistent with a Darwinian process of selection. It would be interesting to explore how this performance gaps increases when one conditions only on entrants that survive. It could be the case, for example, that conditional on survival, new entrants are even more productive than incumbents. We leave this for future work.

Table 12: Characteristics of Traders

Year	Exits	Stayers			All types	
		Beginning	End	Entrants	Beginning	End
Median value of exports (mil. Baht)						
2003-2007	0.5	9.2	11.9	0.4	2.7	1.8
2007-2011	0.3	8.7	9.7	0.2	1.8	1.1
2011-2015	0.1	11.1	11.5	0.4	1.1	1.9
Median number of products						
2003-2007	2	4	4	2	3	3
2007-2011	1	4	4	2	3	2
2011-2015	2	4	4	1	2	2
Median number of markets						
2003-2007	1	3	3	1	2	1
2007-2011	1	3	3	1	1	1
2011-2015	1	3	3	1	1	1
Median size of fixed assets (mil. Baht)						
2005-2007	1.8	6.1	6.9	1.3	4.8	4.1
2007-2011	1.2	7.6	8.7	1.2	4.1	4.0
2011-2013	1.1	6.5	7.6	1.4	4.0	4.5
Median ROA						
2005-2007	2.9%	4.2%	4.8%	3.8%	4.0%	4.6%
2007-2011	3.1%	5.1%	4.9%	4.5%	4.6%	4.8%
2011-2013	4.0%	5.0%	5.1%	4.6%	4.8%	5.0%

Source: Thai Customs Department, Ministry of Commerce; Authors' calculation.

The number of entries and exits into exports, what we call churning, is important in its own right. The empirical trade literature has shown that within-industry reallocations of resources is an important source of average industry productivity growth as low-productivity firms exit and high-productivity firms expand to enter export markets (Melitz and Redding (2014)). This process of resource reallocation is part and parcel of "creative destruction" that is at the core of Schumpeterian growth theory (Aghion et al. (2014)). That said, excessive churning may also be a source of concern if it reflects wasteful resources spent by unproductive entrants or exits of productive producers that are no longer able to operate due to financial frictions or other barriers. Thus while we want to highlight the degree of churning, without further analysis, we present it as a stylized fact and abstain from making judgements whether the high degree of churning observed in certain periods, sectors, and regions are healthy or not.

Table 13 presents trader churning by broad sectors and regions. The "churning rate" for any given year is defined as the gross sum of new entrants and exits over the total number of traders at the end of the previous year. Over the entire sample, the average churning rate per year is 69.8 percent. That is, in a typical year, entering and exiting traders amount to almost 70 percent of all traders. The sectors with the highest churn rate are Textiles & Wearing Apparels and Transportation, the former showing a significant increase since 2007. Looking across regions, traders exporting to China has the largest churn rate over the entire sample, though the rate has declined over time. The opposite applies in the case for Japan.

Table 13: Trader Churning Rate

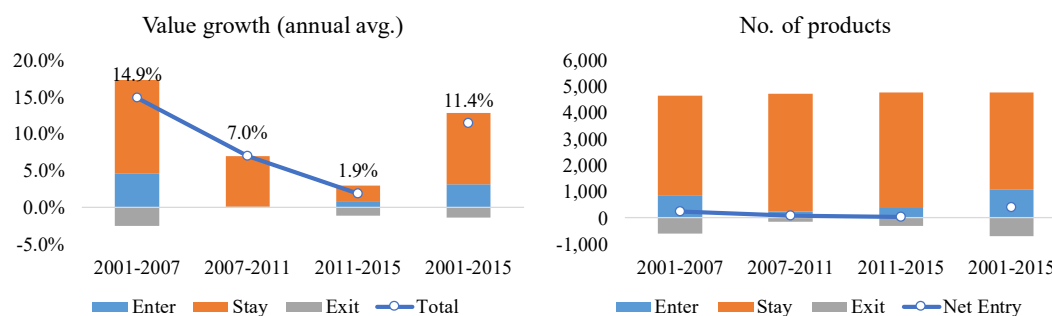
	2001-2007	2007-2011	2011-2015	2001-2015
Aggregate	59.9%	79.2%	75.3%	69.8%
By sector				
Agricultural Products	72.2%	69.3%	72.3%	71.4%
Food	66.5%	64.5%	65.3%	65.6%
Mineral Products	97.6%	88.1%	82.8%	90.7%
Chemicals & Rubbers	71.1%	68.7%	66.6%	69.2%
Wood & Leather Products	81.2%	105.9%	90.4%	90.8%
Textiles & Wearing Apparels	78.3%	134.7%	117.9%	105.7%
Metals & Other Materials	71.2%	86.1%	75.4%	76.7%
Machinery	84.2%	95.2%	84.6%	87.5%
Transportation	105.9%	101.2%	97.1%	102.1%
Miscellaneous	89.7%	113.0%	103.4%	100.3%
By region				
ASEAN	69.9%	67.1%	68.2%	68.6%
Australia	64.0%	67.0%	60.1%	63.7%
China	84.4%	77.3%	70.1%	78.3%
East Asia	71.3%	69.5%	67.6%	69.8%
EU	59.2%	64.7%	63.9%	62.1%
Hong Kong	67.7%	63.1%	59.5%	64.1%
India	80.9%	76.2%	65.8%	75.3%
Japan	51.8%	86.6%	75.5%	68.5%
US	55.0%	59.0%	60.2%	57.6%
Rest of the World	57.8%	74.7%	66.3%	65.1%

Source: Thai Customs Department; Authors' calculation.

Turning to the product dimension, Figure 13A shows export growth decomposition at the product level. Given that the number of products change slowly, it is not surprising to see that the bulk of export growth is driven by growth in exports of existing products. That said, during the trade boom between 2001-2007, the entry of new products did play a significant part in driving export growth.

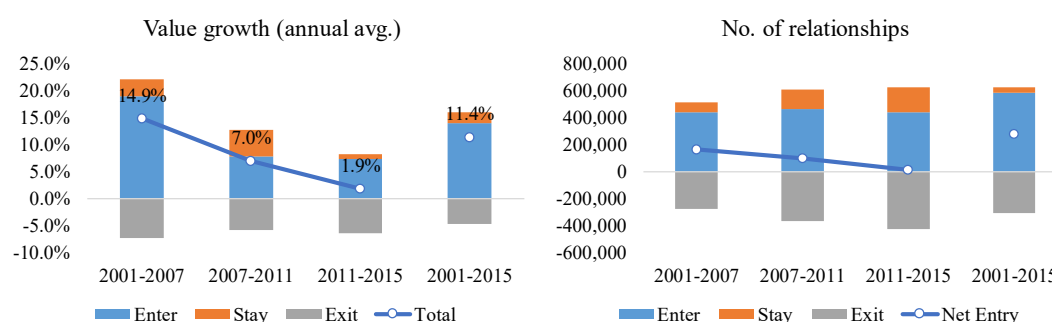
Finally, decomposing growth at the most granular PMT level reveals a starkly different picture (Figure 13B). The formation and disappearance of PMT relationships – that is, the extensive margin – plays a big part in export growth. During 2011-2015, for example, new PMT bundles contributed on average 7.3 percent of export growth per year, while exiting relationships reduced exports by around 6.5 percent every year. Existing PMT relationships, by contrast, grew by 1.1 percent per year on average. Thus the 1.9 percent average yearly growth belies the large amount of expansion and contraction at the extensive margin.

Figure 13A: Export Growth Decomposition at Product Level (2011-2015)



Source: Thai Customs Department; Authors' calculation.

