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Differential effects of internal and external distances on trade flows: The case of Pakistan

By

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Abstract

This paper examines the differential effects of domestic and international transportation distances on exports by Pakistan firms. It uses novel data on exports at the transaction-level and on the location of firms within the country, ports of entry/exit and modes of shipment over time. The study exploits a shift in the US security policy and IV estimation to circumvent the potential endogeneity of manufacturing location choice. The paper finds that access to trade-processing facilities is a key limiting factor to exports. On average, the marginal trade-restricting effect of domestic distance to port of exit is larger than that of international distance to ports of entry in export markets. Both elements of distance have negative effects on the intensive margin of firms' exports and positive effects on extensive margins, albeit with absolutely larger effects due to domestic than international distance.

Keywords: Trade costs, domestic distance, structural gravity, trade margins, Pakistan

JEL Codes: F1, F14, O18, R12

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1 Introduction

During the last two decades, the fall in tariffs, improvement in maritime transport and increased access to communication technologies have reduced the cost of trading internationally. Despite the reduction in the international elements of trade costs, the integration of most developing countries in the world trading system is very low. This has drawn attention to barriers impeding trade flows within countries, especially prohibitive costs of transporting goods from factories and farms to gateway ports and airports. These domestic trade costs are typically high: for example, Anderson and van Wincoop (2004) argue that domestic costs, even in the context of a developed country such as the US, are more than twice as high as the cost of international transportation. Limao and Venables (2001) show that the per unit cost of overland transport in the US is higher than that of the sea leg, while Rousslang and To (1993) also find that domestic freight costs for US imports are of the same order as their international component.

This domestic component of trade cost is particularly high in developing countries: Atkin and Donaldson (2014) find that intra-national costs in Ethiopia and Nigeria are 4 to 5 times larger than that for the US. In the developing world, these costs – inter-alia – are usually induced by the remoteness of trade-processing infrastructure from firms' production facilities and are further compounded by poor transport networks (ODI, 2015). Theoretically, all firms are within the same country, but in practice firms may be located thousands of miles away from export-processing stations.[2] These within country haulages, in some cases, maybe longer than international maritime voyages to the markets of trading partners.

Since a typical trade consignment involves both domestic and international transportation, from firms manufacturing facilities to trade-processing facilities and from gateway ports to export markets, this paper investigates the differential effects of both segments of distance on firm-level exports. It exploits rich information on the location of firms, port of entry and exit and mode of shipment, to compute the inland distances from manufacturing locations to sea ports. This domestic component of transportation distance is used as an additional regressor in gravity estimations, together with the international component of distance (to markets of trading partners). Following estimation of the overall trade-impeding effects of both components of distances, the paper deconstructs the estimated coefficients along the relative responses of firms' intensive and extensive margins. Finally, it explores the heterogeneity in the distance elasticities of firms' total exports and trade margins according to the trade cost sensitivity of products.

[2]The inland transportation distances from manufacturing locations to main sea ports for some economies vary from 500 Kilometres (km) to more than 1,000 km (see Table A.1 in the appendix). The average inland distances in Pakistan to gateway sea ports is 555km, it however varies from 50 km to more than 2500 km across industrial regions (Table 4).

The paper finds that, on average, the marginal effect of domestic distance (from factory location to sea port) is greater than that of international distance (from port to export markets). Both elements of distance have a similar pattern of effects along firms' intensive and extensive margins; with negative effects on the intensive margin and positive effects on the extensive margin. The relatively large trade-impeding effect of domestic distance is robust to various specifications, though the magnitude is sensitive to the control variables included.

A challenge in this kind of analysis is to deal with endogeneity arising from firms' potential choice of manufacturing location, and to more precisely estimate the elasticity of exporting with respect to domestic distance. Exporting firms may decide to build a plant at a particular location to serve the domestic market (in addition to exporting) or use local inputs or benefit from externalities of industrial clusters. This paper attempts to deal with potential endogeneity in two ways. It exploits the changes in domestic distance caused by a shift in the US security policy after the events of 9/11 and compares this to the use of an instrumental variable approach. Interestingly, the key conclusion of the paper about the dominance of domestic distance effect relative to the international distance effect is not sensitive to whether the endogeneity of location is allowed for.

The key contribution of this paper lies in its comparison of the trade-restricting effects of domestic and internationally distances separately and jointly, which remains under-researched in the micro-literature on firms. Quantitative models of international trade use mainly distance between countries in gravity estimations and find robust evidence of its trade-impeding effect (for a survey see Head and Mayer, 2014). Existing micro literature in this stream (e.g. Bernard et al., 2007; Eaton et al., 2004; Mayer and Ottaviano, 2008) also focuses mainly on the responses of trade margins to the international component of distance. Some studies examine the role of the domestic component of transportation and show that the inland distance effect is larger and is particularly large in developing countries (Coşar and Demir, 2016; Donaldson, 2015; Van Leemput, 2015; Martincus et al., 2017). [3] In this line of literature, Coşar and Demir (2016) explore the effect of improvements in transportation infrastructure on regional access to international markets in Turkey and show that the effect is transmitted through extensive margins. Martincus et al. (2017) report similar positive effects from changes in the domestic road network in Peru. In related work, Hillberry and Hummels (2008) focus on the effects of domestic spatial frictions on trade margins for intra-national shipments in the US, and Limão and Venables (2001) examine the effect of geography on transportation costs and trade volume across countries.[4] These two streams of literature focus on international and domestic components of distance in isolation, whereas this paper examines the differential effects of both elements in tandem. Moreover, it informs on the differential

3 In another related paper, Crozet and Koenig (2010) use domestic transportation distances for French firms' exports to adjacent countries to compute the structural parameters of Chaney's (2008) model.
4 In contrast to Hilberry and Hummels (2008), this present paper examines the implications of internal and external distance for international shipments originating from a developing economy and reveals the precise channels of their influence.

effect of each element of distance on trade margins and explores the heterogeneity of the distance effect along multiple dimensions of firm and product characteristics.

The examination of responses of trade margins improves our understanding of the mechanisms of influence of domestic and international trade costs. Existing literature shows that these costs inhibit the entry of firms into export markets (ADBI, 2009), affect the pattern of regional specialisation (Coşar and Fajhelbaum, 2016), impede firms from moving up the value chain ladder (OECD/WTO, 2015) and affect products according to their weight to value ratio (Martincus et al., 2017). In extension of these studies, this paper shows that the internal and external components of trade costs have heterogeneous effects on trade margins of firms, with both components negatively affecting the intensive margin and both positively affecting the extensive margin.

The second main contribution of this paper is to extend the literature on (i) market access and (ii) transportation infrastructure. In the first stream, Atack and Margo (2011) and Banerjee, Duflo and Qian (2012) estimate the relative impact of improvement in transportation infrastructure in the US and China, respectively. These studies compare the effect of market access for the counties that received railroad access with those that did not. In the same vein, Donaldson and Hornbeck (2015) estimate the aggregate effect of railroads on the price of land in the US, while Emran and Hou (2013) explore the effect of access to markets on household consumption in China. In contrast to these studies, this paper investigates the effect on firm-level trade flows of distance to trade-processing infrastructure, and measures these distances at a more micro level.

