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Trade costs and trade composition

Firm-level evidence from Pakistan

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Trade Costs and Trade Composition: Firm-level Evidence from Pakistan

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Trade Costs and Trade Composition: Firm-level Evidence from Pakistan

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Abstract

This study empirically investigates the impact of trade costs on the composition of Pakistan's exports. It extracts micro-level information from administrative datasets of exports, imports and production and uses it to estimate the intensive and extensive margins of firms and products. It then decomposes the responses of trade margins along multiple dimensions of firm heterogeneity, including exporters' trade orientation, spatial and sectoral distribution and modes of shipments. The work finds exporting is a quite rare activity. Individual firms differ widely: most of them do not export and the exporters sell more in the domestic market. Of those that export, only a few ship multiple products to multiple markets. There is huge concentration of firms and products to a few markets from major exporting stations. Both the number of firms and the set of products increase with market size of trading partner. The effect of trade costs appears much greater on the extensive margins of firms and products than on their intensive margins, and this effect is particularly strong for firms based in locations that are relatively remote from seaports.

The study alludes to a large unutilized trade potential of exporting and non-exporting firms that can be harnessed by improving trade-processing infrastructure and through other policy and non-policy mechanisms. It also suggests policies aimed at increasing the extensive margins are much more important for promoting exports.

Keywords: Trade costs, firm heterogeneity, international trade, intensive margins, extensive margins, economic geography

JEL Codes: F10, F12, F13, F14, O18, R41, R42

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Disclaimer

This study uses administrative datasets of the Government of Pakistan, some of which are completely confidential in nature. As an internal researcher, I have accessed this information purely for this research work and taken extreme care to ensure its confidentiality. Most of the analysis was completed during my research visits to Pakistan. The research datasets may not reproduce the exact aggregates reported in the government publications. The use of administrative data in this work does not imply the endorsement of the organizations in relation to the interpretation or analysis of the information. All errors and omissions are solely the responsibility of the author.

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Trade Costs and Trade Composition: Firm-level Evidence from Pakistan

1 Introduction

Trade costs play a crucial role in the modern theoretical and empirical literature on international trade and economic geography. These costs come in many forms: transport, infrastructure, border-related, distribution, cultural, taste differences, sanitary and phyto-sanitary regulations, technical barriers to trade, etc. (Anderson and van Wincoop, 2004). One major challenge in recent research lies in examining their role in driving intensive and extensive margins (IM and EM) of trade. This is because the focus of research on international trade has shifted from countries and industries to firms and products, as it is widely recognized that neither countries nor sectors engage in trade; firms do. Since, understanding the firm-level drivers and determinants of trade flows has assumed importance for the design and assessment of trade policies, my goal in this article is to gauge the quantitative implications of these costs, rather than discussing their sources in detail.

The existing micro literature on firms is largely limited to analysis of firms in advanced economies. For example, Mayer and Ottaviano (2007) study European firms, Bernard et al. (2006) examine US data and Eaton et al. (2004) explore French firms. Despite these multiple studies focusing on firms in Organisation for Economic Co-operation and Development (OECD) countries, little is known about the nature of exporting firms in developing countries,[2] including Pakistan. Most importantly, responses of IM and EM of firms and products to various determinants of trade flows, and their variation along trade orientation, sectoral composition and the spatial distribution of firms, remain largely unexplained.

Against this background, this study empirically investigates the impact of trade costs on the trade composition of Pakistan's export-oriented firms. It assembles a firm-level panel dataset by extracting information from multiple domestic and international sources and then uses it to estimate the IM and EM of trade and examine the role of multiple dimensions of firm heterogeneity.

It focuses on margins of firms as well as products because Bernard et al. (2006) show that the EM of trade – that is, the number of products a firm exports, as well as the number of markets it serves – are central to understanding the response of trade flows to trade costs. Hummels and Klenow (2005) find that richer countries export more units at higher prices, and also that they export a wider set of goods. They establish that EM (larger set of goods) account for two-thirds of the exports in larger economies and one-third of their imports. Hausmann et al. (2007) also argue that the export product mix is one of the determinants of income level and subsequent economic development.

This research contributes to the existing literature in the many ways. The main contribution of this article lies in its examination of the anatomy of the exporting firms of an emerging economy using an administrative dataset of a recent period. I perform estimations using administrative datasets of Pakistan, which is explored for the first time for such an empirical analysis. These primary sources have a higher level of disaggregation and provide for relatively longer coverage of the recent period, and thus allow greater flexibility in examining additional dimensions of firm heterogeneity. I generate a set of stylized facts of firms and products for the year 2012/13 – the most recent year for which the complete dataset was accessible. However, I perform econometric estimations using similar information over a

[2] *A few exceptions are Khandelwal et al. (2011) focusing on Chinese firms and Bernard et al. (2011) on firms in Colombia.*

longer period of time – from 2002 to 2014. To the best of my knowledge, this is the longest panel of exporting firms of any developing country.

The second novel contribution of this work is its dissection of the exporting and non-exporting firms along new dimensions. This analysis encompasses the population of firms trading in all sectors of the economy, whereas the existing literature focuses mainly on firms in the manufacturing sectors. Since this analysis is based on the data of firms in all sectors, it allows the results to be generalized. Moreover, besides exploring the activities of exporting firms, it also looks into the domain of non-exporting firms and examines their spatial location and domestic sales. This provides insights into the unexploited trade potential in Pakistan.

Third, in contrast with most studies focusing on international trade costs, I look at two types of trade costs: behind the border and beyond the border. While the trade cost literature typically investigates the first of these, I show the other are also quantitatively important. Behind-the-border costs considered in this work are induced by firms' spatial location and dispersion of their exporting activities within the country. While beyond-the-border costs arise from the geographical remoteness of export markets, different languages and the existence or lack of preferential trade arrangements (PTAs). I also examine the heterogeneity of trade costs across three commonly used modes of shipments: air, sea and land routes.

Similarly, I concentrate on trade composition along sectoral and geographical dimensions. The reason for this is that analysis of trade structure along these dimensions is assuming rising importance in national trade policies. The sectoral composition of firms and products helps in identifying which sectors are drivers of technological improvement and economic growth. Moreover, constraints to export growth can be easily identified at a sectoral level. Similarly, geographical composition highlights links (or the absence thereof) to dynamic regions of the world and is a useful input in devising an export diversification strategy.

Finally, the extent of detail in this analysis is unprecedented in the micro literature on firms in international trade. I generate a set of detailed descriptive statistics about the exporting firm, including on sectoral dispersion, export market orientation, spatial distribution and modes of shipment. I then conduct the gravity estimation at multiple levels. I initially examine the overall response of exports to trade costs and decompose the effect into IM and EM of firms and products. Following this, I replicate the same estimations at a further micro level and decompose the IM of products to quantity and price margins. I also explore a variation in the trade margins across trading partners and along multiple new dimensions of firm and product heterogeneity, which provides insights into the responses of exporting firms to various factors promoting or inhibiting trade flows at a micro level. Lastly, I decompose the trade margins in two broad categories – agriculture and manufacturing – and then into a further 16 sub-sectors. This decomposition yields information about the asymmetric nature of trade costs across sectors.

The study finds Pakistan's exports are highly skewed towards a narrow set of large firms and the contribution of a very large number of small trading firms is relatively low. This fact emerges consistently from the examination of disaggregated data in multiple dimensions. The exporting firms are very heterogeneous in terms of their size, trade orientation, set of exported products and market coverage. The study alludes to importer premia[3] and the large unutilized trade potential of exporters and non-exporters. Unfolding the linkages between trade margins and trade costs reveals that firms located in remote locations (from seaports) are in a disadvantaged position, as high transportation costs may act as an invisible tax on their exports. Although there is some tendency to use air freight and land routes, most firms

[3] Exporter-cum-importers appear to drive overall export volume.

still prefer to ship large volumes through seaports, even when exporting to geographical neighbours. Second, both IM and EM respond differently to trade costs and, because of this, aggregate analysis may not reflect the true pictures on adjustment of various margins. A decomposition of the effect across sectors, exporting stations and modes of shipments reveals that trade costs have an asymmetric effect on export margins along these dimensions.

The structure of the paper is as follows. Section 2 provides an overview of the related literature and Section 3 introduces data. Section 4 and 5, respectively, discuss the concept of trade costs and trade composition, whereas Section 6 examines the linkages between them using graphical analysis. Section 7 presents empirical strategy and estimation results. Section 8 explores the responses of trade margins along multiple dimensions of firm heterogeneity. Section 9 concludes by highlighting policy implications of this work and avenues for further research. Robustness tests and other information is relegated to appendix.

2 Related Literature

This paper contributes to the literature on both international trade and economic geography. It relates directly with strands of the literature focusing on the impact of trade costs on trade composition. Early theoretical work in this stream suggests that the relatively high costs of doing international business mean there exists a range of commodities that are not traded internationally, as these costs may put trading firms at a comparative disadvantage. Dornbusch et al. (1977) develop a model underlining the effect of trade costs on the comparative advantage of countries, and Krugman (1980) also argues for transportation costs as one of the determinants of trade patterns between countries. Recent empirical work by Milner and McGowan (2013) finds that trade costs influence the export mix of trading partners. Using a sample of manufacturing industries from 37 OECD countries for the period 1995–2004, these authors find industries located in high trade cost countries gain a relatively smaller share in the export of manufactured goods. Ali and Milner (forthcoming) extend this work to the developing world.

The existing scholarly and technical literature has, by and large, looked into the effects of trade costs mainly from the perspective of their influence on trade volumes (Helpman et al., 2008; Limao and Venables, 2001). Some studies explore the role of fixed and sunk costs in the entry and exit decisions of firms in export markets of developed countries (Bernard et al., 2006). Another strand of literature investigates the effect of these costs on the reallocation of market share at country, industry and firm levels (Chaney, 2008; Melitz, 2003). Most of these micro-level studies examine trade margins in advanced economies.

Although examination of the IM and EM of firms and products is important from development policy perspectives, this literature still lacks rigorous quantitative evidence on the effect of trade costs on the trade margins of developing countries. There is always a risk in drawing lessons from countries that are not in the same region and do not have the same history and economic conditions. I therefore extend this stream of literature and estimate the IM and EM of firms and products using a micro dataset of a developing country over a longer period. Following the estimate of all the six trade margins discussed in Mayer and Ottaviano (2007), I decompose them along multiple dimensions of firm heterogeneity.

Furthermore, rather than limiting the analysis to beyond-the-border trade costs, I take into account their variation at the national border and behind the border. This is an extension of all of the above studies, as they implicitly assume a common border effect for all firms and supress the within-country variation of trade processing infrastructure. This study relaxes the assumption and explores the heterogeneity of trade margins along the spatial distribution of

the manufacturing and exporting activities of the firms, as well as along various modes of shipment. This is important as firms appear to ship from multiple exporting stations, and the quantity and quality of trade processing infrastructure at these stations varies widely.

3 Data Description

Most of the information about IM and EM of trade is available from the Export Dynamics Database (EDD) of the World Bank. However, I conduct this research using multiple primary sources. The micro-level information on various margins of firms and products is collected from national data sources (Statistics Division; Federal Board of Revenue, Government of Pakistan). Details on the spatial location of firms, the nature of their trading activities and export intensities comes from the Inland Revenue Services and Pakistan Customs. The merging process of these datasets was made possible use to single tax identification code (NTN) for each firm. The stylized facts relate to 17,258 firms that exported in the financial year 2012-13 while the econometric analysis includes all the firms that exported any product to any market during 2002 to 2014. Gravity model variables are retrieved from the Centre d'Études Prospectives et d'Informations Internationales (CEPII)[4] and gross domestic product (GDP) and aggregate trade flow data are downloaded from the open data sources of the World Bank and the UN Conference on Trade and Development (UNCTAD). Finally, I extract bilateral trade cost figures from a recently released World Bank dataset.

4 Trade Costs in Pakistan

Trade costs include all the factors that drive a wedge between producers' price in the country of origin and consumers' price in the country of destination. In the absence of directly measured data on these costs, most studies compute them indirectly. The burgeoning technical and scholarly literature on trade policy analysis uses distance between trading partners as a proxy for transportation costs. Multilateral institutions, however, have developed various indicators to compare these costs across countries. Most commonly used indicators are cost-insurance-freight (CIF) to free-on-board (FOB) ratios, the Liner Shipping Connectivity Index (LSCI), the Logistics Performance Index (LPI) and a bilateral trade cost indicator developed by the World Bank.