Figure 13B: Export Growth Decomposition at PMT Level (2011-2015)



Source: Thai Customs Department; Authors' calculation.

Digging deeper into this granular PMT level decomposition reveals further insights about the product-market bundles (PM) that new traders engage in. We are interested to explore whether new entrants extend the universe of Thailand's product-market export bundles – exporting an existing product to a new market, exporting a new product to an existing market, or both – or simply compete in existing product-market space. Focusing on the trader level, Table 14 takes the export growth decomposition shown on the left panel of Figure 12 and splits the contribution of new entrants into those that export existing PM bundles and those that export new ones.

Table 14: Export Growth Decomposition at Firm Level

	Enter				Total
	New PMs	Old PMs	Stay	Exit	
2001-2007	1.3%	4.5%	10.7%	-1.7%	14.9%
2007-2011	0.3%	2.3%	5.6%	-1.3%	7.0%
2011-2015	0.2%	2.2%	1.5%	-2.0%	1.9%
2001-2015	2.0%	4.5%	6.8%	-1.9%	11.4%

Source: Thai Customs Department; Authors' calculation.

We find that the majority of the contribution to export growth from new traders has been from existing PMs, particularly in the recent period. During 2011-2015, for example, new entrants with

new PMs contributed only 0.2% to total export growth, much lower than the contribution of 2.2% from new entrants with existing PM. This suggests that new entrants tend to choose to face competition with incumbents rather than going to untapped markets. Possible explanations could be positive externalities from the incumbents that help save entry cost of new entrants or a lack of demand in the markets not currently served by existing traders. We leave it to future study to answer this question.

#### 4.2.1 Evolution of Extensive and Intensive Margins

To gain greater insight into the evolution of Thai exports, we decompose export growth on the extensive margin by broad sectors and regions. We focus on the trader level over the period 2011-2015.

Table 15: Export Growth Decomposition by Sector (2011-2015)

Sector	Enter	Stay	Exit	Net Change	Temporary Entrants	Total
Value growth (annual avg.)						
Agricultural Products	4.8%	-3.2%	-1.7%	3.0%		-0.2%
Food	1.2%	2.0%	-0.7%	0.4%		2.5%
Mineral Products	1.1%	-2.4%	-3.5%	-2.4%		-4.9%
Chemicals & Rubbers	1.4%	-4.5%	-0.6%	0.8%		-3.7%
Wood & Leather Products	5.0%	1.7%	-2.4%	2.5%		4.2%
Textiles & Wearing Apparels	1.2%	-1.0%	-2.2%	-1.0%		-2.0%
Metals & Other Materials	2.9%	0.2%	-1.9%	1.0%		1.2%
Machinery	3.8%	3.4%	-3.6%	0.2%		3.6%
Transportation	1.3%	13.4%	-1.6%	-0.3%		13.1%
Miscellaneous	1.9%	8.1%	-1.3%	0.6%		8.7%
Number of traders						
Agricultural Products	3,276	2,286	-2,717	559	3,858	5,562
Food	2,298	1,790	-1,595	703	2,375	4,088
Mineral Products	1,227	650	-1,005	222	1,430	1,877
Chemicals & Rubbers	6,396	6,158	-5,435	961	7,643	12,554
Wood & Leather Products	4,448	3,332	-6,428	-1,980	9,272	7,780
Textiles & Wearing Apparels	6,203	2,762	-9,247	-3,044	16,588	8,965
Metals & Other Materials	6,507	6,169	-7,639	-1,132	10,660	12,676
Machinery	6,235	5,094	-6,569	-334	10,300	11,329
Transportation	2,892	1,380	-2,397	495	4,467	4,272
Miscellaneous	6,137	3,257	-6,669	-532	11,483	9,394

Source: Thai Customs Department; Authors' calculation.

Starting with the sector breakdown, Table 15 illustrates that the net extensive margin (equals the sum of "enter" and "exit" displayed as "net change") can be an important driver of aggregate growth particularly in the case of Agricultural Products, Mineral Products, and Wood & Leather Products. For others, such as Machinery and Transportation, the contribution from stayers dominate overall export growth. The bottom panel of the table shows the actual number of traders. We can see that



the number of entrants and exits is large and typically larger than stayers. There are also temporary entrants who are traders that enter the market at some point between 2011-2015 but are no longer exporting in 2015. Textiles and Wearing Apparels has a particularly high number of temporary entrants, 16,588 compared to 8,965 traders active in 2015.

Table 16 shows a similar decomposition but now sorted by countries and broad regions. Looking at the relative contribution of intensive (stayers) and net extensive margins (net change), Australia and the US stand out as destination countries where existing exporters play an outside role in driving export growth with entrants and exiters, on net, contributing relatively little.

*Table 16: Export Growth Decomposition by Regions*

Sector	Enter	Stay	Exit	Net Change	Temporary Entrants	Total
Value growth (annual avg.)						
ASEAN	3.0%	3.2%	-2.4%	0.6%		3.8%
Australia	2.8%	10.9%	-4.3%	-1.5%		9.3%
China	3.6%	-0.4%	-3.0%	0.6%		0.2%
East Asia	3.7%	0.7%	-4.1%	-0.4%		0.3%
EU	2.9%	-0.1%	-2.8%	0.1%		0.0%
Hong Kong	5.3%	2.4%	-6.0%	-0.7%		1.7%
India	4.6%	2.5%	-3.4%	1.1%		3.6%
Japan	2.0%	-1.7%	-1.9%	0.1%		-1.6%
US	3.5%	5.3%	-3.1%	0.3%		5.6%
Rest of the World	1.9%	-0.4%	-1.4%	0.5%		0.1%
Number of firms						
ASEAN	10,263	8,947	-8,094	2,169	12,153	19,210
Australia	1,747	2,289	-2,124	-377	2,474	4,036
China	3,285	2,885	-2,773	512	3,791	6,170
East Asia	2,888	3,022	-2,858	30	3,671	5,910
EU	4,065	5,106	-5,120	-1,055	6,005	9,171
Hong Kong	2,257	2,963	-2,607	-350	2,906	5,220
India	2,145	2,206	-2,254	-109	2,421	4,351
Japan	3,818	4,334	-5,190	-1,372	8,175	8,152
US	2,879	3,797	-2,960	-81	3,965	6,676
Rest of the World	5,142	6,014	-6,459	-1,317	8,195	11,156

Source: Thai Customs Department; Authors' calculation.

Finally, we look at the growth of traders from a combined sectoral/regional perspective. Table 17 shows the rapid growth of traders in ASEAN and China (12.7 percent and 9 percent, respectively), although in value terms, the former has been much higher than the latter (3.8 percent per year on average in ASEAN versus 0.2 percent for China). And while the average export value growth to the European Union was similar to China (0 percent per year), the number of traders exporting to the European Union has fallen by 10.3 percent. Japan stands out as a market where there has been a general exodus of exporters, especially in the Wood & Leather Products as well as Textiles & Wearing Apparels sectors. Indeed, these two sectors experienced the strongest percentage declines in the number of exporters overall. ASEAN and China represent the opposite case with widespread entry across all sectors, and particularly strong growth in the Food sector.