In the transportation literature, Hummels (2007) provides detailed accounting of the time-series pattern of shipping costs and shows that the ad-valorem impact of ocean shipping costs is not much lower today than in the 1950s. In earlier work, Limão and Venables (2001) show that per unit cost of overland transport in the US is higher than that of the sea leg. In extension of these studies, this paper shows that the marginal effect of road distances is much larger than sea distance and both segments have heterogenous effects on trade margins. These findings not only corroborate the results of above studies but also inform on the transmission mechanisms of both elements of distance.

In terms of methodology, Atkin and Donaldson (2014), Donaldson (2015) and Van Leemput (2015) examine the effect of domestic transportation through price channels, whereas Coşar and Demir (2016) use gravity type estimations. This paper follows a similar estimation approach to Cosar and Demir (2016), but it conducts estimations at the firm-level, rather than at the district level. Moreover, compared with the US, France and Turkey (explored in the above studies), Pakistan is a relatively under-developed country with poor infrastructure and long inland haulages from export-processing stations, varying from 50 km to 2500 km. This empirical setting is typical of many developing economies and the results have wider application for countries with similar geography and levels of infrastructure and stage of development (Fernandes et al., 2016).

This paper thus contributes to the literature as the first study (to the best of our knowledge) that explicitly investigates the differential effect of trade flows to domestic and international elements of distance by using unique datasets from a developing country. This analysis has development policy implications as it informs on the precise channels of influence of these costs, in addition to estimating their magnitude.

Section 2 introduces the data and presents preliminary evidence. Section 3 discusses the empirical strategy and contains the main estimation results. Section 4 presents detailed robustness checks. Section 5 decomposes the responses of trade flows along trade margins and examines the heterogeneity of the distance effect along several dimensions. Section 6 concludes and highlights the policy implications of this work.

2 Data Description and Preliminary Analysis

Background

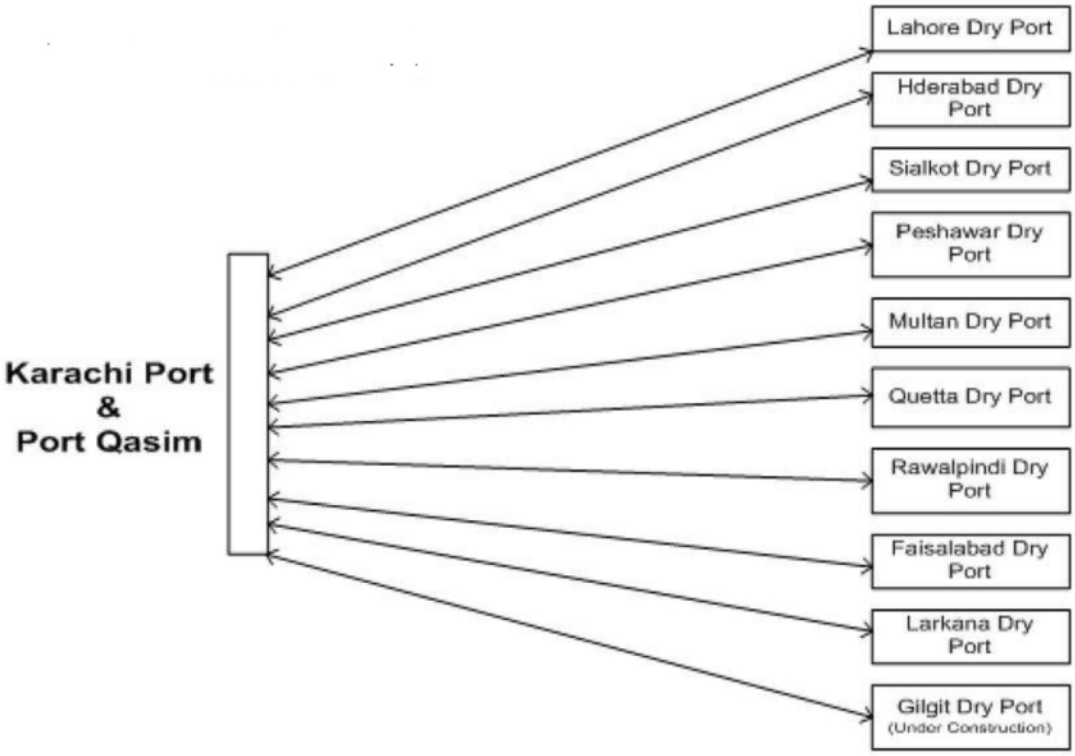
Pakistan is the 36th largest country in terms of geographical size (with an area 340,509 square miles), 6th largest in terms of population (200 million) and 25th largest in terms of purchasing power parity (PPP). It is a semi-landlocked country and is bordered by India to the east, Afghanistan to the west, Iran to the southwest and China to the far northeast.

Manufacturing and exporting activities are unevenly distributed in the economy with a clear division between the coastal belt and hinterland. These regions house populations of around 20 million (m) and 180m, respectively (for detailed description of population distribution see Figure A 1 in the appendix). The coastal belt includes Karachi and other neighbouring towns, most of which are within 50 miles of sea ports. The hinterland comprises several large cities, namely, Lahore, Faisalabad, and Multan, and other provincial, district and Tehsil headquarters. Most of the hinterland towns are more than 1,000 km from the sea ports. A large fraction of manufacturing is concentrated around big cities in the hinterland mainly for historical and cultural reasons. These towns flourished along the Grand Trunk (GT) road which connected parts of Pakistan, India and Bangladesh in the pre-partition period. The GT road served as a main trade route that was disrupted following the partition into several countries.

Pakistan's coastline along the Arabian Sea in the south has two sea ports, Karachi and Qasim, which handle 90% of export cargo. Exporting firms based in hinterland regions either directly transport goods to sea ports or use inland export-processing stations that are linked to sea ports through the road network (Figure 1). A large fraction of firms use sea ports, both for exports and imports and the use of dry ports is quite limited. In 2014, dry ports catered for less than 5% of exports and 10% of imports. Since road transport is the primary mode of inland transportation and road distances from industrial areas in the hinterland to the sea ports range from 50 km to more than 2,000 km (Table 4), domestic transportation are an important element of trade costs. [5]

The hinterland' topography is relatively flat, with a moderate gradient from the coastal region up to a distance of around 2,000 km. The areas further north are mountainous but they do not have much manufacturing and exporting activities. Therefore, the variability in terrain is not a key factor in driving inland transport costs as considered in some earlier studies (for instance, Giuliano et al., 2014).

Figure 1: Export-Processing Infrastructure in Pakistan



[5] The country has North-South rail network, which is in a poort condition and caters for a freight share of 4% only: http://trtapakistan.org/wp-content/uploads/2015/12/Export-Potential-in-Transport-Services-3.pdf

Table 1: Snapshot of Pakistan's Exporting Sectors in 2014

		Exports		Firms		Products		Markets	
		Value	%	#	%	#	%	#	%
Spatial distribution of manufacturing exports	Hinterland	1,235	50	7,362	44	3,496	83	182	96
	Coastal region	1,228	50	9,283	56	3,194	76	186	98
Modes of shipment	Sea	2,204	89	12,335	74	3,690	88	179	95
	Air	246	10	9,701	58	2,650	63	183	97
	Land	13	1	429	3	108	3	11	6
	All	2,463		16,645		4,200		189	