UNCTAD developed the LSCI from five components of maritime connectivity: number of ships, their container-carrying capacity, maximum vessel size, number of services and number of companies that deploy container ships in a country's ports. These elements capture costs associated with port infrastructure, access to transportation facilities and the level of competition on shipping routes. The LPI is similar but is based on a survey conducted by the World Bank.

Table 1 presents some of these indicators and compares the relative rankings of Pakistan and its neighbouring economies, India and Bangladesh. The table also includes information for China and Singapore, as these countries are considered benchmarks for trade facilitation at a global level. These data show the cost of exporting or importing one container in Pakistan is actually lower than in India and Bangladesh; the figure is closer to that of China but much higher than that of Singapore. Similarly, trade documentation requirements in Pakistan are comparable with those of its regional neighbours, but slightly greater than in China and Singapore. In addition, in terms of ease of doing business, Pakistan's ranking is relatively higher. However, India, China and Singapore have better shipping connectivity.

[4] http://www.cepii.fr/

These indices are informative for cross-country comparison but are not directly relevant for analysing firm-level trade flows between trading partners, as they are not bilateral in nature. Therefore, the trade policy community has mostly employed a gravity model for measuring the effect of various elements of trade costs. According to this model, international trade between countries follows Newton's law of gravity, in that the volume of trade varies directly with the economic mass, and inversely with the distance between trading partners. This approach can isolate the effect of various elements of trade costs, such as those associated with language, culture, geography and colonial heritage, etc. Nevertheless, it does not provide aggregate figures for cross-country comparisons.

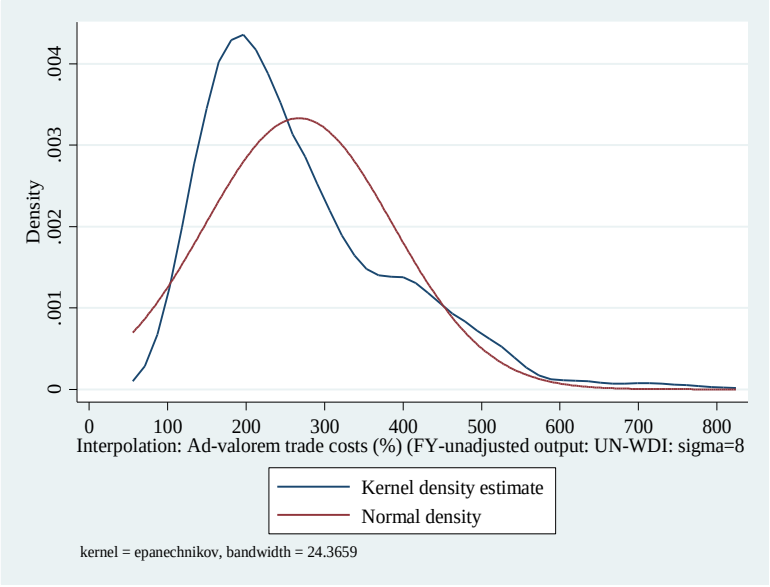
Table 2: Commonly Used Trade Cost Indicators

Parameter	Pakistan	Bangladesh	India	China	Singapore
Cost of exporting 20ft container	765	1,281	1,332	823	460
Cost of importing 20ft container	1,005	1,515	1,462	800	440
Number of export documents	8	6	7	8	3
Number of import documents	8	9	10	5	3
Doing Business Index	128	173	142	90	1
LSCI	27.5	8.39	45.61	165.05	113.16
LPI	2.83	2.56	3.08	3.53	4

Source: Constructed using World Bank and UNCTADStat datasets.

To circumvent this, the World Bank has released a comprehensive bilateral trade cost dataset for 178 countries, which measures trade costs in terms of the trade-depressing effect of national borders relative to a country's domestic trade. This trade costs indicator is computed from a gap between observed trade and actual trade potential by applying a micro-founded and theoretically consistent methodology (Novy, 2013). This approach is considered superior because it is devoid of an omitted variables bias. Moreover, it is theoretically consistent, as it includes all components of trade costs discussed in Anderson and van Wincoop (2004). Bilateral trade costs computed using this methodology are *ad valorem* (tariff) equivalents, and are symmetric in nature.

Figure 1: Trade Costs in Pakistan – Kernel Density Estimate

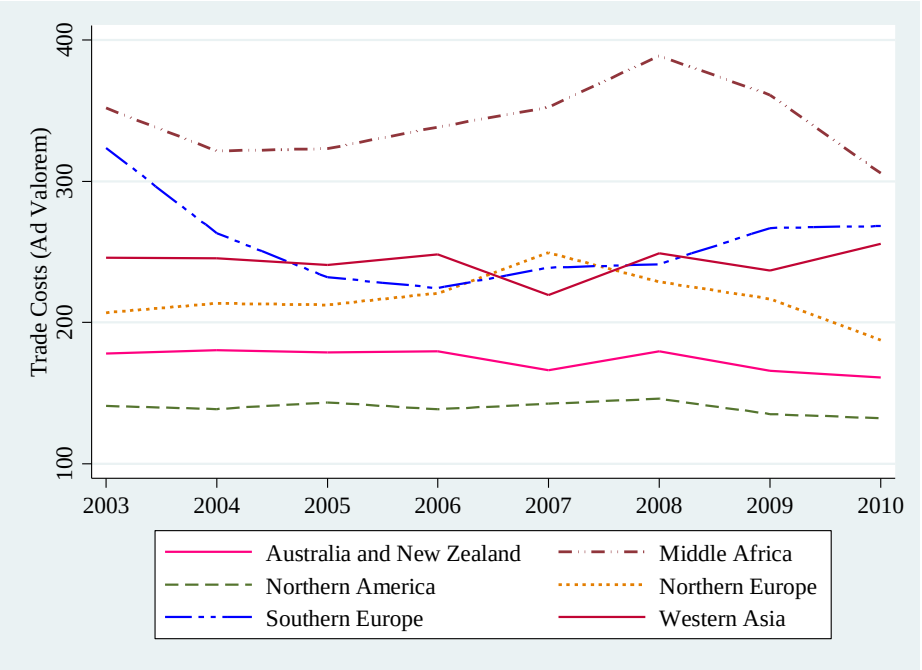


Source: Author's calculations using World Bank bilateral trade cost dataset.

Exploration of this dataset indicates that Pakistan's bilateral trade costs are relatively higher than the world average. These costs vary enormously across trading partners. Figure 1 depicts a kernel density estimate of the bilateral trade costs of Pakistan's 136 trading partners. The broad spread of the diagram alludes to a huge variation across countries. This indicator ranges from 70% *ad valorem* (for Qatar) to more than 500% (for Laos and Suriname), with an average of 186%. Further disaggregation suggests Pakistan's five lowest trade cost export markets are Qatar, Hong Kong, Afghanistan, the Netherlands and Malaysia (in ascending order). The five highest are Mongolia, Armenia, Botswana and Macedonia (in descending order).

Figure 2 illustrates the evolution of Pakistan's bilateral trade costs for a few regions. It appears that North American and European countries as well as Australia and New Zealand have the lowest trade costs, whereas the countries of Sub-Saharan Africa have the highest. These costs are falling across all regions but the fall is uneven across countries.

Figure 2: Evolution of Trade Costs Across Regions and Over Time



Source: Author's calculations using World Bank bilateral trade cost dataset.

In light of discussion on the merits and demerits of various approaches for measuring trade costs, I use a gravity model for estimating the effect of various elements of trade costs on trade composition. The descriptive statistics, however, use the trade cost indicator as the gravity model does not provide aggregate figures for cross-country comparison.

5 Pakistan's Trade Composition

The empirical literature measures trade composition in two different ways: industry-level studies explore the relative share of various sectors and markets whereas firm-level studies analyse the IM and EM of firms and products (WTO, 2012). I follow the second approach but take it to further micro level. I decompose the overall exports of Pakistan to the IM and EM of firms and products and also to price and quantity margins. Following this, I examine the distribution of firms and products along various dimensions including their sectoral and geographical distribution. This micro-level analysis identifies products at an eight-digit level of the Harmonized System (HS) of classification.

5.1 Overview of Exporting Sectors

As in most developing countries, exporting is quite a rare activity in Pakistan. Of the total universe of 50,518 firms in the year 2012/13, only 17,258 (34%) entered into exporting. This proportion further drops to 13% (6,699 firms) if small occasional exporters (10,559) are excluded from the analysis.

Table 3 presents a snapshot of Pakistan's exporting sector for the year 2012/13; this is the latest year for which complete data were accessible. In this year, 17,258 firms exported 4,313 products to 215 markets all over the globe. On average, around 80 firms exported around 20 HS eight-digit products to each market, with export value per firm amounting to PKR 149 million.

Table 3: Snapshot of Pakistan's Exporting Sectors

Description	Value
Number of firms	17,258
Products (HS 8 digits)	4,313
Markets served	215
Firms per Market (avg.)	80
Products per market (avg.)	20
Exports per firm (PKR millions)	149
Total exports (PKR billions)	2,572

Source: Constructed using Administrative datasets for financial year 2012-13.

Around one-third of these firms engage in two-way trade (export-cum-import) and they appear to be major drivers of overall exports (row 1 of Table 2); they constitute 32% of the population of exporting firms but deal with 81% of overall export volume. This concentration of large export volumes in the two-way traders implies these firms (engaged in both imports and exports) may face lower trade costs, as they may possess superior information about the foreign markets and international trade procedures.

Table 4: Trade Orientation of Exporting Firms

	Firms		Exports	
Classification	Number	Percent	Value	Percent
Exporter-cum-importers	5,466	32%	2,094	81%
Exporters but not importers	11,793	68%	478	19%
Exporters and domestic suppliers	6,699	39%	2,111	82%
Very large firms	521	3%	744	29%
Large firms	6,178	36%	1,368	53%
Small and exporting-only firms	10,559	61%	461	18%
All	17,258	-	2,572	-

Notes: 1. Export values are in PKR billions; All figures pertain to financial year 2012/13.

2. Firm size is according to their nature and location of registration: large firms operate through Large Taxpayer Units (LTUs), medium ones through Regional Tax Offices (RTOs), and the rest are small.

This economy has a large number of small exporters, which constitute around 68% of exporting firms but contribute to around 19% of overall exports. Most of these firms engage in neither manufacturing nor importing; they appear to born for exporting.

Examination of firms' sizes[5] according to overall value addition in manufacturing shows exporting is highly skewed towards large firms, which constitute around 39% of the exporters' population and deal with 80% of exports. Of these, 3% of firms are very large and deal with around 30% of export volume; the remaining 36% handle around 53% of exports. These large firms are engaged in exporting as well as serving the local market. The remaining 61% of firms are very small, engage in exporting only, and do not serve the local market.

A further decomposition of export volumes along firm size shows a relatively small fraction of large exporters drives overall exports. As Table 4 shows, the top 1% of firms mediate around 46% of total exports and the top 5% handle around 76%. The remaining 95% appear to be very small and their contribution to overall exports is less than 25%. Also, more than 50% of exporting firms appear to be very tiny, with a combined export share of merely 2%.

Table 5: Distribution of Firms along their Export Share

Firms		Exports	
Percentile	Number	Value	Percent
1%	173	1,180	46%
5%	863	1,951	76%
10%	1,726	2,272	88%
25%	4,315	2,496	97%
50%	8,629	2,513	98%
All	17,258	2,572	

Note: Export values are in PKR billions.
Source: Constructed using Administrative datasets for financial year 2012/13.

[5] *Most studies categorize firms according to the total value of their exports or their number of employees. But the fragmented production structure means intermediary goods may cross national borders many times, which is not truly reflected in domestic sales or exports. To circumvent this, I group firms on the basis of value addition.*

5.2 Distribution of Firms and Products across Sectors

Disaggregation of the data along two broad categories, agriculture and manufacturing, shows that around 80% of firms operate in the manufacturing sector, 11% in agriculture and 8% in both sectors (Table 5). Overall, agriculture constitutes around 17% of national exports.

Table 6: Distribution Across Agriculture And Manufacturing

	Firms		Exports	
Sector	Number	Percent	Value	Percent
Manufacturing	14,049	81%	1,911	74%
Agriculture	1,904	11%	231	9%
Both	1,305	8%	429	17%
All	17,258		2,572	

Notes: The agriculture sector comprises Chapters 1-24 of the HS of classification and the manufacturing sector
Chapters 25-99 of the same. Export values are in PKR billions.
Source: Constructed using Administrative datasets for financial year 2012/13.