Table 17: Export Value Growth (Annual Average – 2011-2015)

	Agricultural Products	Food	Mineral Products	Chemicals & Rubbers	Wood & Leather Products	Textiles & Wearing Apparels	Metals & Other Materials	Machinery	Transportation	Miscellaneous	All sectors
ASEAN	2.2%	8.5%	-2.2%	0.1%	3.4%	2.3%	14.8%	3.8%	8.4%	9.4%	3.8%
Australia	-2.2%	3.1%	-12.4%	1.8%	-9.0%	8.2%	0.5%	3.8%	25.3%	7.7%	9.3%
China	19.3%	39.3%	-3.3%	-4.5%	6.7%	0.6%	17.7%	-4.6%	15.0%	62.5%	0.2%
East Asia	-0.8%	1.4%	-11.7%	-6.5%	2.8%	6.6%	3.0%	4.4%	20.4%	16.0%	0.3%
EU	-5.6%	-1.8%	-23.4%	-8.0%	1.2%	-8.0%	-0.5%	3.6%	16.1%	1.5%	0.0%
Hong Kong	5.2%	12.4%	-9.8%	-11.1%	1.1%	0.2%	0.2%	2.7%	-0.7%	15.5%	1.7%
India	-9.2%	5.1%	-6.7%	-0.9%	9.4%	2.7%	-0.8%	10.7%	13.8%	15.8%	3.6%
Japan	-2.2%	-0.3%	-9.5%	-6.8%	4.6%	4.8%	0.0%	0.0%	-0.9%	-1.2%	-1.6%
US	-4.7%	-0.8%	-24.7%	-2.6%	6.0%	-2.2%	4.9%	15.8%	20.0%	9.1%	5.6%
Rest of the World	-7.4%	-0.1%	-4.9%	-3.5%	5.6%	-4.9%	-7.4%	2.1%	14.5%	0.1%	0.1%
All regions	-0.2%	2.5%	-4.9%	-3.7%	4.2%	-2.0%	1.2%	3.6%	13.1%	8.7%	1.9%

Growth in Number of Exporters

	Agricultural Products	Food	Mineral Products	Chemicals & Rubbers	Wood & Leather Products	Textiles & Wearing Apparels	Metals & Other Materials	Machinery	Transportation	Miscellaneous	All sectors
ASEAN	18.0%	36.9%	26.2%	17.9%	5.0%	10.4%	14.2%	15.7%	19.9%	24.1%	12.7%
Australia	-11.0%	14.5%	-2.5%	-2.2%	-23.4%	-25.1%	-11.7%	-5.1%	14.8%	-9.9%	-8.5%
China	19.5%	45.9%	-20.0%	8.4%	5.5%	0.6%	9.5%	9.0%	12.0%	22.5%	9.0%
East Asia	13.4%	16.0%	7.4%	3.5%	1.2%	-11.1%	1.1%	-0.8%	21.4%	4.7%	0.5%
EU	-9.8%	1.1%	-29.0%	-4.5%	-20.6%	-20.2%	-11.5%	-0.6%	14.6%	-5.2%	-10.3%
Hong Kong	-5.6%	16.8%	-23.2%	-6.5%	-18.0%	-17.2%	-6.3%	-3.3%	19.7%	-2.4%	-6.3%
India	-8.7%	-8.6%	-1.7%	11.9%	-18.5%	-16.2%	-4.9%	10.3%	20.6%	-5.2%	-2.4%
Japan	-2.4%	-8.9%	0.0%	3.0%	-45.4%	-39.3%	-27.8%	-24.8%	11.1%	-41.0%	-14.4%
US	7.8%	4.5%	-5.1%	3.3%	-12.9%	-12.2%	-3.3%	0.5%	19.1%	9.2%	-1.2%
Rest of the World	3.9%	12.7%	6.5%	2.3%	-18.7%	-36.2%	-6.2%	2.9%	11.1%	0.2%	-10.6%
All regions	11.2%	20.8%	13.4%	8.3%	-20.3%	-25.3%	-8.2%	-2.9%	13.1%	-5.4%	-3.1%

Source: Thai Customs Department; Authors' calculation.

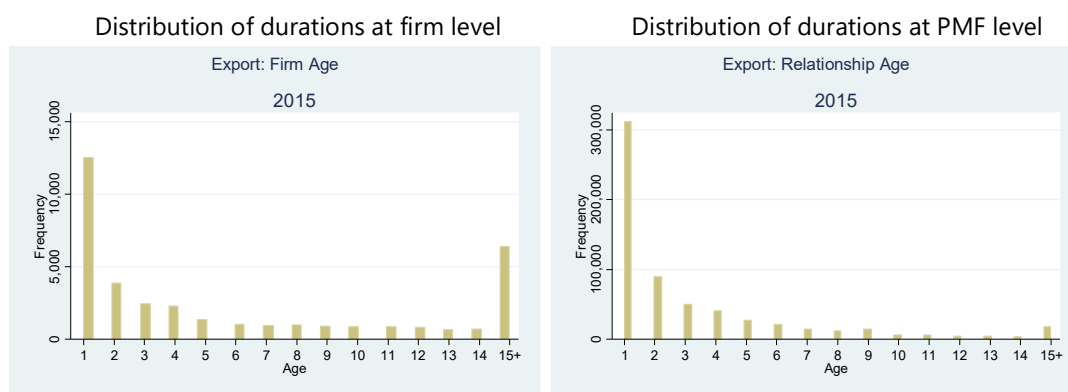
### 4.3 Survival Analysis

In light of the high degree of churning observed, with many traders entering and exiting the export market each year, we take a closer look at the frailty of exporting by estimating survival probabilities of export relationships. Besedes and Prusa (2007) show that the frailty of export relationship, defined as unique product-market bundles, is an important factor underlying the differences in long-run export growth across countries. Exploiting the more granular nature of our data, we examine the frailty of export relationships both at the trader level as well as the product-market-trader level.

To analyse survival, we construct "relationship spells" from our data focusing only on new entrants in our sample (ie. incumbent traders or PMT bundle in 2001 are dropped). If a given export relationship appears in two or more distinct non-overlapping spells, for example trader *i* exports during 2003-2005 and then again in 2008-2009, we treat this as two independent spells. With this criteria, we have 592,648 export spells at the trader level, and 12,819,202 spells at the PMT level.

We are particularly interested in the difference between new and long-term relationships. Figure 14 shows the distribution of exporting relationship age at the end of 2015. The left panel shows the distribution at the trader level. Clearly, most exporters are new and the number of traders who enter during our sample and survive generally falls with the number of years. The spike in the category of traders 15 years and older reflect traders who have been present since the start of our sample in 2001. At the PMT level, the general message is the same except that the number of PMT bundles that have been present since 2001 is very small.

Figure 14: Distribution of Relationship by Age (years)



Source: Thai Customs Department; Authors' calculation.

In Table 18 we report that as of 2015, the fraction of relationships that are long-term (ie. present in all years of the sample since 2001) amount to 17 percent at the firm level and only 3 percent at the PMT level. Yet these relationships account for a sizeable amount of total exports. Long-term firms make up 64 percent of total exports in 2015 while long-term PMT amount to 19 percent. The average annual deepening of long-term relationships is also shown in the table.