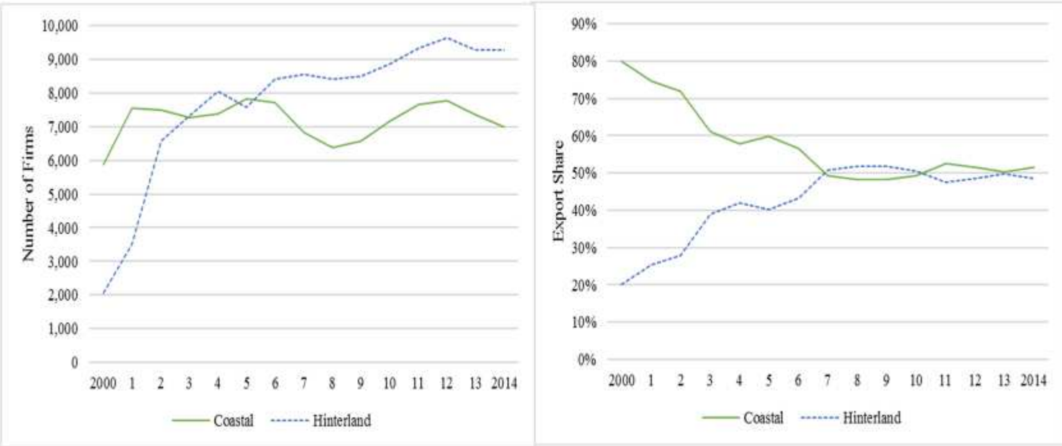
Notes: The data presents the distribution of exports, firms and products along spatial dimensions, as well as along modes of shipment for 2014. Export values are in PKR billions. Products are identified at an eight-digit level of the Harmonised System (HS). Coastal region indicates manufacturing areas near the sea ports including industrial zones in the five districts of Karachi, the hinterland represents all up-country regions of Pakistan. The nearest hinterland industrial region (Hyderabad) is 150 KM from the sea port of Karachi.

After independence in 1947, Pakistan pursued a highly protectionist trade policy aimed at import substitution and the growth of infant industries. In this period, the firms established mainly in hinterland areas sought to serve the domestic market. Historical, cultural and ethnic factors were additional important determinant of their location choice, rather than access to export markets. Having primarily focused on domestic demand many hinterland firms started exporting gradually after the policy change in 1999. In this year, the military staged a successful coup, toppled the elected government and initiated a range of trade and economic policy reforms to garner legitimacy on the basis of economic performance, which incentivised many already established firms to export.[6] This change in trade policy is reflected in the summary statistics. As of 2014, around 50% of exports originated from the coastal belt and the other 50% from the hinterland (Table 1). However, as recently as 2000, the hinterland accounted for just 20% of exports and the coastal belt for 80% (Figure 2). As shown in Panel B of Figure 2 a similar pattern is shown in terms of the number of exporting firms in each region.

[6] Among other measures to promote trade, such as a generous duty drawback scheme on imported inputs, the government cut import tariffs from 47.4% (in sample average terms) in 1999 to 17.3% in 2003 (Sara, 2015). Amjad (2007) notes that growth and confidence of the private sector improved following the introduction of a more liberal trade regime for imports of machinery and other inputs. Some of these policy changes were highlighted in international media: http://news.bbc.co.uk/1/hi/business/1944567.stm

Figure 2: Evolution of Exports from the Hinterland and Coastal Regions

A: Exporting Firms B: Export Share



Notes: Coastal region indicates the areas near the sea ports of Karachi and the hinterland represent all up-country parts of Pakistan.

In line with this change to the proportion of exports across regions, following the economic reforms in 1999, many already established but domestically focused firms entered exporting and some new firms were born. As a result, the proportion of exports originating from the hinterland increased gradually. Figure 3 presents the age-wise distribution of exports for two cohorts of firms: those born prior to the policy change in 1999 (old firms), and those born in the latter period (new firms). It seems that even after the policy change, the pre-1999 firms remained largely focused on home market for a couple of years and then gradually expanded their export volume. By 2014, the export share of this group had risen to around 70% of all exports originating from hinterland. By contrast, the post-1999 firms were in general smaller and their contribution to aggregate exports remained relatively limited for several years.[7]

[7] Pakistan has eight export processing zones (EPZ) in various parts of the country but their export contribution is limited. In 2014, the combined exports from all EPZs valued US $516.389 million, which is around 2% of country's total exports. Currently, the largest operational EPZ is located in in the coastal belt near Karachi.

Figure 3: Evolution of Exports by Firm Age

Source: Authors construction using VAT and Customs datasets.
Notes: New firms are defined as those born after 1999, the date of the military coup and the change in trade policy in Pakistan. Old firms are defined as those born before 1999.

Firm-Level Trade Data for Exports

Micro-level information on various margins of firms and products is retrieved from Pakistan Customs' export dataset. This dataset contains export values, product codes, prices and quantities, port of exit and mode of shipment for the universe of exporting firms for 174 export destination markets. Most of the variables in the export dataset are relatively standard, but those in the intra-country trade (VAT) data are quite unique and novel. This dataset records firm ID (National Tax Number), date of incorporation, address of manufacturing location, and ID of firm's suppliers and buyers along with the value of trade at a monthly frequency. It is sourced from Pakistan Inland Revenue Services (IRS). The IRS has territorial jurisdiction and firms are required to register with their regional VAT offices and file VAT returns on a monthly basis.

Details on firms' spatial location are taken from the VAT records of the IRS. Both datasets (Customs and IRS) identify firms by the same unique identification code, their National Tax Number (NTN), which facilitates their merger. The merged dataset informs on the location of firms' production facilities, port of exit and modes of shipments (sea, air and land). The three unique features allow examination of the effect of domestic distance on exporting arising from the dispersion of production and exporting activities within the country.

Since exports through sea ports are the major component of the overall exports of the country (Table 1), this paper restricts the analysis to shipments by sea only.[8] The export data of shipment through sea contains 15.4 million transactions for the period 2000–2014. For ease of estimation, the data is collapsed at a firm-product-market-year level for manufacturing firms only.[9] This transformation generates 1,127,482 observations with products defined at the HS8 level.[10]

Measurement of Domestic and International Distances

This paper computes the distances from the manufacturing location of firms to sea ports in two ways: straight-line distance with geographical coordinates and geo-coded road distance from Google Maps. These measurements are precise up to the town level, the smallest unit of administration in the merged firm-data.[11] The VAT dataset identifies the location of exporting firms in 1,323 towns across Pakistan. The latitudes and longitudes for these towns are retrieved from Google Maps and straight-line distances to sea ports computed using Stata command 'geodist'. This command provides the length of the shortest curve between two points along the surface of a mathematical model of the earth. When constructing road distances using Google Maps we assume that the firm chooses to use the shortest road distance from the centre of towns to sea ports. A comparison of these two approaches indicate that the straight-line distances (computed from coordinates) are smaller than road distances to the tune of 20-32%, for the major hinterland cities (see Table 2) suggesting that the former might bias the effect of inland distances downwards.

Table 2: Variation in Straight-line and Road Distances (KM) for Selected Towns

Town Name	Straight-line distance (km)	Shortest road distance (km)	Difference (km) (2)-(3)	Difference (%) (2)-(3)
(1)	(2)	(3)	(4)	(5)
Hyderabad	148	178	-30	-20
Multan	737	936	-199	-27
Lahore	1,034	1,245	-211	-20
Rawalpindi	1,131	1,488	-357	-32
Peshawar	1,106	1,365	-259	-23

Source: Authors Construction

Unlike in Martincus et al. (2017) changes in road distances or transportation time from the up-grade of inland road infrastructure is not a key factor in this context as the country has been in political and economic turmoil during the last two decades and did not make significant public investment to improve North-South road or rail network in this period, other than improvement of intra-province roads mainly

[8] Sea ports handle around 90%of Pakistan's exports and remainder 9% transacts through air and 1% through land routes.