Table 6 presents further decomposition of firms, products and export markets on the basis of standard product groups contained in the Comtrade dataset. The first three sectors denote agricultural products, Sectors 4 and 5 (minerals and fuels) represent commodities and the others pertain to manufacturing.

As these data suggest, textiles represents the largest exporting sector in term of firms, products, markets and export share. These firms export textiles products to 195 markets out of a total of 215 export destinations. Fruits and vegetables is the second largest group in terms of export volumes but miscellaneous goods has the second largest number of exporting firms. Other sectors also show similar imbalances between number of exporting firms, set of traded products and export share. For example, the leather and metal sectors have 20% and 14% of exporting firms but their export share is only around 4% and 2%, respectively. This disproportionate fraction of exporting firms and export shares across sectors alludes to a large misallocation of resources.

Table 7: Sectoral Decomposition Of Firms, Products And Exports

		Firms		Products		Markets		Exports	
#	Sector	#	Percent	#	Percent	#	Percent	Value	Percent
1	01-05_Animal	688	4.0%	150	3%	85	40%	67	2.6%
2	06-15_Vegetable	2,325	13.5%	276	6%	147	68%	349	13.6%
3	16-24_FoodProd	1,318	7.6%	171	4%	130	60%	121	4.7%
4	25-26_Minerals	708	4.1%	79	2%	81	38%	80	3.1%
5	27-27_Fuels	69	0.4%	34	1%	35	16%	55	2.1%
6	28-38_Chemicals	1,295	7.5%	418	10%	149	69%	36	1.4%
7	39-40_PlastiRub	1,769	10.3%	220	5%	129	60%	48	1.9%
8	41-43_HidesSkin	3,396	19.7%	74	2%	156	73%	114	4.4%
9	44-49_Wood	1,515	8.8%	174	4%	132	61%	11	0.4%
10	50-63_TextCloth	7,710	44.7%	754	17%	195	91%	1367	53.2%
11	64-67_Footwear	774	4.5%	43	1%	103	48%	11	0.4%
12	68-71_StoneGlass	1,206	7.0%	157	4%	111	52%	137	5.3%
13	72-83_Metals	2,520	14.6%	411	10%	136	63%	58	2.3%

14	84-85_Mach.Elect	2,185	12.7%	875	20%	140	65%	38	1.5%
15	86-89_Transport	468	2.7%	142	3%	92	43%	12	0.5%
16	90-99_Misc.	4,234	24.5%	334	8%	180	84%	68	2.6%
	All	17,258		4,313		215		2,572	

Note: # indicates counts; products are counted at an 8-digit level of HS. Export values are in PKR billions.
Source: Constructed using Administrative datasets for financial year 2012/13.

A further decomposition of the firms according to the set of exported products shows multi-product firms handle a major volume of exports (Table 7). In addition, within multi-product firms, exports are highly skewed towards large firms that export five or more than five products. These large firms constitute around 30% of the cohort but contribute 70% of export volume. By contrast, around 37% of the firms are medium-sized; they deal with two to four products with their combined export contribution of around 23%. Similarly, the contribution of single-product firms is also relatively low; they constitute around 33% of the cohort but deal with only 6.5% of exports.

Table 8: Single and Multi-Product Firms

	Firms		Exports	
Products	Number	Percent	Value	Percent
1	5,760	33%	167	6.5%
2	3,084	18%	176	6.8%
3	1,939	11%	177	6.9%
4	1,271	7%	231	9.0%
5+	5,204	30%	1,820	70.8%
All	17,258	100%	2,572	100%

Note: Export products are counted at an 8-digit level of HS. Export values are in PKR billions.
Source: Constructed using Administrative datasets for financial year 2012/13.

5.3 Distribution of Firms and Products across Markets

A disaggregation of the EM of firms and products along export markets shows firms exporting to multiple markets deal with the major export share. For instance, 19% of the exporters that ship to five or more than five markets account for 73% of exports. On the lower end of the distribution, around half of firms serve only one market with their combined export share of 13% (Table 8). The combined exports of the middle core of firms, serving two to four markets, are at around 13%, although they constitute around 32% of firms.

Table 9: Single and multiple export destination firms

	Firms		Exports	
Markets	Number	Percent	Value	Percent
1	8,465	49%	334	13.0%
2	2,888	17%	131	5.1%
3	1,618	9%	103	4.0%
4	1,020	6%	115	4.5%
5+	3,267	19%	1,889	73.4%
All	17,258	100%	2,572	100.0%

Note: Markets indicates the number of export destinations served by firms.

Export values are in PKR billions.

Source: Constructed using Administrative datasets for financial year 2012/13.

Table 9 splits multi-product firms into various categories on the basis of a set of exported products and target markets. It analyses the combined distribution of the firms and export volume along a set of exported products and markets served. As these data show, 28% of firms export a single product to a single market (Panel A), and they deal with 3% of total exports (Panel B). Just 9% of the firms export two products to a single market. On the other end of the scale, 13% firms export five-plus products to five-plus markets and contribute to 60% of overall exports. The export contribution of firms exporting two to four products to two to four markets is less than 1% in each category. This shows these firms are either very large or very small, and the middle core appears to be missing in this distribution.

Table 10: Distribution of Firms and Export Volume along Products and Markets

A: Proportion of firms (%)

Products	1	2	3	4	5+	Total firms
Markets						
1	**28**	9	4	2	6	8,465
2	3	5	3	2	4	2,888
3	1	2	2	1	4	1,618
4	1	1	1	1	3	1,020
5+	1	1	2	2	**13**	3,267
Firms	5,761	3,086	1,942	1,275	5,204	17,268

B: Proportion of export volume (%)

Products	1	2	3	4	5+	Total exports
Markets						
1	**3**	1.90	0.99	2.07	5.01	334
2	1	0.93	0.71	0.86	1.87	131
3	1	0.70	0.53	0.25	1.96	103
4	0.2	0.53	0.75	0.97	2.03	115
5+	2	2.78	3.91	4.84	**59.90**	1,889
Exports	167	176	177	231	1,820	2,572

Note: Export volume is in PKR billions.
Source: Constructed using Administrative datasets for financial year 2012-13.

Table 10 presents the distribution of firms, products and export volumes in the top five markets of Pakistan – that is, the US, China, Afghanistan, UAE and the UK. The largest number of firms export to the US market (23%), followed by the UK (19%). The set of products exported to these markets is relatively wide and appears to be quite similar but the volume of exports destined for the US market is almost three times than shipped to the UK. These two markets combined absorb around 20% of Pakistan's exports. Pakistan's firms are concentrated to the US markets mainly because of their historical orientation during the regime of the Multi-Fiber Arrangement (MFA) and because of the Generalized System of Preferences (GSP)[6] Plus status enjoyed by exporters in the UK. This also suggests trade patterns tend to be highly persistent over time because of the presence of sunk costs.

Following the US and the UK, China and UAE are Pakistan's biggest export destinations. Each of these markets attracts around 10% of Pakistan's exports but the number of exporting firms and the set of exported products to UAE is almost double the number for China. One apparent reason for this concentration (of firms and products) in the UAE market is the transhipment of export cargo from this market to European and North American destinations.

Table 11: Trade Margins in Major Export Destinations

	Firms		Products		Exports	
Markets	Number	Percent	Number	Percent	Value	Percent
Afghanistan	888	5.1%	850	20%	188	7.3%
China	1,476	8.6%	791	18%	263	10.2%
UAE	3,196	18.5%	1,954	45%	266	10.3%
UK	3,301	19.1%	1,413	33%	142	5.5%
US	4,013	23.3%	1,429	33%	385	15.0%

Note: Products are counted at an 8-digit level of HS. Export values are in PKR billions.
Source: Constructed using Administrative datasets for financial year 2012-13.

The three largest trading partners of Pakistan (US, UK and UAE) are not geographical neighbours but still a relatively large number of firms prefer to export to these markets. Similarly, the set of exported products to these destinations is almost 50% wider compared with for neighbouring economies China and Afghanistan. This variation in the proportion of firms, products and export share to these markets alludes to heterogeneity in the cost of trading with these partners.

Although Afghanistan is geographically closer and China has a PTA with Pakistan, the number of exporting firms and the set of exported products to these markets are relatively narrow compared with for the remote markets of the US and the UK. The gravity model, a most successful empirical model of international trade, suggests that, besides other factors, the US, UK and UAE may attract higher exports because of higher GDP per capita. Moreover, these countries share a common official language (English) with Pakistan, which appears to influence the cost of trading.

In order to further examine the trade margins with Pakistan's geographical neighbours I present the distribution of firms and products along exporting stations (Table 11). As the data

[6] The GSP is a preferential tariff system providing exemption from the more general rules of the World Trade Organization (WTO).

show, the bulk of trade with China transacts through seaports instead of land routes. Similarly, around 50% of trade with Iran is processed in Karachi port and the remaining 50% goes through land routes. The same is true for trade with India.

Table 12: Margins Of Trade with Regional Neighbours

	China							Iran			
	All	Karachi	Peshawar	Lahore	Sust	Sialkot	Rawalpindi	All	Sialkot	Quetta	Karachi
Firms	1476	1,165	14	240	7	108	81	199	21	43	130
Products	791	615	16	182	26	60	81	172	11	31	132
Exports	263	254	0.02	1.27	0.05	1.95	0.52	9.4	0.12	4.30	4.93
	India							Afghanistan			
	All	Karachi	Peshawar	Lahore	Multan	Sialkot	Rawalpindi	All	Peshawar	Quetta	Karachi
Firms	1331	539	5	849	1	144	42	888	751	287	9
Products	556	372	5	261	1	43	16	850	742	216	9
Exports	35	16.8	0.01	16.2	0.01	1.81	0.04	188	166	21.9	0.01

Note: Export volume is in PKR billions.
Source: Constructed using Pakistan Customs' dataset for 2012-13

5.4 Spatial Distribution of Exporting and Non-exporting Firms

This sub-section explores the spatial distribution of exporting and non-exporting firms across various geographical regions of Pakistan. Examination of the spatial distribution of Pakistan's exports across exporting stations shows that around 80% of exports are processed through Karachi and the remaining 20% through up-country Customs stations. Moreover, firms operating from Karachi export a large set of products to a large number of markets. Following Karachi, the three main export origins are Lahore, Sialkot and Rawalpindi. Although the number of export markets served from Lahore and Sialkot is relatively high, the set of exported products is quite narrow. Although around 60% of firms operate though up-country dry ports and airports, their overall contribution is around 20%. A small fraction of firms does appear to switch exporting stations, which subsequent paragraphs look into in further detail.

Table 13: Regional Distribution of Exporting Activity

	Firms		Products		Markets		Exports	
Location	#	Percent	#	Percent	#	Percent	Value	Percent
Karachi	9,757	56.5%	3,836	88.9%	191	89%	2,057	80.0%
Up-country	10,359	60.0%	2,747	63.7%	201	93%	515	20.0%
Lahore	6,796	39.4%	1,891	43.8%	190	88%	128	5.0%
Sialkot	3,955	22.9%	763	17.7%	158	73%	96	3.7%
Rawalpindi	3,674	21.3%	871	20.2%	154	72%	47	1.8%
Peshawar	983	5.7%	922	21.4%	60	28%	172	6.7%
Quetta	366	2.1%	306	7.1%	14	7%	31	1.2%
Faisalabad	151	0.9%	201	4.7%	95	44%	31	1.2%
Multan	91	0.5%	173	4.0%	36	17%	9	0.4%
Sust	7	0.0%	26	0.6%	1	0.5%	0.5	0.0%
Others	6	0.0%	9	0.2%	5	2%	0.1	0.0%
All	17,258		4,313		215		2,572	

Note: # indicates counts; products are counted at an 8-digit level of HS. Export values are in PKR billions.
These percentages may not amount to 100% as these firms operate through different stations around the year.
Source: Constructed using administrative datasets for financial year 2012/13.

Transport infrastructure varies a great deal across these stations, and packing and clearance facilities as well as storage arrangements are more developed at large exporting stations. This incentivizes most firms to use Karachi as their export base (Table 13). However, these data suggest a huge cross movement. For instance, some Karachi-based firms do appear to export from other remote stations such as Peshawar, Quetta and Lahore, most probably to neighbouring countries using land routes. Similarly, Sialkot-based firms, although they export primarily from their manufacturing base, operate from other stations also. This cross movement of cargo suggests that a focus only on Karachi may not be enough: Pakistan may have to increase its trade processing capacity at other stations in order to engender an appropriate export response.