Table 18: Long-Term Relationships (2015)

Fraction of value traded by long term relationships	
At trader level	64%
At PMT level	19%
Average growth of value traded by long term relationships (2001-2015)	
At trader level	6%
At PMT level	5%
Fraction of long term relationships	
At trader level	17%
At PMT level	3%

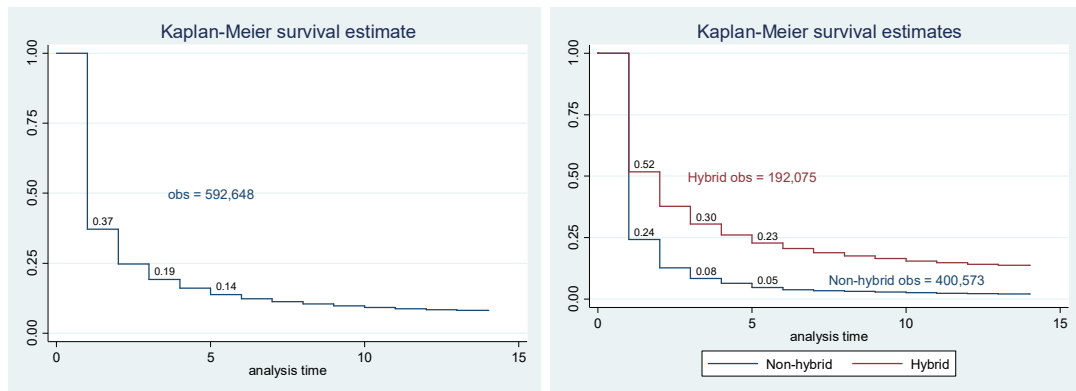
Source: Thai Customs Department; Authors' calculation.

This contrasts with the situation for new relationships presented back in Table 11. Between 2001-2015, new relationships at the PMT level make up on an average year 58 percent of all relationships in a given year and these account for around 11 percent of total export value. At the trader level, new relations make up around 37 percent of all relationships and account for just 1.7 percent of total exports. The fact that new relationships account, in value terms, for a considerably smaller portion than those of established relationships reinforces the view that new relationships only have

a meaningful impact on aggregate export growth if they survive and deepen – in their early years they are too small to have any appreciable effect on export growth.

We proceed to estimate the Kaplan-Meier survival function both at the trader and PMT levels based on new relationships during 2001-2015. This function describes the survival probabilities of relationships as the number of years in service increases. There are a couple of striking results. First and foremost, export duration is remarkably brief. As shown in the left-hand panel of Figure 15, 63 percent of trader level relationships fail after the first year and by the end of the fifth year, around 86 percent of exporters have left the market. Breaking up new entrants into pure exporter and hybrids reveal sizeable difference between the two (right panel of Figure 15). Pure exporters are twice as likely to fail after the first year than hybrids with the gap widening into later years.

Figure 15: Survival Probability at Trader Level



Source: Thai Customs Department; Authors' calculation. Note trader who exports and import at least one time (even not the same year) is classified as hybrid for the whole life.

The second notable observation is that new relationships are much more likely to fail than existing ones. This can be seen in Figure 15 by the steep slope of the survival function over the first three or so years before flattening out markedly after that. That is, in the first three years, the risk of failure is very high (ie. the probability of survival drops substantially year by year). Thereafter, the change in survival probability is very small as we progress through the years, reflecting a fairly small risk of failure.

Given the frailty of new exporters, a natural question is whether those that survive have special attributes. Figure 16 provides some evidence on this by showing that survivors are indeed different. The longer a trader remains in the export business, the more they export in value terms, the greater the number of products they export as well as the number of markets which they export to. The overall combination of product-market bundles exported also increases with age.

Moving on to the PMT level, Figure 17 shows that survival probabilities are even more precarious compared to traders. The probability that a particular PMT bundle survives beyond the first year is just 34 percent (left hand panel). This trails off significantly as the number of years increases and by the fifth year the survival probability is a mere 9 percent. There are significant sectoral differences in this regard, with survival probability being highest for Minerals and lowest for Wood & Leather Products (right panel).

Figure 16: Characteristic of Surviving Exporters

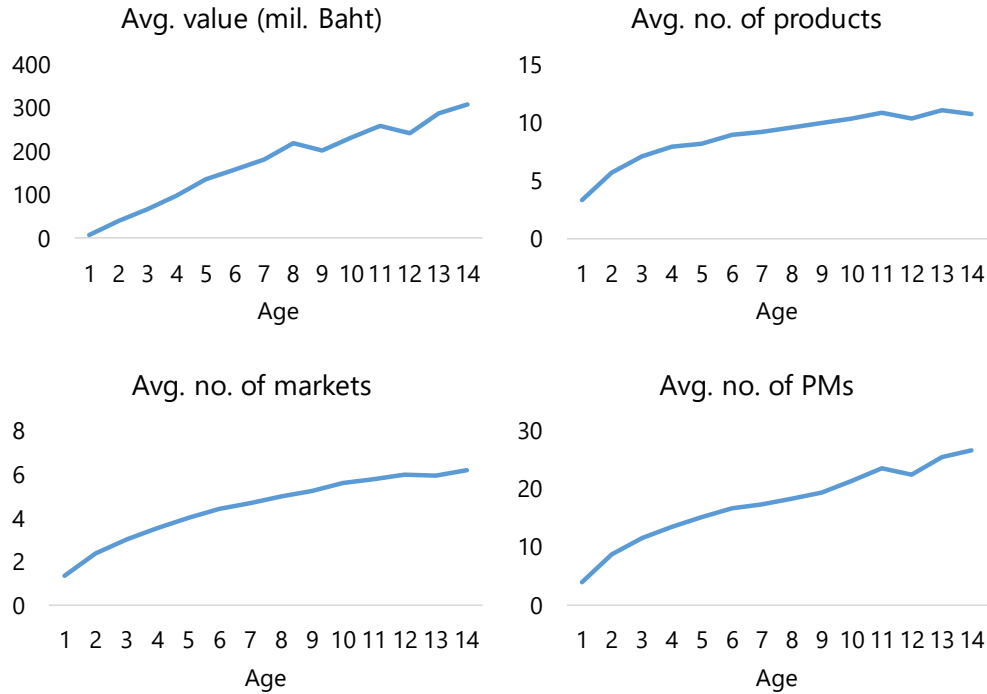
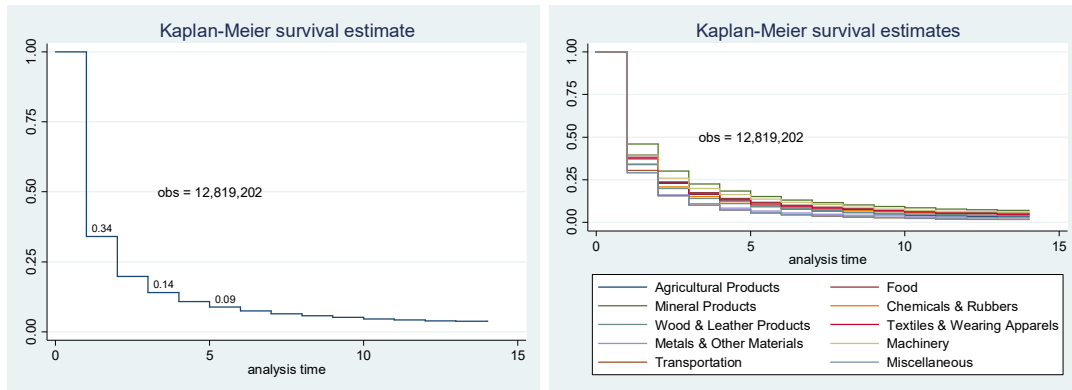


Figure 17: Survival Probability at PMT Level [label graph by sectors and regions as well as legend]



### Stylized Fact 4: There is a Great Deal of Churn among Thai Exporters

In any given year, roughly one-third of exporters are new and an equal number exit the market. Looking at unique PMT bundles, the proportion of new entrants and exits jump to over half. While this dynamism is *consistent* with efficiency improving resource reallocation, it could also be indicative of wasteful entrants and exits as many new exporters cannot overcome barriers to successful exporting. We find that exporters who enter and leave the market tend to be smaller, less diversified, and less profitable than incumbents.