[9] In the robustness checks, we find that the differential effects of domestic and international distances hold for agricultural products shipped through sea also.

[10] This is greatest level of disaggregation in the transaction level data.

[11] Pakistan consists of four provinces, one federal capital territory and one autonomous region (Kashmir). These administrative units are divided into 34 divisions, 149 districts, 588 sub-districts or tehsils (roughly equivalent to counties) and several thousand towns.

in the Punjab province. There are few alternative routes to access the sea ports.[12] This use of a constant measure of inland distance over time is consistent with the measurement of other key explanatory variable, international distance, which is also assumed to be time-invariant. We use a method that relaxes this assumption in Section 4, where we use an enforced changed in the required port of shipment for firms.

As discussed above, a small fraction of exports is processed at inland dry ports. Usually small firms use dry ports to complete documentation and customs procedures and then despatch the shipments to sea ports. This inland transportation, from dry ports to sea ports, occurs through the same road network. Since dry ports are situated in major industrial towns and deal with very limited export volumes, this analysis uses the road distances from manufacturing locations to sea ports, rather than through dry ports.

This paper uses two measures of international distance, straight-line distances between capitals of countries, which is quite standard in the gravity literature, and sea distance between ports. Sea distance is a measure of the shortest maritime distance between two countries. These distances have been extracted from the Vesseltracker.com (2014) for the largest port of each country (two ports when the country is flanked by two different oceans). For each country-pair, the shortest maritime distance between any of the ports of both countries is reported. For landlocked countries, the closest foreign port is used. Table 3 reports a comparison of international distance measured with both approaches. As expected international sea distances are longer when measured by the shortest maritime distance rather than as straight line distances.

Table 3: Summary Statistics of International Distance

Distance	Obs	Mean	Std. Dev.	Min	Max
Between capitals	197	7,372.90	4,124.57	805.97	16,334.90
Between sea ports	197	10,394.07	4,834.30	1,075.52	20,731.02

Source: Distance between capitals is retrieved from CEPII and distance between ports is collected from Vesseltracker.com.

Preliminary Descriptive Evidence

Table 4 shows the spatial distribution of exports across various geographical regions of Pakistan (sorted by order of distance from sea ports) and decomposes this into the number of firms, products and markets. This dispersion presents some preliminary evidence on how the export performance of firms based in the hinterland is different from that of those located near sea ports. It indicates that, although major exporting activity tends to agglomerate in Karachi (42% of firms and 50% of exports), there is considerable spatial variation within the country. Following Karachi, the three main export

[12] Pakistan has recently initiated a large infrastructure development programme with the cooperation of Asia Infrastructure Development Bank (AIIB). This $65 billion-dollar Chinese investment (the largest Chinese investment in any country) aims to overhaul road and rail network and thus improve connectivity with sea ports.

manufacturing regions are Lahore, Sialkot and Rawalpindi, all of which are more than 1,000 km from sea ports.

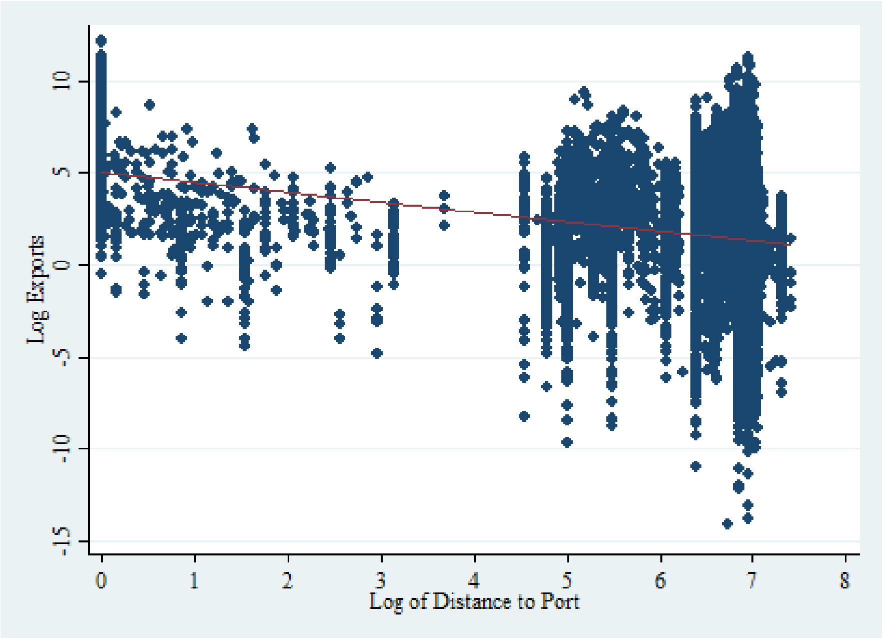
Second, firms located in Karachi (near the sea ports) export a large set of products to a large number of markets (columns 7 and 9). By contrast, the set of exported products is quite narrow for firms located in distant regions and they appear to ship to fewer destinations. This heterogeneity in trade margins across the spatial distribution highlights, inter alia, the potential trade-impeding effect of the inland distance from trade-processing facilities.

Table 4: Spatial Distribution of Pakistan's Exports in 2014

Inland Dist. <=km	Exports (Bn)		Firms		Products		Markets		Region
	Value	%	#	%	#	%	#	%	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
50	1,235.5	50.1	7,273	42.8	3,497	82.6	182	96.3	Karachi
162	23.9	0.9	63	0.4	122	2.9	83	43.9	Hyderabad
490	3.8	0.2	34	0.2	13	0.3	15	7.9	Sukkur
715	39.4	1.4	153	0.9	296	7	72	38.1	Quetta
876	0.3	0	8	0	14	0.3	16	8.5	Bahawalpur
958	64.2	2.5	174	1	406	9.6	84	44.4	Multan
1,203	272.9	11	691	4.1	782	18.5	141	74.6	Faisalabad
1,280	465.0	19.2	3,405	20	2,362	55.8	163	86.2	Lahore
1,360	34.0	1.3	341	2	629	14.9	99	52.4	Gujranwala
1,390	146.0	5.9	3,940	23.2	1,096	25.9	178	94.2	Sialkot
1,411	6.9	0.3	45	0.3	129	3	45	23.8	Sargodha
1,516	17.6	0.7	277	1.6	552	13	82	43.4	Rawalpindi
1,521	21.7	1.4	124	0.7	371	8.8	86	45.5	Islamabad
1,605	2.7	0.1	26	0.2	47	1.1	23	12.2	Abbottabad
1,616	129.0	5.1	442	2.6	845	20	103	54.5	Peshawar
2,500	0.1	0	6	0	60	1.4	16	8.5	Sust
All	2,463		16,645		4,200		189		

Source: Constructed using administrative dataset of Pakistan Customs.
Notes: The data shows the spatial distribution of exports across geographical regions of Pakistan and decomposes exports by firms, products and markets. Distance is measured in km from the sea port of Karachi. Export values are in PKR billions (bn). Products are identified at the eight-digit level of the Harmonised System (HS).

Figure 4: Variation in Exports with Distance from Sea Ports



Notes: Figure 4 represents the variation in export with inland distance from sea ports. The clustering of data points at the upper end reflects exports originating from two large cities, Lahore and Faisalabad, and other adjoining regions. These regions, although relatively far from sea ports, are major centres of production of textiles.