Table 14: Spatial Distribution Of Manufacturing And Exporting Activity (PKR Billions)

Export station	Karachi	Lahore	Peshawar	Quetta	Rawalpindi	Sialkot	Faisalabad
Firms' location							
Abbottabad	0.52	0.01	2.24	0.04	1.25		
Bahawalpur	0.28						
Faisalabad	213.8	8.21	1.69	0.43	2.42	0.36	29.47
Gujranwala	21.05	1.14	1.34	0.23	0.30	5.88	
Hyderabad	20.80	0.02	0.27	0.07			
Islamabad	25.29	1.07	13.19	1.12	0.32	0.02	
Karachi	1,020	7.82	12.73	5.52	0.12	0.36	0.01
Lahore	359.6	41.26	30.94	9.66	1.22	0.54	
Multan	48.58	2.35	3.15	0.46	0.01		1.08
Peshawar	27.98	0.19	21.25	1.11	0.10	0.15	
Quetta	22.80	0.00	0.99	3.40			
Rawalpindi	0.15	0.02	0.26	0.00	0.96		
Sargodha	5.89	0.00	0.01	0.02			0.16
Sialkot	33.1	4.22	0.64	0.26	9.63	67.77	
Sukkur	1.53	0.06	0.04	1.03			

Note: Export values are in PKR billions. Location indicates the regional tax office of firm registration. This analysis is limited to large firms, as they appear to handle large export volumes.
Source: Constructed using administrative dataset for financial year 2012/13.

Modes of exporting vary widely. This distribution of firms on the basis of exporting stations, which differ in terms of trade costs and delivery times, generates interesting insights. Most firms prefer to export from airports, followed by Karachi port (Table 14)

However, they export larger volumes through seaports. The two ports (Karachi and Port Qasim) account for 73% of total exports. Airports also handle a large set of products (64%) but the export share processed through them is only 13%. Exports through land Customs stations are even lower. This distribution suggests seaports need to be prioritized for the launch of trade facilitation initiatives as they handle the bulk of export cargo. At the same time, firms prefer to use air shipments to save on account of delivery timing. Therefore,

focuses on air and sea connectivity need to proceed in tandem to engender an appropriate export response.

Table 15: Distribution across Modes Of Shipments

	Firms		Products		Markets		Exports	
Location	#	Percent	#	Percent	#	Percent	Value	Percent
Airports	10,425	60.4%	2,768	64.2%	204	95%	345	13.4%
Karachi port	7,239	41.9%	3,031	70.3%	160	74%	1,016	39.5%
Dry ports	5,691	33.0%	1,933	44.8%	162	75%	301	11.7%
Qasim port	4,731	27.4%	2,248	52.1%	161	75%	869	33.8%
Others	345	2.0%	366	8.5%	5	2%	41	1.6%
All	17,258		4,313		215		2,572	

Note: # indicates counts. Products are counted at an 8-digit level of HS. Export values are in PKR billions. These percentages may not amount to 100% as these firms operate through different stations around the year.

Source: Constructed using administrative dataset for financial year 2012-13

Exporting is quite a rare activity and export intensity varies inversely with distance from seaports. During 2012/13, of the total population of around 50,000 firms, only 34% entered into exporting, of which around 6,700 were relatively large firms. These large firms serve the domestic market in addition to exporting. On average, they export 22%[7] of their output but their export intensity varies greatly depending on their geographical location. Firms based in Sialkot and Faisalabad have higher export orientation, followed by those in Sargodha and Rawalpindi, both of which are emerging export bases. Firms concentrated in Karachi and Lahore have an export intensity of 21% and 17%, respectively, which alludes to their relatively higher focus on serving domestic markets. This disaggregation of export intensity across different cities of Pakistan points towards a huge untapped export potential.

Table 16: Spatial Distribution of Export Intensity

Location	Firms	Exports	Sales	Export intensity (%)
Abbottabad	20	4.1	35.1	10.3
Bahawalpur	4	0.3	13.3	2.1
Faisalabad	635	256.4	107.8	70.4
Gujranwala	293	29.9	28.4	51.3
Hyderabad	58	21.2	28.4	42.7
Islamabad	101	41.1	838.3	4.7
Karachi	2,573	1,047	3,937	21.0
Lahore	1,353	443.5	2,061	17.7
Multan	131	63.9	130.1	33.0
Peshawar	121	50.8	108.3	31.9
Quetta	49	27.2	37.3	42.2
Rawalpindi	43	1.4	0.8	62.8
Sargodha	34	6.1	3.1	66.2
Sialkot	1,278	115.6	4.6	96.1

[7] Export intensity drops to 19% if we include the local sales (PKR 3,806 billion) of 33,260 non-exporting firms

Sukkur	6	2.7	4.2	38.8
All	6,699	2,111	7,337	22.3

Note: Sales indicate total local supply. Sales and exports are measured in PKR billions. All figures pertain to financial year 2012/13 for the large firms registered for VAT purposes.

Besides this large untapped export potential of existing exporters, a large number of firms (33,260) just serve local markets (Table 16). These constitute around two-thirds of all firms and the value of their domestic sales is almost 40% higher than total exports. Incentivizing these firms to enter into exporting may boost Pakistan's exports.

Table 17: Spatial Distribution of Non-Exporting Firms

	Firms		Sales	
Location	Number	Percent	Value	Percent
Abbottabad	269	1%	105	2.8%
Bahawalpur	832	3%	125	3.3%
Faisalabad	4,427	13%	213	5.6%
Gujranwala	1,474	4%	65	1.7%
Hyderabad	780	2%	175	4.6%
Islamabad	955	3%	182	4.8%
Karachi	10,054	30%	986	25.9%
Lahore	8,380	25%	1,339	35.2%
Multan	1,752	5%	346	9.1%
Peshawar	884	3%	73	1.9%
Quetta	426	1%	58	1.5%
Rawalpindi	1,848	6%	45	1.2%
Sargodha	357	1%	35	0.9%
Sialkot	582	2%	22	0.6%
Sukkur	240	1%	38	1.0%
All	33,260		3,806	

Note: Sales includes the values of goods only and the service providers are not included in the data. The sale figures are in PKR billions. All figures pertain to financial year 2012/13.

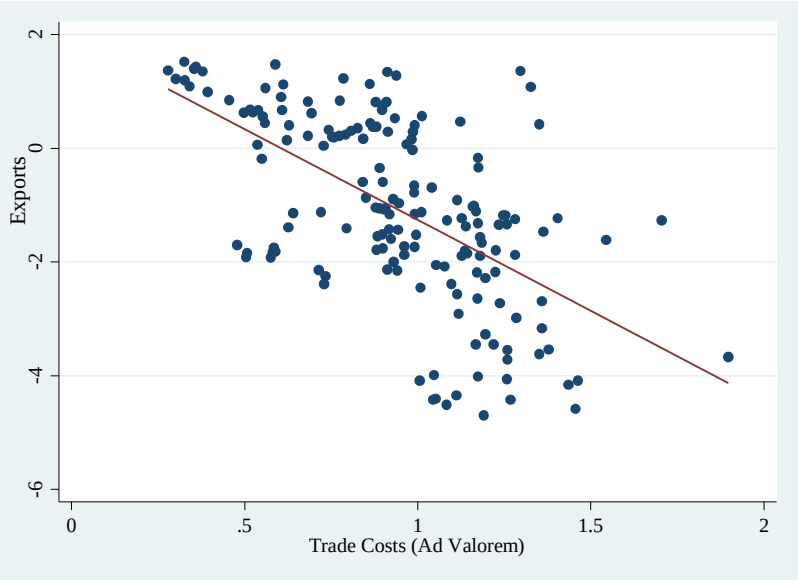
This exploration of the spatial distribution of firms and their use of exporting stations generates new insights. Understanding the role of spatial distribution is important as firms located in the hinterland may face more constraints compared with those located in coastal areas. Second, keeping in view the large untapped export potential, supply-side constraints do not appear to be a big challenge; the challenge lies in increasing the trading capacity of existing exporters and ensuring the active engagement of non-exporters in international markets.

6 Linkages between Trade Costs and Trade Composition

This sub-section explores the potential linkages between trade costs and trade flows as well as the IM and EM of firms and products. This graphical analysis at a macro level uses the trade cost indicator of the World Bank, which provides aggregate figures of bilateral trade costs (Arvis et al., 2013).

Figure 3 depicts a macro view of the relationship between Pakistan's export volume and the trade cost indicator on a logarithmic scale. It suggests that trade flows drop sharply with the rise in these costs and become negligible as the costs become much higher. This association appears quite systematic, suggesting a concentration of exports to certain low trade cost partners only.

Figure 3: Trade Costs and Trade Flows (On a Logarithmic Scale)



Source: Author's calculations using World Bank bilateral trade cost dataset and EDD.

In order to highlight the resistance trade costs pose, Table 17 compares the average bilateral trade cost and the manufacturing export share of Pakistan to some significant regions of the world. It is evident that lower trade cost regions, such as North America, Europe and Central Asia, attract the highest export share, whereas higher trade cost regions, such as Sub-Saharan Africa and Latin America and the Caribbean, attract less.

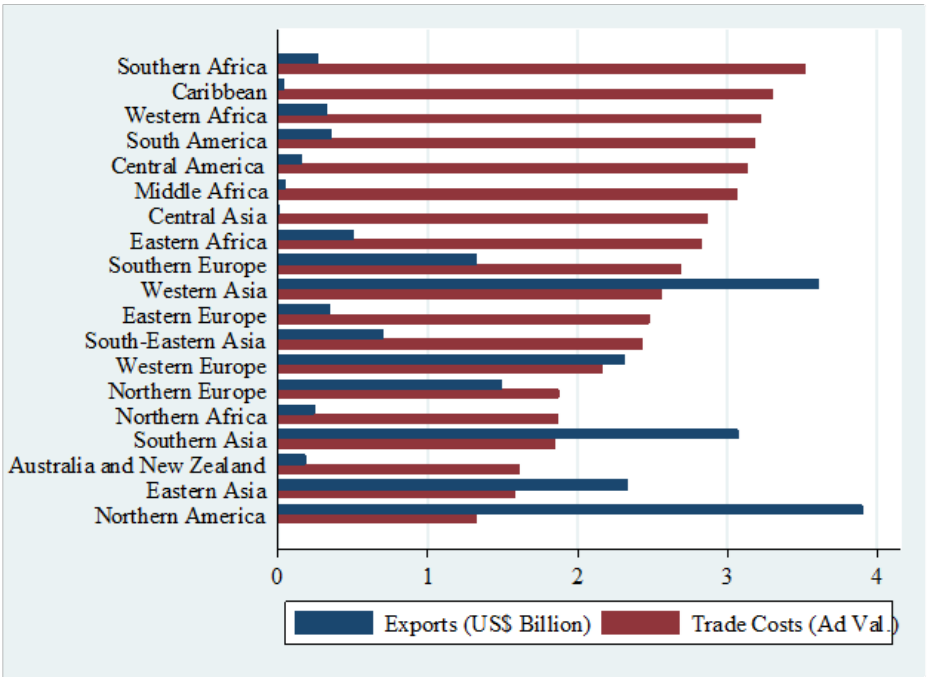
Table 18: Geographical Composition of Exports

Region	Average trade costs	Export share (%)
East Asia and the Pacific	154.54	13.78
Europe and Central Asia	189.05	32.73
Latin America and the Caribbean	234.95	2.50
Middle East and North Africa	170.27	11.20
North America	124.38	24.98
South Asia	161.44	9.47
Sub-Saharan Africa	225.48	5.34

Note: Trade costs are ad valorem. All figures are for the year 2010
Source: World Integrated Trade Solutions database and trade costs dataset.

In order to further examine this relationship, Figure 4 decomposes the volume of Pakistan's exports and trade costs across all geographical regions.