Evidently, export growth is also increasingly being driven by the extensive margin. Over the past decade, changes on the extensive margin has become increasingly important in driving aggregate export growth. Existing exporters and PMT bundles account for a decreasing share of exports.

Exporting is a dynamic undertaking and driving export growth requires greater attention to new firms as well as new configuration of product and markets.

### Stylized Fact 5: Exporting is Fragile

Export relationships, both at the trader and PMT levels are very fragile. The likelihood that an exporter or a given PMT bundle remains in the market for more than one year is very low. But those that survive generally blossom and account for a disproportionate share of aggregate exports. The challenge of exporting, therefore, is not simply one of overcoming fixed costs of entry, but also one of remaining in the market in subsequent years. The fact that most relationships end quickly suggests that many exporters will not be able to recover the sunk cost required to enter an export market. This may partly explain why exporters are relatively rare. It also suggests that the assumption of a constant probability of exiting in standard Melitz (2003) model may be inappropriate.

## Conclusion

This paper has documented the tremendous skewness in Thai international trade: a small minority of firms import and export, and they are big. The implication is clear. When it comes to thinking about Thai trade, one must think about big traders. Many of these are likely to be multinationals. Trading firms also stand out from domestic firms both in terms of scale and efficiency. This reinforces the importance of resource allocation among traded and non-traded sectors in Thailand's overall productivity. The high degree of churning and the overall frailty of export relationships also suggests that exporting is difficult and successful firms are those that have overcome productivity hurdles before entering the market.

Our results highlight the need for greater understanding of firm-level heterogeneity both in assessing trade patterns as well as the macroeconomic consequences of various shocks. A firm's decision concerning the number of export destinations to serve and the number of products to export is systematically correlated with the characteristics of the firm. Thus firm heterogeneity is an indispensable element in understanding aggregate trade outcomes.

Going forward, there are many possible extensions to pursue. The dimensionality and scale of the data sets presented here is extremely rich. We have merely documented salient stylized facts that the data offers. The potential research questions to be contemplated on such data is numerous and wide-ranging. These include exchange rate pass-through (focusing on pricing behavior of exports and imports), the determinants of firm entry and exit into exports, the role of finance in trade (by linking up with credit registry data), and the evolution of border trade (exploiting information on point of entry/shipment). These and other insights will be of tremendous benefit for policy formulation and we hope that this paper helps to catalyze such work.

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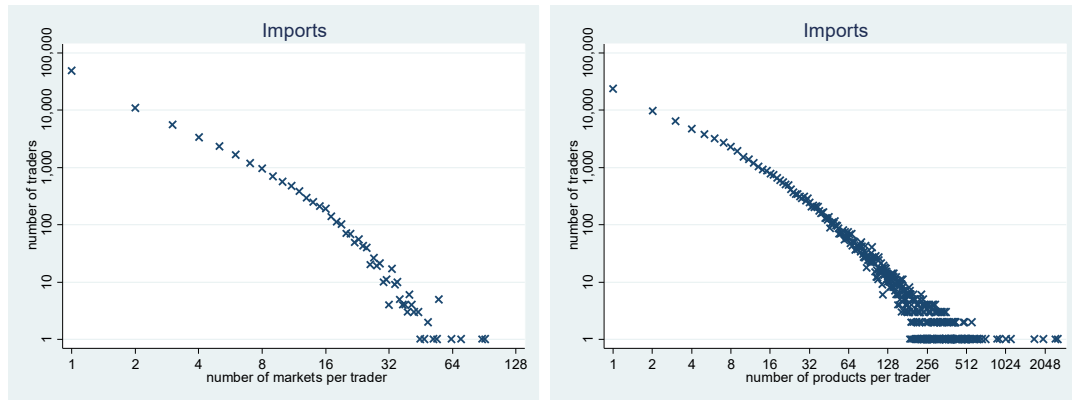
## Annex: Imports and Importing Firms

This annex presents data for imports and importing firms. The overall message is the same as for exports, though with few exceptions which we note below.

### A.1 Extensive Margins

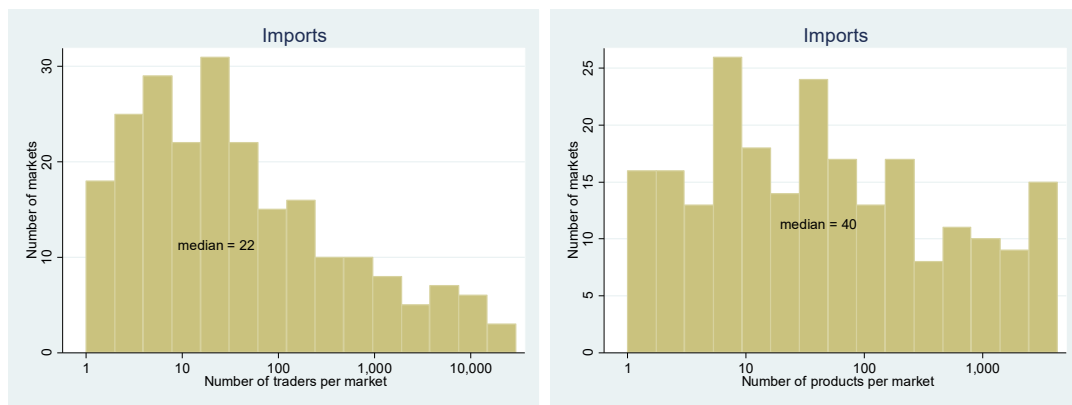
Figures A1–A3 presents the distribution of import products, markets, and traders as in Section 2.1 of the main text. The picture that emerges is similar as that for exports, except for the number of products imported per market and the number of traders per market, which are significantly smaller for imports (Figure A2).

Figure A1: Distribution of number of import markets/products per trader in 2015



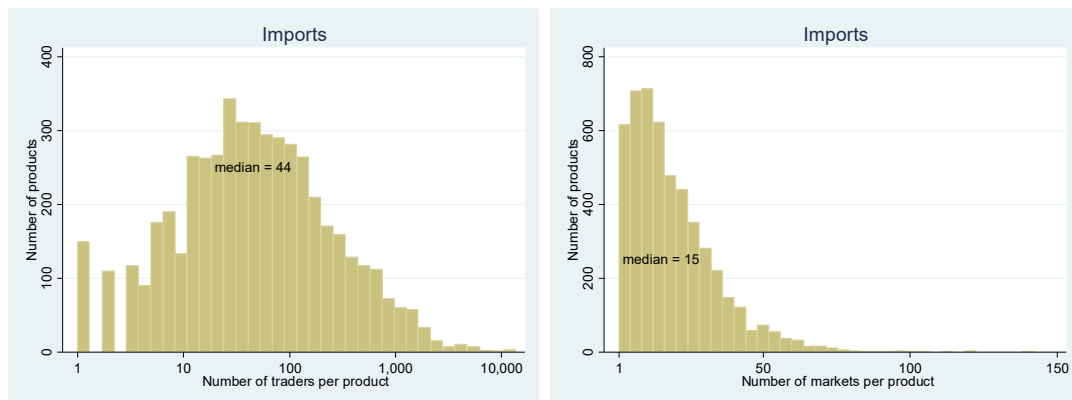
Source: Thai Customs Department; Authors' calculation.