Figure 4 shows how the value of exports falls with distance from sea ports, with firms located in the hinterland facing higher transport costs than those located in coastal areas. For example, shipping a standard 20-feet container from the port of Karachi to the US involves a freight charge of $700, but the internal transportation of the same container from the industrial area of Rawalpindi (1,500 km from sea ports) to Karachi incurs almost the same charges. [13] The figure also shows a large clustering of data points at the upper end, which reflect exports originating from two large hinterland cities, Lahore and Faisalabad, and their adjoining regions. These areas, although relatively far from sea ports, are major centres of textile production.

3 Empirical Strategy and Estimation Results

The availability of information on the domestic location of exporting firms and their export destinations makes it possible to formally explore the effects of domestic distance and international distance of export trade flows. To do so we estimate the following equation:

$$\text{In}\,(X^f)_{ijkt} = \beta_0 + \beta_1 \ln(\text{dist.})_i + \beta_2 \ln(\text{dist.})_j + \beta Z'_{ijt} + \gamma_{kt} + \varepsilon_{ijkt} \quad (1)$$

[13] Information on domestic freight collected from transporters' association and those for international freight are retrieved from the Customs' dataset.

The subscript f denotes firm, i town, j export market (country destination), k product and t time (year). The dependent variable, X^f_{ijkt}, is the value of exports per firm at a product-market-year level.

The main explanatory variable, $dist._i$, is the distance from the location of firms in Pakistan to the sea port. The construction of this variable is explained above in Section 2. Domestic distance varies across and within firms depending upon the port of shipment, which is determined mainly by export destination as these ports specialise in handling cargo for different markets. The second explanatory variable, $dist._j$, measures the international distance to export market. It measures the sailing distance from the port of exit in Pakistan to port of entry in export markets. The coefficients β_1 and β_2 are expected to be negative.

γ_{kt} are time-varying fixed effects for products, which account for heterogeneity across different product groups and also soak up any supply shocks that might vary over time.[14]

Z' is a set of controls. The specification incorporates standard gravity controls, such as GDP of trading partners, and a dummy variable identifying whether the trading partners have a common border.[15] These gravity variables are taken from CEPII and follow the definitions therein. In addition, all regressions include controls for firm size. In the absence of information on turnover, employment or capital for the universe of Pakistan's exporters, the study relies on export-based measures of firm characteristics. Namely, it uses the total value of exports (across firm's destinations) as a proxy for firm size. Melitz and Redding (2014) argue that the total amount of export is a plausible proxy for firm size and productivity. Its lagged values are used to avoid a simultaneity problem.

In an alternative specification (equation 4), both internal and external components of distance are added (as in Crozet and Koenig, 2010) and their combined effect is estimated. The modified regression equation is as follows.

$$\ln (X^f)_{ijkt} = \beta_0 + \beta_1 \ln (dist.)_{ij} + \gamma_{kt} + \varepsilon_{ijkt} \quad \text{...} (2)$$

In this revised form, the variable of interest, $dist._{ij}$, becomes the total distance from the location of firm i in Pakistan to export market j. The coefficient β_1 represents the combined effect of domestic and international elements of distance.[16] This alternative estimation approach is used to verify the robustness of the baseline results obtained from equation (1).

[14] Owing to the focus of this paper on distance to the port we choose not to include region specific fixed effects and relying on within region differences in road distance to identify the effect on exports. The inclusion of region fixed effects serves to increase the absolute magnitude of the estimated coefficient on road distance, in part because the fixed effects capture the effect of interstate highways, which tend to be higher quality than local roads. These results are available on request.

[15] We also experimented with the addition of a measure for a common official language and are a member (joint with Pakistan) of a preferential trade agreement. Their inclusion had no bearing on the results but are available from the authors on request.

[16] Distinguishing between the domestic and international elements of distance allows the total bilateral distance to trading partners to vary depending on the location of firm in Pakistan. This modified specification therefore permits incorporating market-year fixed effects, which would otherwise soak up the effect of international distance.

The estimation method is Ordinary Least Squares (OLS). The model with high dimensional fixed effects is estimated with the Stata command, 'reghdfe', suggested in Guimaraes and Portugal (2010). Standard errors are clustered at the town-destination level. Following the baseline estimations, and robustness checks, the heterogeneity of the effect across sectors and over time is investigated and, finally the estimated distance coefficient is decomposed to the responses of different trade margins. To account for heteroskedasticity in trade data and the presence of zero trade flows, the Poisson Pseudo Maximum Likelihood (PPML) estimator, as suggested in Silva and Tenreyro (2006), is also used as a robustness check.

Base Results

Table 5 presents the baseline estimation results for equation (1) in columns (1) to (4). Column (1) contains the coefficient for domestic/inland distance to sea ports, column (2) for both domestic and international distance to export markets when controlling only for firm size, column (3) when controlling also for gravity variables and column (4) for the full specification with product-year fixed effects also included.

Column (1) reports the estimated coefficient (elasticity) on domestic distance to be -0.152, which is statistically significant at a 1% level, and confirms that remoteness from trade-processing facilities at ports negatively affects exports, as transportation costs are higher for exports originating from more distant towns. When international (external) distance is added in Column (2) into the estimated model, the effect of international distance is also negative (as expected and significant) but the magnitude of the marginal effect is absolutely smaller (-0.056). This finding is robust to the inclusion of gravity variables (col. 3) and product-year fixed effects (col. 4). The relative magnitude of the estimated elasticities on the two components of distance varies somewhat across these alternative specifications, but in all these specifications (including our preferred, full specification in col. 4) the results show that the effect of domestic distance is greater than that of international distance. Since these estimations are in logs, the coefficients correspond to an elasticity measure. The coefficient in column (4), for example, suggests that, on average, an increase of 10% in domestic distance is associated with a decline in firm exports to a specific export market at the product level of 1.1%. The corresponding effect of such an increase in international distance is only a 0.9% decrease in firm exports. To provide a more relevant interpretation we report standardised coefficients in column 4a. As the results from this regression show, the effect of a one standard deviation increase in domestic distance is greater than a one standard deviation change in international distance effect.[17]

[17] Expressed in natural logs the variance for domestic distance is in fact larger than that for international distances (at 1.23 and 0.63 respectively).

Table 5: Base Results

Dependent variable is log of exports at firm-product-market-year level

	Baseline Regressions						Straight-line Distances	Total Distance. (Equation 2)	PPML (with zeros)
	(1)	(2)	(3)	(4)	Standardised coefficients (4a)	(5)	(6)	(7)	(8)
ln(Distance)$_{domestic}$	-0.152*** (0.001)	-0.155*** (0.001)	-0.149*** (0.001)	-0.109*** (0.002)	-0.130*** (0.002)	-0.096*** (0.002)	-0.113*** (0.002)		-0.133*** (0.006)
ln(Distance)$_{international}$		-0.056*** (0.004)	-0.037*** (0.006)	-0.094*** (0.005)	-0.072*** (0.004)		-0.061*** (0.005)		-0108*** (0.014)
ln(Distance)$_{domestic+ international}$								-0.134*** (0.006)	
Additional controls									
Firm Size $_{t-1}$	Y	Y	Y	Y	Y	Y	Y	Y	Y
Gravity variables			Y	Y	Y	Y	Y	Y	Y
Product-year effects				Y	Y	Y	Y	Y	Y
Market-year						Y			
N	1,127,482	1,127,482	1,127,482	1,127,482	1,127,482	1,127,482	1,127,482	1,127,482	4,228,124

Notes: Robust standard errors clustered at town-market level are in parentheses, * p<0.10, ** p<0.05, *** p<0.01. Columns (1) to (6) contain the results of specification (2), and column (7) contains those for specification (3). The estimates in column (4) are used as a baseline. Y indicates the inclusion of fixed effects. The coefficients on fixed effects and other gravity variables are not reported but available on request.