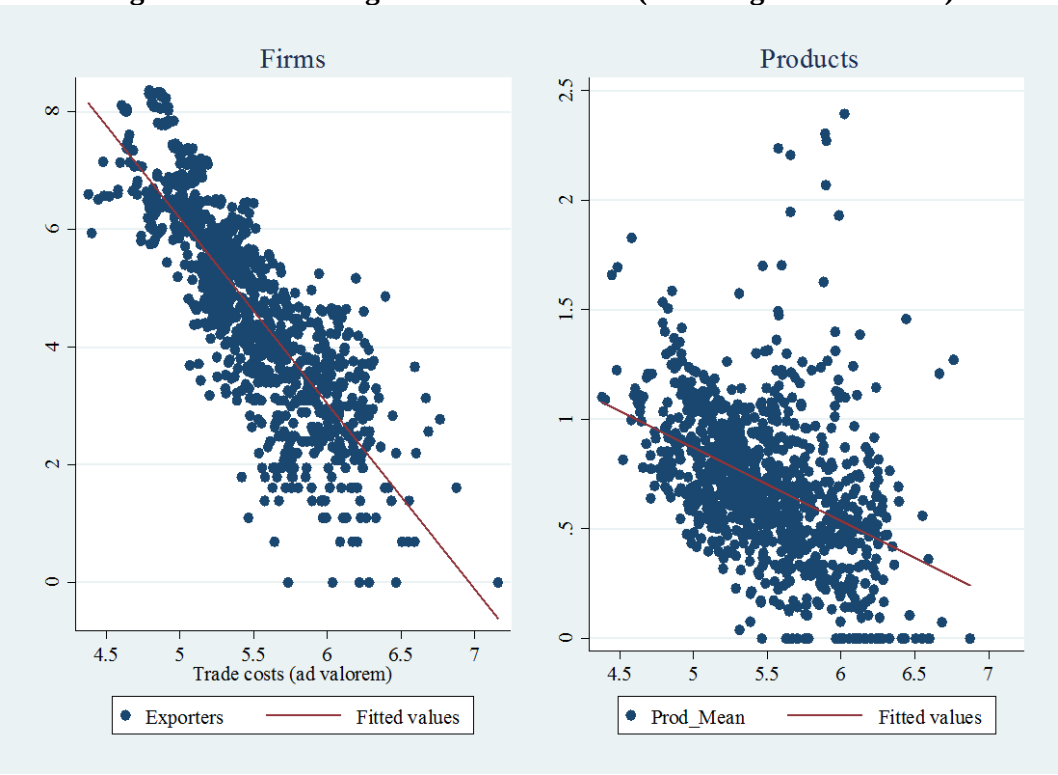
Figure 4: Trade Costs And Trade Flows – Regional Variation (2010)



Note: Trade volume is measured in $ billions whereas trade costs are measured in ad valorem equivalents and have been normalized with 100 to make the bars comparable.
Source: Author's calculations using World Bank bilateral trade cost dataset and UNCTADStat.

The bar chart clearly suggests Pakistan's exports are destined for relatively low trade cost geographical regions. This concentration of exports to low trade cost countries speaks volumes about the resistance high trade costs pose in terms of accessing other export markets. Figure 5 presents the interaction of trade costs with the EM of firms and products.

Figure 5: Trade Margins and Trade Costs (On a Logarithmic Scale)



Source: Author's calculations using World Bank bilateral trade cost dataset and EDD.

This suggests fewer firms prefer exporting to the markets of high trade cost countries. In the same manner, product margins vary widely across markets. This dispersion masks a great deal of entry and exit of firms, as this study does not consider this channel. These data suggest that, on average, these firms export one to 10 products (at HS six-digit level) to various destinations with a standard deviation of zero to 21. A large spread of data in the right panel alludes that the averages conceal much heterogeneity and the actual variation of product margins against trade costs varies enormously across markets.

Table 18 explores the heterogeneity of response of firm and product margins. Column (1) shows that, although both firm and product margins bear a strong negative correlation with trade costs, the magnitude of the effects is much higher for the firm margins. This suggests that, primarily, trade costs influence exports by restricting entry into export markets. But once these firms have started exporting, the trade cost contracts their export product mix.

Table 19: Correlation Matrix (All Variables in Logs)

	Trade costs	Firms	Products
Trade costs	1		
Firms	-0.8198	1	
Products	-0.4215	0.5102	1

Source: Author's calculations using World Bank bilateral trade cost dataset and EDD.

7 Empirical Strategy and Results

The foregoing descriptive analysis shows various trade margins drop in trade costs. In order to investigate empirically the significance of this effect and to isolate the reaction of the IM and EM to various factors promoting or impeding trade, I use a gravity model, the most successful empirical model in international trade. This section discusses the empirical framework and estimation results.

7.1 Estimation Framework

Although gravity model has been applied primarily to explain bilateral trade flows across countries, recent theoretical and empirical developments show the same gravity estimations can be performed at a firm level also (Head and Mayer, 2014). Mayer and Ottaviano (2007) note that the gravity equation is the single most robust way to relate trade flows with their fundamental drivers. Bernard et al. (2006) estimate a similar model for US firms. These two empirical studies as well as the theoretical model of Chaney (2008) illustrate that heterogeneous firm models are compatible with gravity. Building on the work of these predecessors, I estimate the following equation (1):

$$(\text{Trade Margins})_{ijt}=\text{constant}+ \beta_1(\text{dist})_{ij}+ \beta_2(\text{GDP})_{jt} +\beta_3(\text{contig})_{ij}+ \beta_4(\text{lang})_{ij} + \beta_5(\text{PTA})_{ijt} +(\gamma)_t +\epsilon_{ijt}\text{--(1)}$$

The dependent variables – namely, IM and EM – are defined at country pair level following the approach of Mayer and Ottaviano (2007), both for firms and products. But in extension to that work, I measure them over time for a longer period.

According to these scholars, the margins of firms and products are:

a. Firm EM: number of exporting firms per market
b. Firm IM: average export value per firm per market
c. Product EM: number of products exported to each market
d. Product IM: export value per product per firm per market
e. Quantity margins: quantity exported per product per firm per market
f. Price margins: average export price per product per firm per market

The product IM are further decomposed to quantity and price margins. This decomposition helps pin down the main channels of influence of trade costs on export values per product per firm.

The subscript ‘i’ denotes Pakistan, ‘j’ trading partners and ‘t’ time. In the baseline estimations, I proxy trade costs by bilateral distance between trading partners, ($dist_{ij}$), and incorporate usual gravity controls and include dummy variables identifying whether the trading partners have a common border ($contig_{ij}$), share a common official language ($lang_{ij}$) and are a member of a PTA (PTA_{ijt}). The common language and adjacency dummies are used to capture information costs. Search costs are probably lower for countries whose business climate, language and institutional structures are similar.

These gravity variables are taken from CEPII and follow the definitions therein. I add GDP of trading partner but exclude GDP of Pakistan. The reason for this is that the former varies across countries and over time but the latter is fixed for each trading relationship and is thus captured in the constant term (Bernard et al., 2007). Moreover, I include time fixed effects in the estimations but do not add country fixed effects since they are perfectly collinear with the GDP of trading partners. Standard errors are clustered at the firm level.

Following the baseline estimations, I test the robustness of the baseline results by employing the trade cost indicator of the World Bank. Estimations using the trade cost indicator employ

an equation similar to (1) but replace gravity controls with the *ad valorem* trade costs. The modified equation is:

$$(\text{Trade Margins})_{ijt}=\text{constant}+ \beta_1(\text{trade costs})_{ijt}+ (\alpha)_{j+} (\gamma)_t +\epsilon_{ijt} \text{----(2)}$$

The subscript 'i' denotes Pakistan, 'j' trading partners' and 't' time and α and γ are fixed effects accordingly. The coefficient of interest is β_1; its negative sign and statistical significance level will point towards confirmation of baseline results.

7.2 Estimation Results

In this sub-section, I estimate the equation (1) for the IM and EM of firms and products, and price and quantity margins.

7.2.1 Intensive and Extensive Margins of Firms

I initially estimate equation (1) for aggregate exports in order to examine the overall response of exports to various components of trade costs and then decompose the reaction to the IM and EM of firms. Table 19 presents the baseline estimation results.

Table 20: Firm Intensive and Extensive Margins

	(1)	(2)	(3)
Dependent variables	Xij	Firm EM	Firm IM
Distance	-0.759***	-0.634***	-0.125
	(0.117)	(0.049)	(0.083)
Dest. GDP	0.902***	0.651***	0.251***
	(0.033)	(0.011)	(0.025)
Contiguity (0,1)	0.168	-0.643***	0.811***
	(0.461)	(0.221)	(0.262)
Language (0,1)	0.648***	0.665***	-0.017
	(0.156)	(0.054)	(0.121)
PTA (0,1)	1.110***	0.874***	0.236
	(0.382)	(0.200)	(0.222)
Time FE	y	y	y
R^2	0.587	0.777	0.312
Observations	1,933	1,933	1,933

*Note: Robust standard errors are in parentheses, *p<0.10, **p<0.05, ***p<0.01. EM denotes extensive margins and IM intensive margins.*

Column (1) presents the response of aggregate exports to various gravity variables commonly used in earlier empirical studies. The estimations show distance negatively affects exports, as transportation costs are higher for remote trading partners. GDP of destination market has a positive effect, which means bigger markets attract a large export volume. The contiguity variable is positive but not statistically significant, suggesting Pakistan's export volume to neighbouring countries does not differ from that to remote countries. Common official language appears to influence trade flows positively as it reduces the cost of information and communication. PTAs increase trade, since they reduce tariffs.

Columns (2) and (3) decompose the response of aggregate exports to EM (firm per market) and IM (export value per firm), respectively. These estimations ask whether trade impediments such as different language, remoteness, national borders, etc. restrict trade through entry of exporting firms or contract their export volume. The coefficients in columns (2) and (3) add up to that in column (1). The results show both EM and IM drop in distance

but the effect is relatively higher on EM. In fact, the coefficient on distance for IM is statistically insignificant, suggesting the entire effect of remoteness is transmitted through a reduction in the number of exporting firms.

Since these estimations are in logs, the coefficients correspond to elasticity. For example, the coefficients in column (2) can be interpreted as:

- If trading partner A is 10% further away (from Pakistan) compared with trading partner B, the number of exporting firms drops by 6%.
- If trading partner A is 10% larger than trading partner B in terms of GDP, it attracts 6.5% more exporting firms.

These estimates suggest around 80% of the effect of distance is through EM. This means remoteness primarily hinders entry of firms into exporting. In contrast, GDP of trading partner increases trade on both margins: the 72% effect appears through EM and 32% through IM. This is compatible with the descriptive evidence that many firms export to the markets of rich economies and is also in line with the findings of earlier studies.

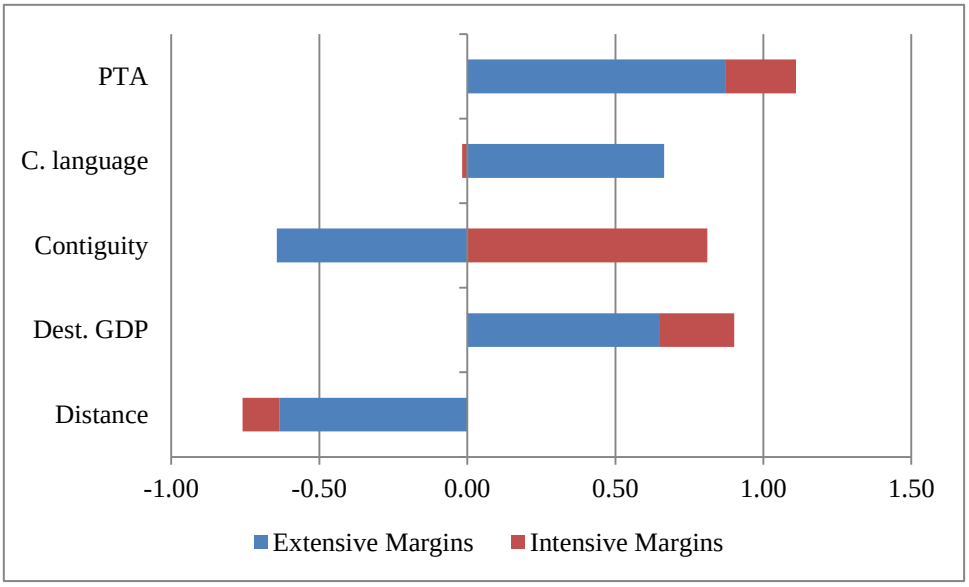
The contiguity variable has a heterogeneous effect on both margins. It restricts the entry of firms but incentivizes them to export large volumes. The reaction of IM is positive and statistically significant, because transportation costs are lower for regional markets and there are alternative means of transports. This negative sign on EM could be a result of high non-tariff barriers impeding firms' entry into the market of India. It appears that a relatively smaller number of firms operate in the markets of neighbouring countries, and they export a smaller set of products to these markets.