Figure A2: Distribution of number of import traders/products per market in 2015



Source: Thai Customs Department; Authors' calculation.

Figure A3: Distribution of number of export traders/markets per product in 2015 exports



Source: Thai Customs Department; Authors' calculation.

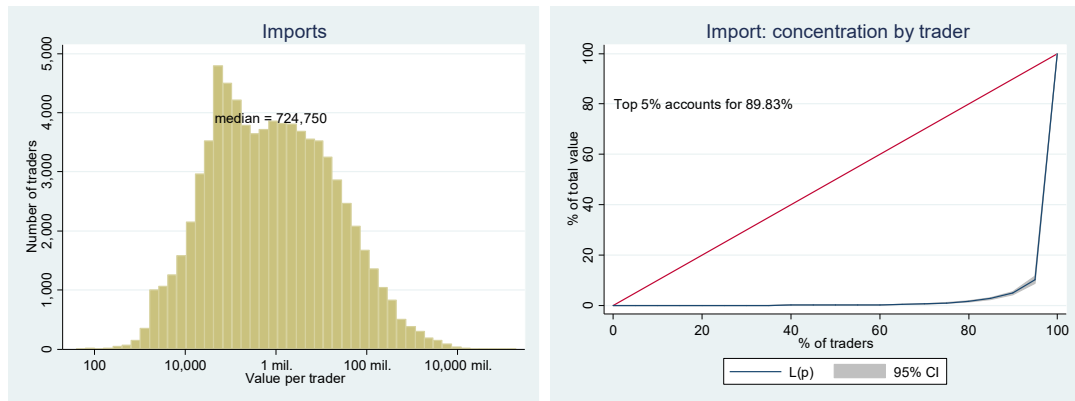


## A.2 Intensive Margins

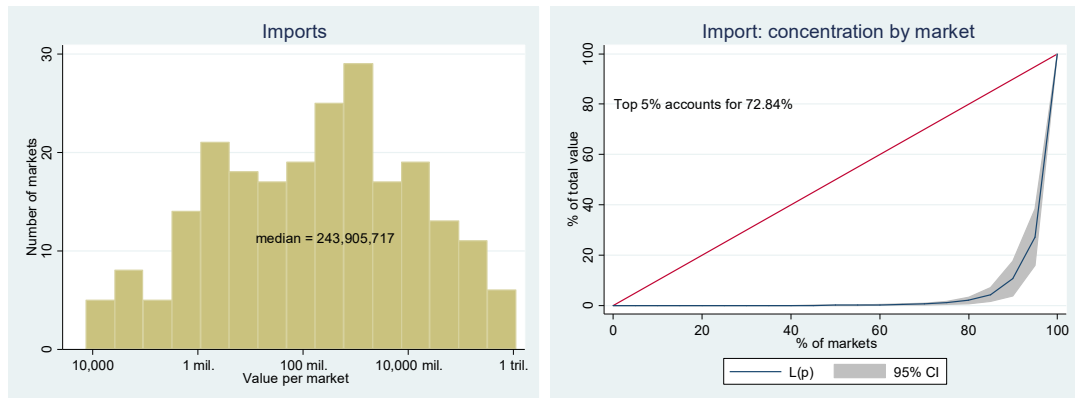
Import concentration is very high. The top 5 percent of importers, markets, and products account for 89.8, 72.8, and 69.7 percent, respectively, of total imports (Figure A4). This is very similar compared to exports though, for imports, market concentration is higher and product concentration is lower.

Figure A4: Intensive Margins

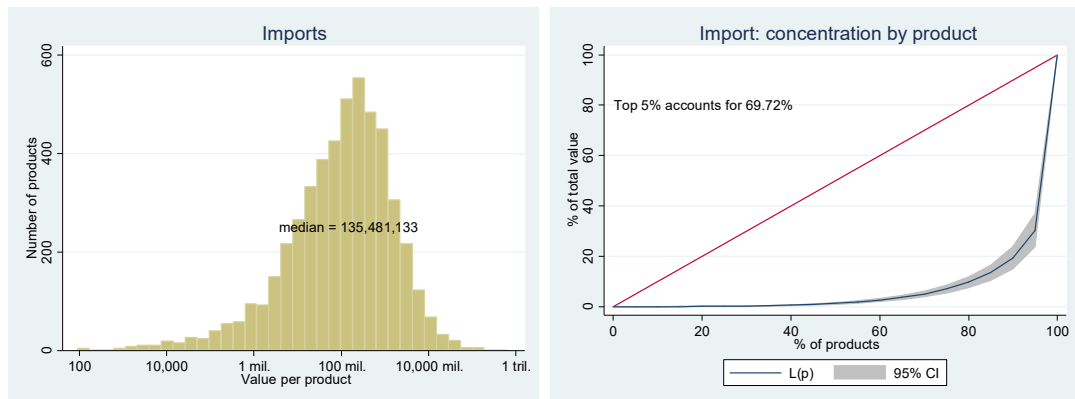
Distribution of average import value per trader per year (2015)



Distribution of average import value per market per year (2015)



Distribution of average import value per product per year (2003-2015 imports)



Source: Thai Customs Department; Authors' calculation.

### A.3 Import Product-Market-Trader Nexus

The distribution of importers and import value based on the number of products imported and the number of source markets gives a similar picture as with exports. This is shown in Table A1. Over 62 percent of importers import just a single product but these account for only 3.5 percent of total imports. The 42.2 percent of importers importing 2 products or less make up just 2.5 percent of import value. At the other extreme, 0.1 percent of importers importing 30 or more products from 30 or more markets make up as much as 22.5 percent of imports. The import landscape is full of very small players dealing in few products and source markets.

*Table A1: Distribution of Importers and Import Value (2015)*

A: Share of firms							
Number of products	Number of countries						All
	1	2	3	4	5-29	30+	
1	28.4%	1.2%	0.2%	0.1%	0.1%	0.0%	29.9%
2	8.8%	2.8%	0.5%	0.1%	0.1%	0.0%	12.3%
3	5.2%	1.8%	0.8%	0.2%	0.2%	0.0%	8.1%
4	3.4%	1.3%	0.7%	0.3%	0.2%	0.0%	5.9%
5-29	15.3%	5.9%	4.1%	3.0%	6.4%	0.0%	34.7%
30+	1.1%	0.7%	0.7%	0.6%	5.8%	0.1%	9.0%
All	62.2%	13.7%	7.0%	4.3%	12.7%	0.1%	100.0%

B: Share of value							
Number of products	Number of countries						All
	1	2	3	4	5+	30+	
1	0.8%	0.2%	0.1%	0.0%	0.1%	0.0%	1.3%
2	0.6%	0.3%	0.1%	0.1%	0.1%	0.0%	1.2%
3	0.3%	0.3%	0.1%	0.1%	0.1%	0.0%	0.9%
4	0.2%	0.2%	0.1%	0.1%	0.2%	0.0%	0.9%
5-29	1.1%	1.4%	1.4%	1.7%	13.5%	0.0%	19.1%
30+	0.5%	0.7%	1.1%	1.2%	50.6%	22.5%	76.5%
All	3.5%	3.1%	3.0%	3.3%	64.6%	22.5%	100.0%

Source: Thai Customs Department; Authors' calculation.

Looking at source markets, the top panel of Table A2 shows that China, EU, and AEAN have the largest number of traders in 2015. Across all markets, most firms import 5 or less products, though for Japan, there are many firms importing larger number of products. In terms of broad sectors, the bottom panel of Table A2 shows that most importers are involved in Machinery and Metals & Other Materials. The degree of market specialization is higher than for products, with most firms importing from just one market in all sectors.