Columns 5, (6), (7) and (8) present initial robustness checks. In col. (5) the country destination or market –year fixed are included and time-invariant international distance is dropped. These dummies all for a better control for destination market's multilateral distance. Column (6) uses the alternative measure of domestic distance (as explained in section 2). The estimated elasticities on domestic distance in both of these alternative specifications is similar to the base estimates in col. (4). Col. (7) reports the estimates the combined effect of both domestic and international distances (equation 2 above). The estimated coefficient represents the combined effect of domestic and international elements of distance. The effect of combined distance is negative as expected and is statistically significant. The magnitude of combined effect is similar to the sum of individual coefficients estimated in the baseline regression (col. 4).

Col. (8) reports the comparable full specification for the separated distance effects, where we use PPML instead of OLS estimation. The incidence of zero observations for exports increases dramatically at the level of disaggregation used in the present analysis. All of the zeros have been dropped by the use logged values in the OLS estimates, and this may bias the estimated distance effects. We report therefore PPML estimates where zeros are included in the data set in all of those empty cells where there are any cases of positive exports by other firms at the specific product-year level to a particular destination. Even after re-dropping of zeros during the running of the programme, the sample size increases to over 4 million observations. The absolute magnitude of the PPML estimated coefficients on both distance variables increases mildly relative to the comparable specification using OLS, and the relative magnitude of the distance elasticities is unaltered.

Our base estimates show therefore that the trade-impeding effect of domestic remoteness from ports is larger than that of the international component of distance. These results are in line with the findings of earlier studies. For example, focusing on specifications that are closest to ours Martincus et al (2017) find an estimated elasticity on the change in log internal distance of 0.22. The magnitude of the estimated effects is somewhat sensitive to the configuration of fixed effects adopted, but we find a consistently larger negative elasticity of export with respect to domestic distance than of international distance.

4 Robustness Checks

One of the major empirical challenges in the present analysis is the potential endogeneity of firms' manufacturing location choice, with firms setting up or changing through relocation the distance from ports depending on whether they export or not, or on plans about their future export status. It should be noted, however, that the geographical mobility of firms may be relatively low in the context of the present analysis, and lower than in many highly integrated, developed economies. Pakistan's provinces (KP, Punjab, Sindha and Baluchistan) differ considerably in terms of language and culture. Three of these provinces have their own official language with dissimilar scripts, which are used for instruction in schools and for conducting government and business (in addition to Urdu – the national language). Nonetheless, the base line estimates of the domestic distance effect can only be viewed as unbiased if the distance between a firm's domestic location and the port through which it exports can be viewed as exogenously given. Note, however, that the baseline estimates will tend to downwardly bias the estimated domestic distance effect, since the declines in exports with increased distance from the port can be mitigated by locating or re-locating closer to the port. The conclusion from the base estimates about the relative dominance of the domestic distance effect over that of international distance is not sensitive therefore to the assumed exogeneity of domestic location. The precision of the estimated domestic distance effect may, however, be affected. In order to check on the precision of the estimated domestic distance effect, we adopt two approaches. Firstly, we exploit the exogenous variation in inland distance that occurred because of the imposition of the Integrated Cargo Containers Control Programme (IC3) on Pakistan by the US in 2007, which forced many firms to switch exporting to the US from Karachi to Qasim Port (whilst continuing to operate from the same location). In addition, we adopt an instrumental variables approach.

Exploiting Exogenous Variation in Domestic Distance

In 2007, a US-led security initiative, the Integrated Cargo Containers Control Programme (IC3), stipulated intrusive scanning and live monitoring of Pakistan's exports before being shipped to the US. The scanning technology was provided by the US at Qasim Port only and the scanning was mandatory to access the US market. For those previously using Port Qasim no change in internal distance occurred. For others, this shift in the US security policy forced switching of US-bound exports from Karachi Port and inland dry ports to Qasim Port, which increased domestic transportation distances ranging from 10 km to 86 km (55 km on average), depending upon firms' geographical location and previous port use. IC3 was primarily a security initiative and imposed on Pakistan by the US following the events of 9/11 to thwart potential exploitation of cargo containers for the smuggling of weapons of mass destruction.[18] No exemptions from the pre-shipment scanning requirement at Port Qasim were given by the US authorities. Therefore, the resulting changes in inland transportation distance for firms previously exporting to the US from other ports and now forced to switch to Qasim Port are potentially exogenous. We use those firms exporting to the US through Port Qasim as the counterfactual in this exercise. The trade effect of this increased component of inland distance on US-bound exports is estimated using a difference-in-difference type regression in first-difference form.

$$\text{In } (\Delta X)_{ikt} = \beta_0 + \beta_1 \ln(\Delta \text{ dist.})_{i} + \varepsilon_{ikt} \quad (3)$$

[18] For further details on the nature and implementation of IC3 see Ali, Kneller and Milner (2017).

where i denotes firm, k product and t time (year) and Δ dist.$_i$ is change is inland distance caused by switching of port in the post-IC3 period. The model is estimated on the first-differenced data to soak up any time-invariant factors at the firm-product level affecting trade flows.

As the results in col. (1) of Table 6 indicate, the distance effect is negative and statistically significant, with the magnitude of the effect being absolutely larger than was found in the base results (and by implication absolutely larger than the international distance effect identified in the base results). The estimated coefficient on distance is -0.172 compared to -0.109 in Table 6 (column 4). These estimates confirm the finding on the relative importance of domestic and international distance on Pakistan's exports.

Instrumenting Firm Location

In addition, we seek to formally model domestic distance as an endogenous variable using an instrumental variables approach. To construct instruments for firm location we exploit the clustering of production activity in Pakistan prior to the major trade liberalisation that occurred following the 1999 coup. The identifying assumption we make here is that the agglomeration of manufacturing over the pre-liberalisation period occurred in an era of highly restrictive trade policies.[19] Location choices were therefore made without consideration of current or future export opportunities, but rather were due to geographic, as well as domestic demand and supply considerations. In constructing this instrument we further assume that the coup by the Pakistani military, along with the trade liberalisation that they then enacted, was unanticipated. If, as seems reasonable given contemporaneous and historical accounts, this holds firm location decisions would not have been adjusted in anticipation of future liberalisation. These pre-reform agglomerations should therefore predict firm locations but should be exogenous to firm-product-exports in more recent time periods. These assumptions are similar to those found in the economic geography literature using historical instruments (see Redding and Turner, 2014, for a review).