A similar reaction is evident to common official language. This appears to influence EM positively but has an insignificant effect on IM. This means the number of exporting firms is larger for the common official language countries, suggesting familiarity with language reduces barriers to trade. Most of the common language countries are former British colonies, which have common legal institutions and historical linkages. These factors appear to reduce the cost of trading by curtailing the psychological distance from these economies. As a result, they appear to attract a larger set of exporting firms.

Similarly, PTAs appear to increase exports primarily through EM. The coefficient on PTA is positive and statistically significant for EM but statistically insignificant for IM. This suggests PTAs incentivize entry of firms into the markets of trading partners. This is because PTAs reduce the burden of tariffs, which may encourage more firms to start exporting. But these firms do not appear to expand their export volume in the markets of trading partners.

Overall, the decomposition presented in Figure 6 suggests that effect of trade inhibitors and trade promoters is much greater on EM than it is on IM. This means EM are much more important for promoting exports.

Figure 6: Responses of Intensive and Extensive Margins of Firms



7.2.2 Intensive and Extensive Margins of Products

Table 20 decomposes the IM of firms (reported in column (3) of Table 19) to the IM and EM of products. This decomposition assesses how a number of exported products by firms vary with different barriers to trade. These estimations ask whether trade impediments such as different language, remoteness, national borders, etc. contract firms' export product set or shrink their export value per product.

As the results show, the set of exported products seems to widen under partner country's GDP, common official language and PTA membership. However, it appears to shrink with remoteness and for regional economies. Moreover, the individual responses of product margins are very high and statistically significant, but the responses of IM and EM are in opposite directions. For example, the number of products (EM) increases in partner's GDP, but average export value per product falls. Meanwhile, product EM drops in distance but its IM increase. The opposite signs on the coefficients in column (3) and column (4) show the individual components of product margins tend to cancel each other out, which can attenuate the net reaction of the IM of firms.

These coefficients also indicate elasticities and can be interpreted accordingly. For instance:

- On average, an increase of 10% in distance between trading partners is associated with a reduction of 7.5% in the number of exported products but an increase of 6% in value per product per firm.
- Similarly, on average an increase in partner's GDP by 10% is associated with an increase in the set of exported products by 6.5% but a decrease in the value of exports per product by 3%.

GDP of destination market affects product EM positively as it signals demand for more variety; rich markets attract higher trade because of higher purchasing power and love of varieties. This is manifested in a positive and statistically significant coefficient on product EM.

For neighbouring markets, set of exported products appears to fall, as does set of exporting firms. This could owe to higher barriers to entry in these markets, limited demand for Pakistan's products or a combination of both of these factors.

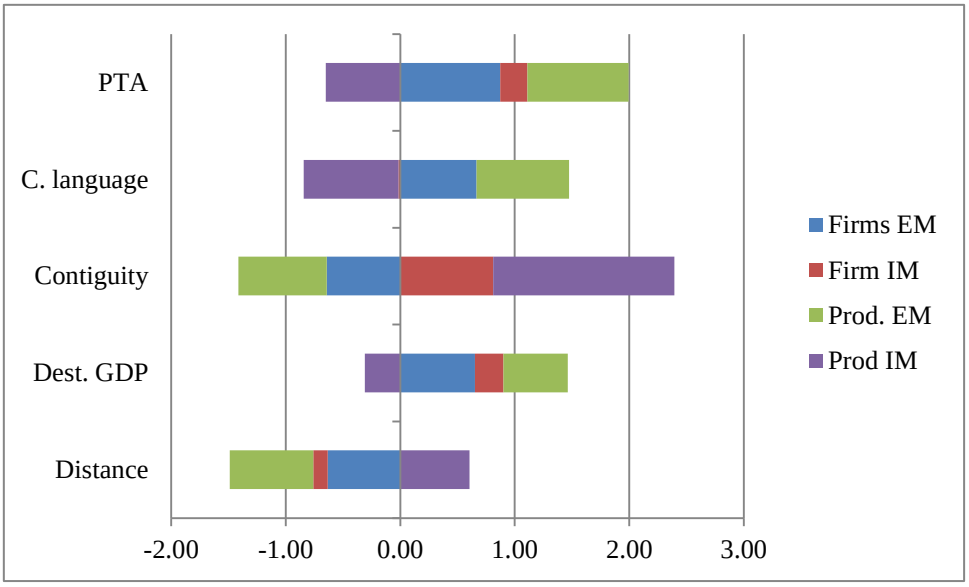
Table 21: Estimates of Product Extensive and Intensive Margins

	(1)	(2)	(3)	(4)
Dependent variables	Xij	Firm EM	Prod EM	Prod IM
Distance	-0.759***	-0.634***	-0.729***	0.604***
	(0.117)	(0.049)	(0.051)	(0.066)
Dest. GDP	0.902***	0.651***	0.560***	-0.309***
	(0.033)	(0.011)	(0.012)	(0.021)
Contiguity (0,1)	0.168	-0.643***	-0.771***	1.582***
	(0.461)	(0.221)	(0.237)	(0.149)
Language (0,1)	0.648***	0.665***	0.809***	-0.827***
	(0.156)	(0.054)	(0.058)	(0.104)
PTA (0,1)	1.110***	0.874***	0.885***	-0.649***
	(0.382)	(0.200)	(0.183)	(0.171)
Time FE	y	y	y	y
R^2	0.587	0.777	0.722	0.283
Observations	1,933	1,933	1,933	1,933

Note: Robust standard errors are in parentheses, * $p<0.10$, ** $p<0.05$, *** $p<0.01$. The coefficients on fixed effects are not reported since they are not of direct interest. EM denotes extensive margins and IM intensive margins.

PTAs appear to increase exports on the EM of firms and products. The reduction in the costs of tariffs because of PTAs incentivizes more firms to export, and existing exporters also expand their product set. However, export value per product per firm declines. This may suggest tough competition in the market of PTA members. Another potential reason for this could be the restrictive lists of products eligible for preferential treatment under various PTAs. As the number of exporters trading the same product rises, average export value per firm is set to fall. Similarly, common official language appears to influence EM positively. This means the number of exporting firms and of exported products is higher for the common official language countries, as they may find it more convenient to trade with these economies. Figure 7 reports the combined reaction of firms and product margins.

Figure 7: Combined Reaction of Intensive and Extensive Margins of Firm and Products



The results suggest the set of exported products matters too. The directions of responses of EM (firms and products) are similar but the magnitude of the effect varies slightly. Larger trading partners attract a higher number of exporting firms and a wider set of exported products, although the export value per product per firm drops. Moreover, it seems an increase in trade barriers attenuates the positive effect of trading with large economies by reducing the number of firms and constraining the set of products.

7.2.3 Quantity and Price Margins

This rise in product IM (in column (4) of Table 20) with distance may arise because either higher quantities or higher-value goods are exported. In order to pin down the exact channel of influence of trade costs, Table 21 further decomposes the product IM to quantity and price margins. The results indicate that the elasticity of quantity shipped to distance is positive but statistically insignificant, but for price it is positive and statistically significant at a 1% significance level. This suggests the firms export higher-value goods to remote markets. This is compatible with the empirical literature, which suggests the quality of exported goods usually rises with distance. The reason for this is that firms incur trade costs in proportion to quantity shipped, not on the basis of the value of the goods. As a result, they tend to "ship good apples out" (Hummels and Skiba, 2002).

The response of quantity margins in neighboring markets is positive but for price margins it is negative. Although in this regional context trade barriers with neighboring economies are relatively higher, these firms appear to ship higher quantities. However, unit prices appear to fall for regional markets, which support the existing empirical literature that finds firms engage in price segmentation across markets. This suggests a further reduction in trade costs to these markets may generate export response on quantity accounts. This decomposition suggests the responses of quantity and price margins to PTA are insignificant on both the accounts, while common official language has a negative effect.

Table 22: Estimates of Quantity and Price Margins

Dependent variables	(1) Xij	(2) Firm EM	(3) Prod. EM	(4) Qty. M	(5) Price. M
Distance	-0.759***	-0.634***	-0.729***	0.010	0.594***
	(0.117)	(0.049)	(0.051)	(0.093)	(0.094)
Dest. GDP	0.902***	0.651***	0.560***	-0.377***	0.068***
	(0.033)	(0.011)	(0.012)	(0.027)	(0.024)
Contiguity (0,1)	0.168	-0.643***	-0.771***	3.133***	-1.551***
	(0.461)	(0.221)	(0.237)	(0.376)	(0.372)
Language (0,1)	0.648***	0.665***	0.809***	-0.547***	-0.279**
	(0.156)	(0.054)	(0.058)	(0.120)	(0.122)
PTA (0,1)	1.110***	0.874***	0.885***	-0.552	-0.098
	(0.382)	(0.200)	(0.183)	(0.341)	(0.341)
Time FE	y	y	y	y	y
R^2	0.587	0.777	0.722	0.300	0.329
Observations	1,933	1,933	1,933	1,933	1,933

Note: Robust standard errors are in parentheses, * $p<0.10$, ** $p<0.05$, *** $p<0.01$. The coefficients on fixed effects are not reported since they are not of direct interest. EM denotes extensive margins and IM intensive margins.

Overall, this decomposition suggests these firms compete on the basis of exporting higher-value goods to remote markets and on the basis of shipping larger quantities in neighbouring markets. Moreover, the reaction of IM and EM may not be similar to various elements of trade costs. Therefore, understanding this heterogeneity is important for the design of effective trade policies.

8 Firm Heterogeneity and Trade Margins

The stylized facts of exporting firms discussed in in Section 5 points to a great deal of firm heterogeneity in trade orientation, spatial location, sectoral distribution and mode of shipment. This section empirically tests whether these differences matter for the IM and EM of firms and products.

8.1 Effect of Trade Orientation of Firms

The descriptive analysis suggests large firms engage in exporting as well as importing and they handle a major volume of exports. Their exports positively correlate with their imports, with a correlation coefficient of 0.20. A decomposition of IM and EM along trade orientation of exporters shows that two-way traders are less deterred than exporting-only firms by high trade costs. Second, the responses of the IM and EM of firms are quite different for these groups. For instance, the entire effect of trade costs for exporters-cum-importers reflects through extensive margins (column (2) of Table 22): number of firms appears to drop for remote markets but effect on average quantity exported per firm is insignificant. In contrast, average quantity exported per firm also drops for the other group, alongside a decrease in the number of firms. The responses of product IM and EM are, however, similar. This is quite intuitive, as two-way traders may face lower trade costs because of established presence in the market and may use their import network for exporting.

Table 23: Decomposition of Trade Margins Across Trade Orientation Of Firms

Dependent variables	(1) Xij	(2) Firm EM	(3) Firm IM	(4) Prod. EM	(5) Prod. IM
Log of distance					
# Exporters-cum-importers	-0.696***	-0.608***	-0.088	-0.700***	0.612***
	(0.084)	(0.042)	(0.054)	(0.043)	(0.047)
# Exporters but not importers	-0.900***	-0.658***	-0.242***	-0.750***	0.508***
	(0.083)	(0.042)	(0.053)	(0.043)	(0.046)
R2	0.607	0.755	0.397	0.694	0.352
Observations	3,407	3,407	3,407	3,407	3,407

Note: Robust standard errors are in parentheses, $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$. The coefficients on fixed effects and other gravity variables are not reported since they are not of direct interest. EM denotes extensive margins and IM intensive margins.

8.2 Impact of Spatial Distribution of Firms

A large number of firms are either based in the hinterland or operate from up-country exporting stations. Comparing the performance of this group with firms exporting from Karachi (a coastal city) points to some similarities but larger differences. These firms are similar in that the trade-restricting effect of remoteness operates mainly through the EM of firms and products for both of these groups (column (2) and column (4) of Table 23).

But trade costs (using distance to markets as a proxy) have a relatively more inhibiting effect on these firms operating from up-country (Table 23). For instance, an increase in distance to market by 10% reduces their exports by around 8.5% but the corresponding effect for the cohort operating from Karachi is only 5%. Moreover, the relatively higher magnitude of the coefficient on product IM for Karachi-based firms (column (5)) suggests they export higher values per product.

Overall, the gravity estimations reveal Karachi-based firms are in an advantageous position as the trade-restricting effect of distance is lower for them and they ship higher quantities. This indicates that, for firms located in remote areas, transportation costs act as an invisible tax on exports.