Table A2: Summary Statistic by Broad Sectors and Regions

By Broad Regions (2015)

Country/Region	No. of firms	No. of products	Share of firms by no. of products					Total
			1	2-5	6-10	11-29	30+	
ASEAN	21,756	4,281	39.1%	35.3%	11.9%	9.6%	4.1%	100.0%
Australia	4,537	2,621	42.4%	33.4%	15.3%	7.3%	1.6%	100.0%
China	29,654	4,246	31.8%	37.4%	13.8%	12.6%	4.3%	100.0%
East Asia	15,361	3,723	35.4%	36.5%	12.3%	12.1%	3.7%	100.0%
EU	22,147	4,462	31.0%	33.5%	14.1%	14.2%	7.1%	100.0%
Hong Kong	10,341	3,241	45.1%	34.6%	10.1%	7.5%	2.7%	100.0%
India	5,754	2,968	47.6%	36.7%	8.7%	5.6%	1.4%	100.0%
Japan	17,086	4,257	33.2%	27.9%	13.0%	14.8%	11.0%	100.0%
US	15,926	3,826	39.2%	34.6%	11.7%	10.1%	4.3%	100.0%
Rest of the World	10,790	3,647	44.3%	34.5%	11.0%	8.0%	2.2%	100.0%
<b>Total/All regions</b>	<b>78,303</b>	<b>5,011</b>	<b>37.6%</b>	<b>32.3%</b>	<b>14.0%</b>	<b>11.5%</b>	<b>4.6%</b>	<b>100.0%</b>

By Broad Sectors (2015)

Sector	No. of firms	No. of markets	Share of firms by no. of markets					Total
			1	2-5	6-10	11-29	30+	
Agricultural Products	5,069	150	70.1%	22.8%	4.7%	2.3%	0.1%	100.0%
Food	4,088	130	72.0%	21.1%	4.3%	2.4%	0.1%	100.0%
Mineral Products	3,927	96	73.7%	23.7%	2.0%	0.6%	0.0%	100.0%
Chemicals & Rubbers	30,859	161	60.5%	31.5%	5.6%	2.4%	0.1%	100.0%
Wood & Leather Products	23,635	166	77.6%	19.7%	2.2%	0.5%	0.0%	100.0%
Textiles & Wearing Apparels	24,851	172	84.3%	13.4%	1.7%	0.6%	0.0%	100.0%
Metals & Other Materials	35,590	189	67.2%	27.0%	4.4%	1.4%	0.0%	100.0%
Machinery	40,736	180	63.9%	29.0%	5.2%	1.9%	0.1%	100.0%
Transportation	8,504	126	79.3%	18.0%	1.9%	0.7%	0.1%	100.0%
Miscellaneous	30,101	163	72.4%	23.4%	3.3%	0.8%	0.0%	100.0%
<b>All Sectors</b>	<b>78,303</b>	<b>227</b>	<b>67.7%</b>	<b>25.4%</b>	<b>5.1%</b>	<b>1.7%</b>	<b>0.1%</b>	<b>100.0%</b>

Source: Thai Customs Department; Authors' calculation.

#### A.4 Sectoral and Regional Perspective

Tables A3.1 and A3.2 contrasts the number of importers operating in various sector/market combinations with the value of imports. Of note is the fact that 5 percent of importers in Mineral Products account for 15.1 percent of all imports while on the other hand, 30.2 percent of importers engaged in Wood & Leather Products make up only 2.1 percent of imports.

Table A3.1: Share of Importers by Region and Sector (2015)

	Agricultural Products	Food	Mineral Products	Chemicals & Rubbers	Wood & Leather Products	Textiles & Wearing Apparels	Metals & Other Materials	Machinery	Transportation	Miscellaneous	All sectors
ASEAN	2.5%	1.3%	1.2%	9.8%	6.3%	4.9%	9.5%	12.0%	2.0%	7.4%	27.8%
Australia	0.6%	0.5%	0.2%	1.7%	1.4%	1.5%	2.1%	2.4%	0.5%	1.4%	5.8%
China	1.4%	1.0%	0.9%	15.8%	6.6%	6.9%	15.6%	19.9%	2.9%	10.9%	37.9%
East Asia	0.5%	0.5%	0.5%	8.4%	3.1%	2.9%	7.9%	10.6%	1.2%	4.9%	19.6%
EU	1.5%	1.7%	1.3%	11.6%	8.2%	6.6%	12.1%	14.7%	2.8%	10.5%	28.3%
Hong Kong	0.2%	0.2%	0.1%	4.0%	2.3%	1.9%	4.4%	6.7%	0.5%	3.8%	13.2%
India	0.6%	0.2%	0.3%	2.4%	0.8%	1.1%	2.6%	2.2%	0.3%	1.2%	7.3%
Japan	0.8%	0.8%	1.3%	8.6%	6.3%	8.9%	10.0%	10.8%	2.8%	8.5%	21.8%
US	0.9%	1.3%	0.8%	7.9%	4.3%	3.9%	7.4%	9.4%	1.5%	7.1%	20.3%
Rest of the World	1.5%	0.9%	0.5%	4.0%	2.8%	2.8%	4.9%	4.9%	0.7%	3.5%	13.8%
All regions	6.5%	5.2%	5.0%	39.4%	30.2%	31.7%	45.5%	52.0%	10.9%	38.4%	

Source: Thai Customs Department; Authors' calculation.

Table A3.2: Share of Import Value by Region and Sector (2015)

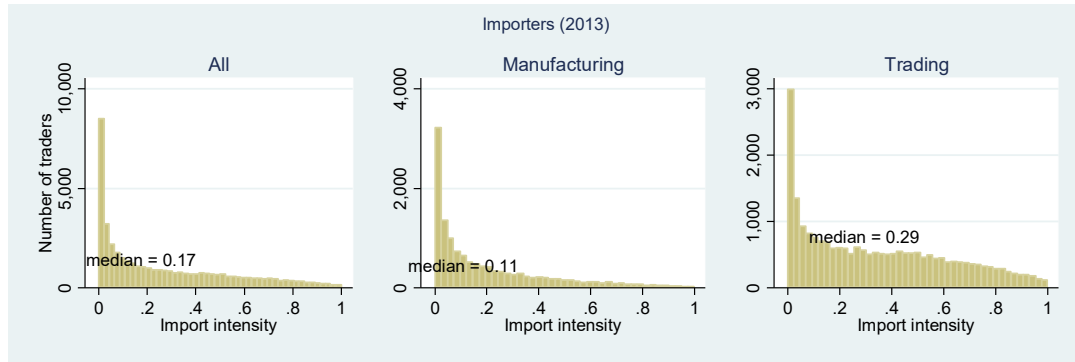
	Agricultural Products	Food	Mineral Products	Chemicals & Rubbers	Wood & Leather Products	Textiles & Wearing Apparels	Metals & Other Materials	Machinery	Transportation	Miscellaneous	All sectors
ASEAN	0.7%	0.6%	5.4%	2.8%	0.5%	0.4%	3.9%	8.9%	1.5%	0.9%	25.5%
Australia	0.2%	0.1%	0.7%	0.1%	0.0%	0.0%	0.6%	0.1%	0.0%	0.0%	1.8%
China	0.6%	0.2%	0.1%	2.5%	0.3%	0.8%	3.3%	6.9%	0.7%	0.8%	16.2%
East Asia	0.1%	0.0%	0.1%	1.4%	0.1%	0.3%	1.8%	2.5%	0.2%	0.1%	6.5%
EU	0.4%	0.3%	0.1%	1.8%	0.3%	0.2%	1.0%	2.7%	0.9%	0.5%	8.1%
Hong Kong	0.0%	0.0%	0.0%	0.2%	0.1%	0.2%	1.6%	2.9%	0.0%	0.3%	5.3%
India	0.1%	0.0%	0.0%	0.4%	0.0%	0.1%	0.2%	0.2%	0.1%	0.0%	1.2%
Japan	0.1%	0.0%	0.1%	2.0%	0.2%	0.2%	3.9%	5.9%	1.6%	0.8%	14.7%
US	0.4%	0.4%	0.1%	0.9%	0.2%	0.2%	0.5%	1.8%	1.2%	0.3%	5.9%
Rest of the World	1.5%	0.6%	8.6%	1.1%	0.4%	0.2%	1.5%	0.5%	0.2%	0.3%	14.8%
All regions	4.1%	2.3%	15.1%	13.0%	2.1%	2.4%	18.2%	32.4%	6.4%	4.0%	100.0%