We generate measures of product agglomerations at the HS4 using the Pakistan VAT dataset for 1999. Using this data we are able to identify the location (the city) of the largest agglomeration of firms within each HS4 digit product code. The distance of that HS4 cluster from the port represents our instrument. We then must match these product codes to firms in our data. This is made difficult by the fact that firms can produce multiple products yet our endogenous distance measure differs across firms but is common across products. We choose two approaches to this problem. The first identifies the HS4 product code most commonly exported by the firm and then uses distance for that HS4 digit category as the instrument for that firm. The second approach is similar but instead constructs the match based

[19] Similar argument regarding the effect of restrictive trade policies has been many earlier studies ((for instance, see Karayalcin and Yilmazkuday, 2015)

on the most valuable HS4 product code (measured by value of export sales) exported by the firm. The raw correlations of these instruments with each other is 0.6871, suggesting that they capture different variation in the data. They are also, as expected, both positively correlated with the endogenous firm distance measure at 0.2978 and 0.2641 respectively. This positive correlation holds when we add to the regression a control for firm size, the gravity variables, along with product-year fixed effects. The instruments are highly significant in the first stage regression and comfortably pass the standard tests for weak instruments (see col. 2(a) and 3(a) in Table 7).

The second stage results, using the predicted values from the first stage, are reported in Table 6; col. (2b) for matching to firms based on the most common export product and in col. (3b) on the most valuable export product. The coefficient on domestic distance is absolutely larger than in the equivalent OLS/base specification for either matching approach and absolutely larger than the coefficient on international distance. Although the IV estimate of the domestic distance elasticity is sensitive to the matching criterion used, it is of some reassurance that the mean elasticity from the alternative instruments (-0.186) produces a value very similar to that when we exploited the exogeneity of the IC3 event (-0.172). The IV estimates provide further support for the conclusion drawn from the base results about the relative effects of domestic and international distance on the exports of Pakistan’s firms.

Table 6: Robustness

	Diff-in-diff	IV (match on most common export product)		IV (match on most valuable export product)	
		First stage	Second stage	First stage	Second-stage
Dependent Variable	Δ log exports	Distance	Log exports	Distance	Δ log exports
	(1)	(2a)	(2b)	(3a)	(3b)
$\ln(\text{Distance})_{domestic}$			-0.227***		-0.146***
			(0.02)		(0.02)
$\ln(\Delta\ \text{Distance})_{domestic}$	-0.172***				
	(0.011)				
$\ln(\text{Distance})_{international}$		-0.066***	-0.092***	-0.078***	-0.094***
		(0.003)	(0.005)	(0.003)	(0.005)
Distance based on 1999 HS4 agglomerations		0.092***		0.075***	
		(0.001)		(0.001)	
Additional controls					
Firm Size $_{t-1}$		Y	Y	Y	Y
Gravity variables		Y	Y	Y	Y
Product-year effects		Y	Y	Y	Y
Cragg-Donald Wald F-stat		14715.4		12056.7	
N	37,149	1,067,100	1,067,100	1,113,497	1,113,497

Notes: Standard errors in parentheses, * p < 0.10, ** p < 0.05, *** p < 0.01. The estimation sample contain US-bound exports through Qasim Port from 2007 to 2014.

5 Extensions

This section examines the heterogeneity of distance effect across products according to their sensitivity to trade costs (as indicated by their value to weight ratio) and also decompose the coefficients on distance along firms' intensive and extensive export margins.

Heterogeneity across Products

Thus far we have explored the average impact of the different components of distance across all the products exported by Pakistan firms. A natural extension would be to investigate how these distance effects differ across products of differing sensitivity to trade costs or distance. To examine the heterogeneity of the effect across products, we divide them in two groups based on their value to weight ratio: above median ('high' value products with potentially lower sensitivity to trade costs) and below median ('low' value products with greater sensitivity to trade costs). The results of effectively splitting the full sample of products on this basis are reported in Table 7. The estimated distance elasticities are negative for both types of products and for both components of distance. The relative magnitudes of the (in absolute terms) differ, however, between the two components of distance. In the case of domestic distance, the trade-deterring effect of increased distance is larger for 'low' than 'high' value products. This is consistent with greater sensitivity to trade costs for low value products. But this pattern of distance elasticities does not hold for international distance. We now find that high value products are more sensitive to trade costs than low value products, though the difference is small and one may argue that there is similar sensitivity to international distance across low and high value goods. This finding may be important when considering what measures might be needed to promote higher value exports.

Table 7: Heterogeneity of the Distance Effects across Products

Dependent variable is log of exports at firm-product-market-year level

Dependent variable	(1) Log exports
In(Distance)$_{Domestic}$	
*Low value products	-0.187***
	(0.002)
*High value products	-0.024***
	(0.002)
In(Distance)$_{International}$	
*Low value products	-0.110***
	(0.005)
*High value products	-0.126*
	(0.005
Additional controls	
Firm Size$_{t-1}$	Y
Gravity variables	Y
Product-year effects	Y
N	1,127,482

Notes: Robust standard errors clustered at town-market level are in parentheses, * p<0.10, ** p<0.05, *** p<0.01. Y indicates the inclusion of other variable, though the coefficients on these fixed effects and other gravity variables are not reported.

The Impact of Domestic and International Distance on Trade Margins of Firms

Another natural extension to the present analysis is to consider how the components of distance influence the different margins of firms' exports, i.e. where the total value of as firm's exports is broken down in to the intensive and extensive margins. To construct these two margins of trade we collapse the data to the firm-year level and calculate the number of products exported by the firm (in a year), which we call the extensive margin, and the average exports per product (in a year) which we label the intensive margin. As the dependent variables are in logs, the total effect of each component of distance on firm exports is equal to the sum of the distance coefficients on the extensive and intensive margin.

The full sample results are reported in col. 1 (total exports), 1a (intensive margin) and 1b (extensive margin) of Table 8. We find significant and common patterns of the distance effects across the margins of trade, with a negative effect of both domestic and international distance on the intensive margin and a positive effect of both distance components on the extensive margin. In the case of domestic distance the negative effect on the intensive margin dominates the positive effect on the extensive margin such that there is an overall negative (and significant) effect of domestic distance on firm level exports overall. For international distance we find that the relative magnitudes (in absolute terms) of the effects on the margins is reversed, producing an overall positive (albeit insignificant) overall effect on firm exports overall.

The differential pattern of signs on the effects of distance on firms' export margins is potentially important for policy purposes, because it suggests firms may increase the extensive margin as a means of offsetting the negative effects of internal distance on the intensive margin. It should be recognised, however, that we are unable to control for firm size in the estimations in Table 8, since our proxy for firm size in the earlier analysis is the scale of exporting itself. It may be that there is a systematic difference in the size of firms located close to and distant from the port; with potentially larger firms (more distant from ports serving both domestic and export) having larger product ranges and able to spread any fixed costs of being more distant from the port across a wider range of export products.

In the remaining columns of Table 8 we report the effects of distance on the firms' export margins of 'low' and 'high' value goods separately. In broad terms the pattern of results is in line with those for the full sample, with absolutely larger influences of distance on intensive than extensive margins and in general only negative effects of distance applying to intensive margins. As expected, we also find a larger negative elasticity distance for the intensive margin in the case of low value products. In contrast to the full sample results, we now find that domestic distance has no effect on the extensive margin in the case of low value products and that international distance has a positive effect on the intensive margin of high value products. This is surprising, though some caution is required given that firm size is not controlled for.

The extensions to the base modelling do identify some heterogeneity in the effects of the two components of distance across different margins and different types of products. However, the additional findings do not undermine the earlier conclusion about the greater influence of domestic than international distance in deterring the total exports (and intensive margin) of firms.