Table 24: Decomposition of Trade Margins For Karachi and Up-Country Firms

Dependent variables	(1) Xij	(2) Firm EM	(3) Firm IM	(4) Prod. EM	(5) Prod. IM
Up-country	-0.843***	-0.616***	-0.227***	-0.683***	0.455***
	(0.073)	(0.042)	(0.047)	(0.040)	(0.047)
Karachi	-0.494***	-0.507***	0.013	-0.592***	0.606***
	(0.074)	(0.041)	(0.049)	(0.039)	(0.050)
R2	0.587	0.676	0.380	0.638	0.268
Observations	3,163	3,163	3,163	3,163	3,163

Note: Robust standard errors are in parentheses, $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$. The coefficients on fixed effects and other gravity variables are not reported since they are not of direct interest. EM denotes extensive margins and IM intensive margins.

Further decomposition of the trade effect across major exporting stations of Pakistan Customs reveals that the effect of remoteness on average volume of exports is relatively higher for the firms exporting from remote stations such as Rawalpindi, Lahore and Peshawar. For firms operating from Quetta, the entire effect is through product EM.

Table 25: Decomposition of Trade Margins Across Exporting Stations

Dependent variables	(1) Xij	(2) Firm EM	(3) Firm IM	(4) Prod. EM	(5) Prod. IM
Log of distance					
# Rawalpindi	-1.027***	-0.510***	-0.517***	-0.569***	0.052
	(0.077)	(0.036)	(0.057)	(0.034)	(0.056)
# Karachi	-0.293***	-0.324***	0.031	-0.367***	0.398***
	(0.071)	(0.034)	(0.051)	(0.033)	(0.048)
# Lahore	-0.843***	-0.494***	-0.349***	-0.535***	0.186***
	(0.064)	(0.034)	(0.045)	(0.032)	(0.045)
# Multan	-0.397***	-0.369***	-0.028	-0.459***	0.431***
	(0.097)	(0.044)	(0.071)	(0.046)	(0.072)
# Peshawar	-0.742***	-0.507***	-0.235***	-0.556***	0.321***
	(0.099)	(0.049)	(0.071)	(0.058)	(0.075)
# Quetta	-0.239	-0.189	-0.051	-0.321*	0.270
	(0.395)	(0.194)	(0.224)	(0.189)	(0.169)
# Sialkot	-0.680***	-0.503***	-0.178***	-0.519***	0.342***
	(0.062)	(0.033)	(0.042)	(0.033)	(0.044)
# Faisalabad	-0.062	-0.224***	0.163***	-0.286***	0.449***
	(0.066)	(0.037)	(0.043)	(0.036)	(0.045)
R2	0.567	0.676	0.436	0.635	0.396
Observations	7,168	7,168	7,168	7,168	7,168

Note: Robust standard errors are in parentheses, * $p<0.10$, ** $p<0.05$, *** $p<0.01$. The coefficients on fixed effects and other gravity variables are not reported since they are not of direct interest. EM denotes extensive margins and IM intensive margins.

In order to further investigate the effect of remoteness, I decompose trade margins according to geographical location of these firms as determined from their place of registration for VAT purposes (Table 25).

Table 26: Decomposition of Trade Margins Across Spatial Location Of Firms

Dependent variables	(1) Xij	(2) Firm EM	(3) Firm IM	(4) Prod. EM	(5) Prod. IM
Log of distance					
# Abbottabad	-1.036***	-0.637***	-0.399***	-0.608***	0.209***
	(0.081)	(0.034)	(0.058)	(0.036)	(0.048)
# Bahawalpur	-1.202***	-0.783***	-0.419***	-0.873***	0.454***
	(0.089)	(0.035)	(0.065)	(0.038)	(0.056)
# Faisalabad	-0.645***	-0.435***	-0.210***	-0.501***	0.291***
	(0.079)	(0.032)	(0.056)	(0.034)	(0.045)
# Gujranwala	-0.897***	-0.574***	-0.323***	-0.633***	0.309***
	(0.081)	(0.032)	(0.058)	(0.034)	(0.046)
# Hyderabad	-0.923***	-0.665***	-0.257***	-0.738***	0.480***
	(0.084)	(0.034)	(0.060)	(0.036)	(0.048)
# Islamabad	-0.998***	-0.642***	-0.356***	-0.716***	0.360***
	(0.082)	(0.033)	(0.059)	(0.035)	(0.048)
# Karachi	-0.485***	-0.328***	-0.157***	-0.397***	0.240***
	(0.080)	(0.032)	(0.057)	(0.034)	(0.046)

# Lahore	-0.640***	-0.421***	-0.219***	-0.490***	0.271***
	(0.079)	(0.032)	(0.057)	(0.034)	(0.046)
# Multan	-0.814***	-0.573***	-0.241***	-0.646***	0.405***
	(0.080)	(0.032)	(0.056)	(0.035)	(0.046)
# Peshawar	-0.968***	-0.606***	-0.362***	-0.606***	0.244***
	(0.081)	(0.033)	(0.059)	(0.035)	(0.048)
# Quetta	-0.924***	-0.677***	-0.246***	-0.757***	0.511***
	(0.081)	(0.033)	(0.058)	(0.035)	(0.048)
# Rawalpindi	-1.306***	-0.708***	-0.598***	-0.763***	0.165***
	(0.081)	(0.033)	(0.058)	(0.035)	(0.047)
# Sargodha	-1.266***	-0.742***	-0.524***	-0.833***	0.309***
	(0.085)	(0.034)	(0.061)	(0.036)	(0.049)
# Sialkot	-0.753***	-0.368***	-0.385***	-0.482***	0.096**
	(0.080)	(0.032)	(0.056)	(0.034)	(0.046)
# Sukkur	-1.078***	-0.741***	-0.337***	-0.885***	0.548***
	(0.092)	(0.041)	(0.065)	(0.039)	(0.058)
R2	0.458	0.641	0.282	0.583	0.239
Observation	10,852	10,852	10,852	10,852	10,852

Note: Robust standard errors are in parentheses, * $p<0.10$, ** $p<0.05$, *** $p<0.01$. The coefficients on fixed effects and other gravity variables are not reported since they are not of direct interest. This analysis is limited to manufacturing firms only as the information about geographical location of' carry-over traders is not available. This estimation does not include inland distance from firms' manufacturing locations to exporting stations, which may further aggravate the disadvantaged position of firms located in remote areas.

This decomposition makes it possible to explore the effect for firms located in very remote and small cities. As the results suggest, trade costs have a relatively higher effect for firms based in Abbottabad, Bahawalpur, Sargodha and Rawalpindi, among others. The effect is relatively lower for two main stations, Karachi and Lahore. For all these firms, the IM and EM drop in distance, while the products margins respond in the opposite direction (columns (4) and (5) of Table 25).

8.3 Role of Modes of Shipments

These firms use three different modes of shipments: air, dry ports and seaports. The fourth mode of export (land routes) is used mainly for exporting to Afghanistan. A decomposition of trade margins along these lines shows trade costs are more restrictive for firms using air shipments followed by those exporting through inland dry ports and seaports (Table 26). Although it is quite expensive, many firms prefer to ship by air, as shown in the descriptive statistics. This suggests increasing trade facilitation at these stations and enhancing air connectivity in general can trigger higher export response.

Geographical remoteness of trading partners has a negative effect on the EM and IM of firms through any mode of export but for air shipments the effect on firms' IM is mainly through the EM of products (columns (3) and (4) of Table 26). In contrast, for dry ports and seaports both margins give opposite responses. Product EM (number of products) drop but IM (value per product) rise as most of the bulk cargo is shipped through these stations.

Table 27: Decomposition of Trade Margins Across Modes Of Shipments

	(1)	(2)	(3)	(4)	(5)
Dependent variables	Xij	Firm EM	Firm IM	Prod. EM	Prod. IM
Log of distance					
# Airports	-1.262***	-0.603***	-0.659***	-0.617***	-0.043
	(0.066)	(0.040)	(0.040)	(0.038)	(0.042)
# Dry ports	-0.961***	-0.636***	-0.325***	-0.629***	0.304***
	(0.067)	(0.042)	(0.037)	(0.040)	(0.041)
# Seaports	-0.538***	-0.463***	-0.075**	-0.525***	0.450***
	(0.066)	(0.041)	(0.038)	(0.038)	(0.041)
R2	0.573	0.638	0.461	0.585	0.461
Observations	5,861	5,861	5,861	5,861	5,861

Note: Robust standard errors are in parentheses, $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$. The coefficients on fixed effects and other gravity variables are not reported since they are not of direct interest. EM denotes extensive margins and IM intensive margins.

8.4 Sectoral Decomposition of Trade Margins

In this dataset, around 80% of firms export manufactured products. The remaining 20% trade agricultural products and appear to face relatively higher trade costs compared with those exporting manufactured goods. In both sectors, the IM and EM of firms drop sharply in trade costs. At product level, however, the responses of EM and IM are opposite to each other; the value exported per product rises while the number of products shrinks, and this effect is relatively strong for agriculture. As a result, the overall response of firm IM is negative(Table 27).

Further decomposition across major exporting sectors suggests the effect of trade costs is negative on EM and IM of firms and the magnitude of the former is relatively higher (Table 28).

Table 28: Decomposition of Trade Margins across Agriculture and Manufacturing

	(1)	(2)	(3)	(4)	(5)
Dependent variables	Xij	Firm EM	Firm IM	Prod. EM	Prod. IM
Agriculture	-1.111***	-0.962***	-0.149**	-0.982***	0.833***
	(0.110)	(0.049)	(0.075)	(0.045)	(0.064)
Manufacturing	-0.901***	-0.755***	-0.146**	-0.740***	0.595***
	(0.106)	(0.048)	(0.071)	(0.045)	(0.061)
R2	0.471	0.685	0.260	0.708	0.360
Observations	3,133	3,134	3,133	3,134	3,133

Note: Robust standard errors are in parentheses, $^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$. The coefficients on fixed effects and other gravity variables are not reported since they are not of direct interest. EM denotes extensive margins and IM intensive margins.

Table 29: Decomposition of Trade Margins Across All Sectors

	(1)	(2)	(3)	(4)	(5)
Dependent variables	Xij	Firm EM	Firm IM	Prod. EM	Prod. IM
01-05_Animal	-1.347***	-0.851***	-0.496***	-0.789***	0.292***
	(0.082)	(0.039)	(0.053)	(0.034)	(0.043)
06-15_Vegetable	-0.876***	-0.685***	-0.191***	-0.670***	0.479***
	(0.083)	(0.039)	(0.053)	(0.034)	(0.042)
16-24_FoodProd	-1.125***	-0.768***	-0.356***	-0.708***	0.352***
	(0.083)	(0.039)	(0.053)	(0.034)	(0.042)
25-26_Minerals	-1.310***	-0.873***	-0.437***	-0.821***	0.384***

	(0.085)	(0.039)	(0.055)	(0.035)	(0.045)
27-27_Fuels	-1.648***	-0.980***	-0.668***	-0.895***	0.227***
	(0.090)	(0.040)	(0.062)	(0.035)	(0.054)
28-38_Chemicals	-1.078***	-0.735***	-0.343***	-0.670***	0.328***
	(0.083)	(0.039)	(0.053)	(0.034)	(0.042)
39-40_PlastiRub	-1.129***	-0.719***	-0.410***	-0.690***	0.280***
	(0.082)	(0.039)	(0.052)	(0.034)	(0.042)
41-43_HidesSkin	-1.024***	-0.664***	-0.360***	-0.663***	0.303***
	(0.082)	(0.039)	(0.052)	(0.034)	(0.042)
44-49_Wood	-1.373***	-0.763***	-0.610***	-0.703***	0.093**
	(0.082)	(0.039)	(0.053)	(0.034)	(0.042)
50-63_TextCloth	-0.730***	-0.541***	-0.190***	-0.472***	0.283***
	(0.082)	(0.038)	(0.052)	(0.034)	(0.041)
64-67_Footwear	-1.326***	-0.799***	-0.527***	-0.749***	0.222***
	(0.083)	(0.039)	(0.053)	(0.034)	(0.042)
68-71_StoneGlas	-1.324***	-0.784***	-0.540***	-0.735***	0.195***
	(0.083)	(0.039)	(0.053)	(0.034)	(0.042)
72-83_Metals	-1.170***	-0.729***	-0.441***	-0.675***	0.233***
	(0.081)	(0.038)	(0.052)	(0.034)	(0.042)
84-85_Machinery Elect	-1.150***	-0.746***	-0.404***	-0.655***	0.251***
	(0.082)	(0.038)	(0.052)	(0.034)	(0.043)
86-89_Transport	-1.327***	-0.849***	-0.478***	-0.767***	0.290***
	(0.083)	(0.039)	(0.054)	(0.034)	(0.044)
90-99_Miscellaneous	-1.003***	-0.614***	-0.389***	-0.612***	0.223***
	(0.082)	(0.039)	(0.052)	(0.034)	(0.042)
R2	0.449	0.591	0.300	0.586	0.184
Observations	17,215	17,215	17,215	17,215	17,215

Note: Robust standard errors are in parentheses, * $p<0.10$, ** $p<0.05$, *** $p<0.01$. The coefficients on fixed effects and other gravity variables are not reported since they are not of direct interest. EM denotes extensive margins and IM intensive margins.