Source: Thai Customs Department; Authors' calculation.

## A.5 Firm Characteristics

The import intensity of importers (Figure A5) is typically low, though it is higher than for exporters (median value of 0.17 compared to 0.11 for exporters). For trading firms, the import intensity is significantly higher in general. This contrasts with exporters where manufacturing firms tend to have higher export intensity. Finally, there is no double-peak for import intensity as there is for exports.

Figure A5: Import Intensity of Import Firms



Source: Thai Customs Department, Ministry of Commerce; Authors' calculation.

Looking at the balance sheet characteristics of importers versus non-importers reveal that importers tend to be larger, experience greater returns on assets, have higher leverage, and have higher turnover ratios (Figure A6). Thus not only are exporters special, importers also stand out from domestic firms. Finally, Table A4 shows that importers who import more products from more markets tend to have both higher return on assets as well as higher turnover ratios. As for exports, importing in scale is associated with stronger performance metrics.

Table A4: Distribution of Importers and Their Balance Sheet Attributes (2013)

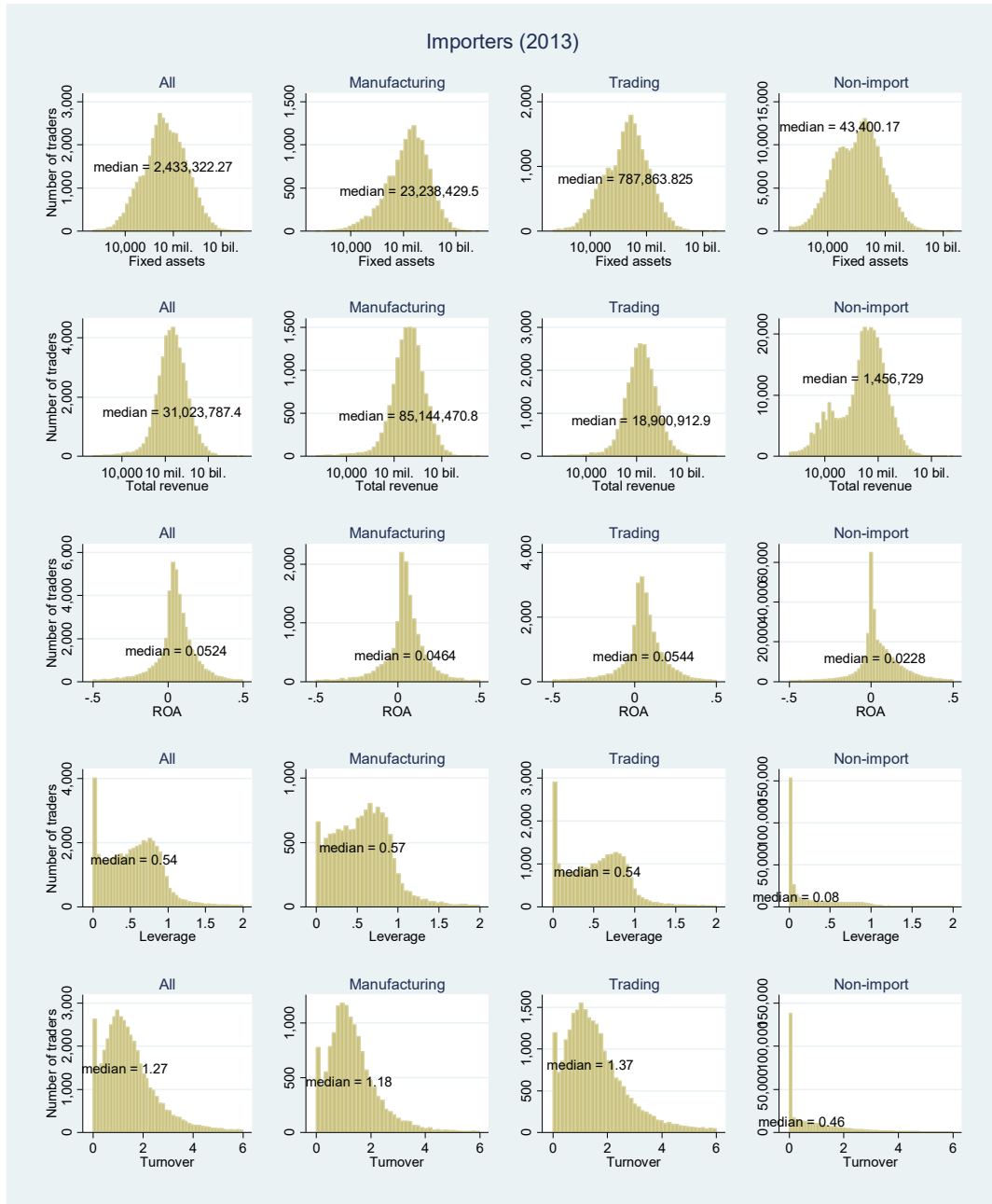
C: Median ROA							
Number of products	Number of countries						All
	1	2	3	4	5+	30+	
1	4.27%	3.34%	3.94%	3.07%	3.80%	na.	4.14%
2	4.66%	4.84%	4.82%	3.43%	2.71%	na.	4.70%
3	4.48%	5.11%	4.95%	4.37%	5.02%	2.87%	4.81%
4	5.03%	5.85%	5.27%	5.61%	4.79%	na.	5.31%
5-29	4.13%	4.79%	5.27%	5.60%	5.71%	1.53%	5.08%
30+	4.09%	4.86%	5.34%	6.53%	6.83%	10.05%	6.50%
All	4.34%	4.81%	5.14%	5.58%	6.19%	9.44%	5.03%

D: Median Turnover Ratio							
Number of products	Number of countries						All
	1	2	3	4	5+	30+	
1	1.20	1.35	1.39	1.16	1.40	na.	1.21
2	1.26	1.35	1.46	1.29	1.25	na.	1.30
3	1.22	1.34	1.45	1.42	1.50	4.35	1.31
4	1.27	1.35	1.45	1.54	1.45	na.	1.35
5-29	1.18	1.30	1.35	1.39	1.40	1.79	1.32
30+	1.24	1.29	1.28	1.31	1.35	1.68	1.34
All	1.21	1.32	1.36	1.37	1.38	1.70	1.30

Source: Thai Customs Department, Ministry of Commerce; Authors' calculation.

Figure A6: Importers are Special



Source: Thai Customs Department, Ministry of Commerce; Authors' calculation.