A comparison across sectors shows the magnitude of the coefficient for textiles is slightly lower compared with other sectors, which suggests the trade-restricting effect is relatively lower for firms operating in this sector. Decomposition of firm IM reveals opposite responses for both components – product EM and product IM. The set of exported products contracts while the average quantity exported per firm rises, but the cumulative effect is negative. This again alludes to concentration of exports to a narrow set of firms and products.

9 Conclusion, Policy Implications and Further Research

This section summarizes the discussion and highlights the key policy implications emerging from this analytical work.

9.1 Conclusion

Using administrative datasets, this study examines the responses of IM and EM of firms and products to trade costs in the exporting sectors of Pakistan. It aims at diagnosing the firm-level dynamics of exports in three domains: behind the border, at border and beyond the border. The study generates a set of new stylized facts about these firms and examines the heterogeneity in responses of trade margins across firm sizes, trade orientation, spatial locations and modes of exporting and along sectoral distribution. The analysis and discussion is focused at policy-makers. The firm-level analysis reveals new insights that are simply unobservable at an aggregate level.

The study finds the distribution of Pakistan's export-oriented firms is highly skewed: the top 1% of firms handle around 46% of exports and the top 5% mediate around 76%. These large firms are two-way traders, and they export multiple products to multiple markets. Exporting

activity is unevenly dispersed across the country, with a huge concentration of firms and products in the coastal city of Karachi. Firms based in the remote areas of the hinterland as well as those shipping from inland stations and airports appear to bear disproportionately higher costs compared with those located in the coastal area with direct access to seaports. Alongside this universe of large firms, the economy has a large number of small exporters whose combined contribution to overall exports is relatively small; these constitute around 95% of the cohort but their contribution to exports is hardly around 25%. Most of the small firms appear to export a single product to a single market. This predominance of small exporters indicates huge potential for reallocation of resources across firms. Although major exporting activity tends to agglomerate at a few stations, there is excessive spatial variation across the country.

The reaction to various trade determinants is different at the IM and the EM of firms and products. The EM of firms appear to matter the most as they are more sensitive to trade costs than IM, although trade costs appear to influence the EM of firms and products alike. In general, the overall response of exports to various trade impediments (such as distance) and trade promoters (such as partner's GDP, PTAs) is much larger on the EM of firms. The responses of product EM and IM to various trade impediments and trade-promoting factors bear opposite signs. This heterogeneity of response seems to attenuate overall export growth on the IM of firms. Otherwise, the higher response of EM of firms is a welcome sign for the economy as it alludes to "export entrepreneurship" and is an encouraging signal of a promising business climate.

A decomposition of the effect across sectors, exporting stations and modes of shipments reveals trade costs have asymmetric effect on trade margins along these dimensions. This suggests domestic trade costs are also quite significant. The study reveals a very low export intensity of existing exporters and large untapped potential of non-exporters. It appears that supply is not a major constraint but the challenge is to increase the export intensity of existing exporters and incentivize non-exporters to engage in international trade. Export promotion strategy and policy has to focus on market entry of firms and products, rather than quantity subsidy.

Overall, the descriptive statistics and econometric estimations reveal that exporter-cum-importers are superstar firms. The number of exporting firms is highly skewed towards a single market (more than 50% of firms export to only one destination), but overall export volume is skewed towards multi-market firms. What prevents these small firms from entering other export markets? It could be information barriers, supply-side constraints, infrastructure or lack of competition in the domestic market. Investigating these constraints is important to ensure an appropriate policy response.

9.2 Policy Implications

The paper is highly policy-tailored. Policy-makers will hopefully be able to draw many important insights in pursuing trade negotiations and designing and implementing trade and industrial policies. The following recommendations directly emerge from this analysis.

9.2.1 Active Engagement with Large Firms

- Only a small fraction of large firms handle a major proportion of exports (the top 1% of firms deal with around 50% of exports). The reason for this is that exporting is a costly activity and only more productive firms enter into export markets. Since these large firms have already incurred the sunk costs and developed their distribution network, it is essential to target trade facilitating measures at further enhancing their competitiveness and expanding the set of products and export markets. Although the number of these

firms is low compared with that of exporting-only firms, their export product set is wider and their destination markets are multiple.

- A decomposition of IM and EM along trade orientation of exporters shows two-way traders are less deterred than small and exporting-only firms by high trade costs. The current literature on global value chains also suggests the growth of lead firms has a ripple effect in the economy. It is necessary to engage directly with lead firms, target trade facilitation measures from the industry's perspective, give them specific export growth targets and monitor their performance. A few policy incentives may include according the status of Authorized Economic Operators to this cohort, administrative support in expanding markets and products and facilitating imports of intermediary inputs. The industrial policy of Korea provides a best model in this context.

9.2.2 Further Liberalize Imports

- This analysis finds a high degree of positive correlation between firm-level exports and imports and they appear to be two sides of the same coin. Since large firms engage in exporting, importing and serving the domestic market, further liberalization of its imports can improve the competitiveness of the large firms engaged in two-way trade, and increase competition in domestic market. Pakistan may need to revisit its input tariff (to facilitate these exporter-cum-importers) and output tariffs (to increase competition in the domestic market), which is necessary to push non-exporters to tap international markets and initiate the process of reallocation of resources across firms.

9.2.3 New Trade Policy Tools and Trading Partners

- PTAs, although in operation with only a few countries, appear to increase exports on EM of firms and products. It appears that the reduction in the costs of tariffs owing to PTAs incentivize more firms into exporting, and existing exporters also appear to expand their product set. Currently, multiple efforts are going on in developing large regional and extra-regional trading blocks. The world is witnessing the emergence of mega trading blocks in Asia and Europe (Trans-Pacific Partnership, Transatlantic Trade and Investment Partnership) and the continent-wide FTA in Africa. Pakistan needs to actively engage in these initiatives in order to improve the comparative advantage of its export-oriented firms.
- Common official language (English) appears to influence EM positively. This means both the number of exporting firms and the number of exported products are relatively larger for former British colonies. Firms appear to find it more convenient to trade with these economies because there is less of a psychological distance from these countries. It is important to focus on the untapped markets of former British colonies (in the Caribbean, Sub-Saharan African and the Pacific) because these countries share a common culture and legal system and use English as one of their official languages, all of which has been estimated to reduce the cost of trading by at least 19% (Razzaque et al., 2015).

9.2.4 Improving Trade-processing Infrastructure

- Connectivity and infrastructure directly seem to affect the cost of trading. The trade-impeding role of the spatial location of firms is highlighted in gravity estimations. For firms located up-country, transport costs represent an implicit tax on their exports. The challenge is to provide infrastructure by means of which remote exporting firms can engage in more trade. The trade intensity of firms located up-country is lower than that of those in Karachi. Seaports and airports are the preferred choices of these firms, and in

some cases the only available option. Currently, more than 80% of export cargo is processed through seaports, but Pakistan's LSCI is very low (27.5, with China highest, at 165). Incentivizing major shipping lines to navigate Pakistan's ports could drastically facilitate seaborne trade.

- Currently, most firms exporting to India, Iran and China prefer to use seaports rather than land routes. Improving connectivity and strengthening trade-processing infrastructure at inland crossings could encourage them to use alternative facilities. As firms located in the central and northern parts of Pakistan face higher costs in terms of time and transportation to seaports in Karachi, they may find it beneficial to use land routes to increase trade with regional economies. Exports to contiguous countries are less costly, because alternative means of transport are available to firms, and because of similar cultures and languages firms can easily circumvent informal barriers. Two-thirds of North American Free Trade Agreement (NAFTA) trade between member states is through land routes (Felbermayr and Tarasov, 2014)). Similarly, in Europe, 72% of the volume of exports is transported using the road network (Combes and Lafourcade, 2005). This is a golden time for Pakistan, as the softening of growth in China means its firms may develop synergies in other markets to reduce their costs of production. In addition, the increasing engagement of Iran with the international community means land trade routes with this country could provide access to many other markets. Therefore, increasing regional trade through land routes has to be one of the central pillars of any export-promoting strategy.
- Many firms tend to ship through airports, despite high trade costs and low air connectivity. Moreover, ongoing fragmentation of production processes and increased trade in intermediary inputs at a global level mean the volume of air shipments is set to rise. Air freight is a key pillar of trade-dependent economies like Singapore. Therefore, it is vital to focus on upgrading airfreight facilities.

Although I focus on the exporting sector in Pakistan, this work has implications for the trade policies of other countries at a similar level of economic development, as most of them export less because of higher trade costs (Waugh, 2010). This analysis is based on the data of firms in all sectors, so allowing the results to be generalized. The spatial decomposition of trade margins is particularly relevant for developing countries, showing firms appear to face exceptionally high transport costs because of their remote location. The study shows that, from a trade facilitation perspective, a focus on reducing trade costs within the country is also important, which is relevant for most developing countries facing infrastructure challenges. It also supports the strategy of aid for trade. The sectoral break-up of exporting firms informs on the specialization of the export base and influences its response to sectoral shocks. Finally, the analysis of the effects of PTAs is very pertinent as most developing countries are excluded from emerging mega trade blocs.

9.3 Future Research

This study emphasizes the role of extensive margins of firms and products as a driver of overall exports. Future work could look into the role of entry and exit of firms and products in driving these margins. In addition, there is a need to explore in further detail the effect of heterogeneity of trade-processing infrastructure at exporting stations and its interaction with the spatial location of firms.

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11 Annexes

Table A1: Gravity covariates used in the analysis

Variable	Description	Source
X	Exports from Pakistan (i) to trading partners (j) in year t	Administrative datasets
Distance	Distance between capitals of countries (km)	CEPII gravity dataset
Contiguity	= 1 if countries share a border, 0 otherwise	Head et al. (2010)
Language	= 1 if countries share an official language, 0 otherwise	Head et al. (2010)
RTA	= 1 if countries are members of the same regional trade agreement, 0 otherwise	Head et al. (2010)
Y	GDP, constant $	WDI, the World Bank
y	GDP per capita, constant $	WDI, the World Bank

Table A 2. Sector Abbreviations used in Trade Composition Analysis

Abbreviation	Sector
01-05_Animal	Live animals; animal products
06-15_Vegetable	Vegetable products
16-24_FoodProd	Prepared foodstuffs; beverages, spirits and vinegar; tobacco and manufactured tobacco substitutes
25-26_Minerals	Mineral products
27-27_Fuels	Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes.
28-38_Chemicals	Products of the chemical or allied industries
39-40_PlastiRub	Plastics and articles thereof; rubber and articles thereof
41-43_HidesSkin	Raw hides and skins, leather, fur, skins and articles thereof; saddlery and harness; travel goods, handbags and similar containers; articles of animal gut (other than silk-worm gut)
44-49_Wood	Wood and articles of wood; wood charcoal; cork and articles of cork; manufactures of straw, of esparto or of other plaiting materials; basket ware and wickerwork
50-63_TextCloth	Textiles and textile articles
64-67_Footwear	Footwear, headgear, umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof; prepared feathers and articles made therewith; artificial flowers; articles of human hair
68-71_StoneGlas	Articles of stone, plaster, cement, asbestos, mica or similar materials; ceramic products; glass and glassware
72-83_Metals	Base metals and articles of base metal
84-85_MachElec	Machinery and mechanical appliances; electrical equipment; parts thereof; sound recorders and reproducers, television image and sound recorders and reproducers, and parts and accessories of such articles
86-89_Transport	Vehicles, aircraft, vessels and associated transport equipment
90-99_Miscellan	Miscellaneous manufactured articles

Source: WTO, HS Nomenclature 2012 Edition

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