Table 8: Domestic and International Distance and the Margins of Trade

Dependent Variable	Total Firm Exports	Product intensive margin	Product extensive margin	Total Firm Low Value Exports	Low Value Product intensive margin	Low Value Product extensive margin	Total High Value Firm Exports	High Value Product intensive margin	High Value Product extensive margin
	(1)	(1a)	(1b)	(2)	(2a)	(2b)	(3)	(3a)	(3b)
$\ln(\text{Distance})_{domestic}$	-0.274***	-0.292***	0.017***	-0.491***	-0.490***	-0.000	-0.221***	-0.268***	0.047***
	(0.005)	(0.005)	(0.002)	(0.007)	(0.006)	(0.002)	(0.006)	(0.006)	(0.002)
$\ln(\text{Distance})_{international}$	0.028	-0.064***	0.093***	-0.037	-0.117***	0.080***	0.159***	0.030***	0.129***
	(0.024)	(0.004)	(0.009)	(0.033)	(0.028)	(0.011)	(0.030)	(0.025)	(0.011)
Additional controls[(1)]									
Gravity variables	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	114,538	114,538	114,538	67,788	67,788	67,788	78,108	78,108	78,108

(1) * p<0.10, ** p<0.05, *** p<0.01. When collapsing the data to the firm level we are unable to include firm size as a control variable because the total value of a firm's exports is the proxy used to measure firm size.

6 Conclusions

This paper examines the differential effects of domestic and international components of distance by using novel datasets from a developing country. These datasets identify the locations of manufacturing firms, ports of entry and exit, and modes of shipment (air, land and sea) over time. Taking advantage of data to estimate an extended gravity model we find that, on average, the marginal export-restricting effect of domestic distance (from manufacturing location to port of shipment) on firm-level exports is greater than that of international distance (from ports to the markets of trading partners). While the negative effects of domestic and international distances have been documented separately in some earlier studies, this paper examines the relative contribution of each component. We further show that both components of distance have similar effects on trade margins, with distance deterring firms' intensive export margin only and this effect being particularly large for low value goods. These results are robust to alternative specifications and estimation methods, data sources and the measurement methods for distances.

Since distance is commonly used proxy for trade costs, this paper shows that the relatively higher element of domestic transportation costs is a key impediment to accessing international markets. In the developing world, these costs – inter alia – are usually induced by the remoteness of trade-processing infrastructure from firms' production facilities and are further compounded by poor transport networks (ODI, 2015). Domestic distance represents an implicit tax: it inhibits firms' exporting, though not their range of export products. This finding for Pakistan suggests that, from a trade facilitation perspective, a focus on improving within-country transportation and connectivity matters more than improving the same at the international level for generating an appropriate trade response. Second, since the overall trade-restricting effect of domestic trade costs on existing export firms' exports is along the intensive margin, this suggests that policies aimed at strengthening these margins assume more importance in promoting exports.

7 References

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Appendix

Table A.1: Domestic and International Distances for Selected Economies

Country	Domestic (1)	International (2)
Pakistan	555	7,373
Malaysia	556	9,992
C. African Rep.	557	7,495
Vietnam	560	9,908
South Africa	585	8,392
Saudi Arabia	606	6,469
FM Sudan	620	11,942
Mozambique	696	7,879
Mexico	706	10,063
Indonesia	716	10,471
Congo, Rep.	803	6,995
Kenya	865	8,343
India	869	8,128
Kazakhstan	877	7,233
China	1,018	9,378
Australia	1,121	12,813
Brazil	1,157	9,232

Source: CEPII
Notes: This table presents domestic and international transportation distances for selected developing countries. Column (1) contains average inland transportation distance to port of exit, column (2) contains the distances between countries.

Table A.2: **List of Trading Partners of Pakistan Included in the Analysis**

Afghanistan
Albania
Algeria
Angola
Argentina
Armenia
Australia
Austria
Azerbaijan
Bangladesh
Belarus
Belgium
Belize
Benin
Bolivia
Bosnia and Herzegovina
Brazil
Bulgaria
Burkina Faso
Burundi
Cabo Verde
Cambodia
Cameroon
Canada
Central African Republic
Chad
Chile
China
Colombia
Comoros
Congo, Republic of
Costa Rica
Croatia
Czech Republic
Cote d'Ivoire
Dem. Rep. Congo
Denmark
Djibouti
Dominica
Dominican Republic
Ecuador
Egypt
El Salvador
Equatorial Guinea
Estonia
Ethiopia
Fiji
Finland
France
Gabon
Georgia
Germany
Ghana
Greece
Grenada
Guatemala
Guinea
Guinea-Bissau
Guyana
Haiti
Honduras
Hong Kong
Hungary
Iceland
India
Indonesia
Iran
Ireland
Italy
Jamaica
Japan
Jordan
Kenya
Korea
Kyrgyz Republic
Lao PDR
Latvia
Lebanon
Liberia
Libya
Lithuania
Luxembourg
Macao
Madagascar
Malawi
Malaysia
Maldives
Mali
Mauritania
Mauritius
Mexico
Moldova
Mongolia
Morocco
Mozambique
Nepal
Netherlands
New Zealand
Nicaragua
Niger
Nigeria
Norway
Panama
Papua New Guinea
Paraguay
Peru
Philippines
Poland
Portugal
Romania
Russia
Rwanda
Samoa
Senegal
Seychelles
Sierra Leone
Singapore
Slovak Republic
Slovenia
South Africa
Spain
Sri Lanka
St. Kitts and Nevis
St. Lucia
Sudan
Suriname
Sweden
Switzerland
Syrian Arab Republic
Sao Tome and Principe
Tajikistan
Tanzania
Thailand
The Gambia
Togo
Tonga
Trinidad and Tobago
Tunisia
Turkey
Turkmenistan
Uganda
Ukraine
United Kingdom
United States
Uruguay
Uzbekistan
Vanuatu
Venezuela
Vietnam
Yemen
Zambia
Zimbabwe

Table A.3: Pattern of Domestic Trade

A: Domestic Trade of Firms Located in Rahim Yar Khan
(A town in Punjab near the border of Sind province)

Locations of Trade Partners	Trade (PKR M)	Ethnic Region of Trade Partner	Intra-Town Distance (km)
Multan City	0.39	Same	227
Okara	1.06	Same	404
Karachi East	4.59	Different	490
Malir	252.92	Different	497
Karachi West	0.10	Different	513
Karachi South	247.15	Different	550
Lahore Cantt	17.93	Same	540
Lahore City	5.02	Same	510
Lahore	1,465.85	Same	523
Gujranwala	1.82	Same	558
Peshawar	340.69	Different	632
Islamabad	28.87	Same	646
Chota Lahore	49.99	Same	655
Haripur	454.03	Different	667

B: Domestic Trade of Firms located in Sukkur
(A town in Sindh near the border of Punjab province)

Locations of Trade Partners	Trade (PKR M)	Ethnic Region of Trade partner	Intra-Town Distance (km)
Malir	42.5	Same	352
Hub	20.6	Different	352
Karachi	4,934.7	Same	365
Karachi West	5.1	Same	365
Karachi Central	16.7	Same	365
Karachi South	1,314.4	Same	365
Karachi East	1.0	Same	365
Okara	0.6	Different	564
Sheikhupura	0.1	Different	667
Lahore Cantt.	0.2	Different	682
Ferozewala	25.0	Different	684
Peshawar	35.8	Different	747
Chota Lahore	5.0	Different	780
Islamabad	2.8	Different	782
Haripur	444.2	Different	799

Note: Sorted in the order of distance from town

Figure A 1: Spatial Distribution of Population in Pakistan

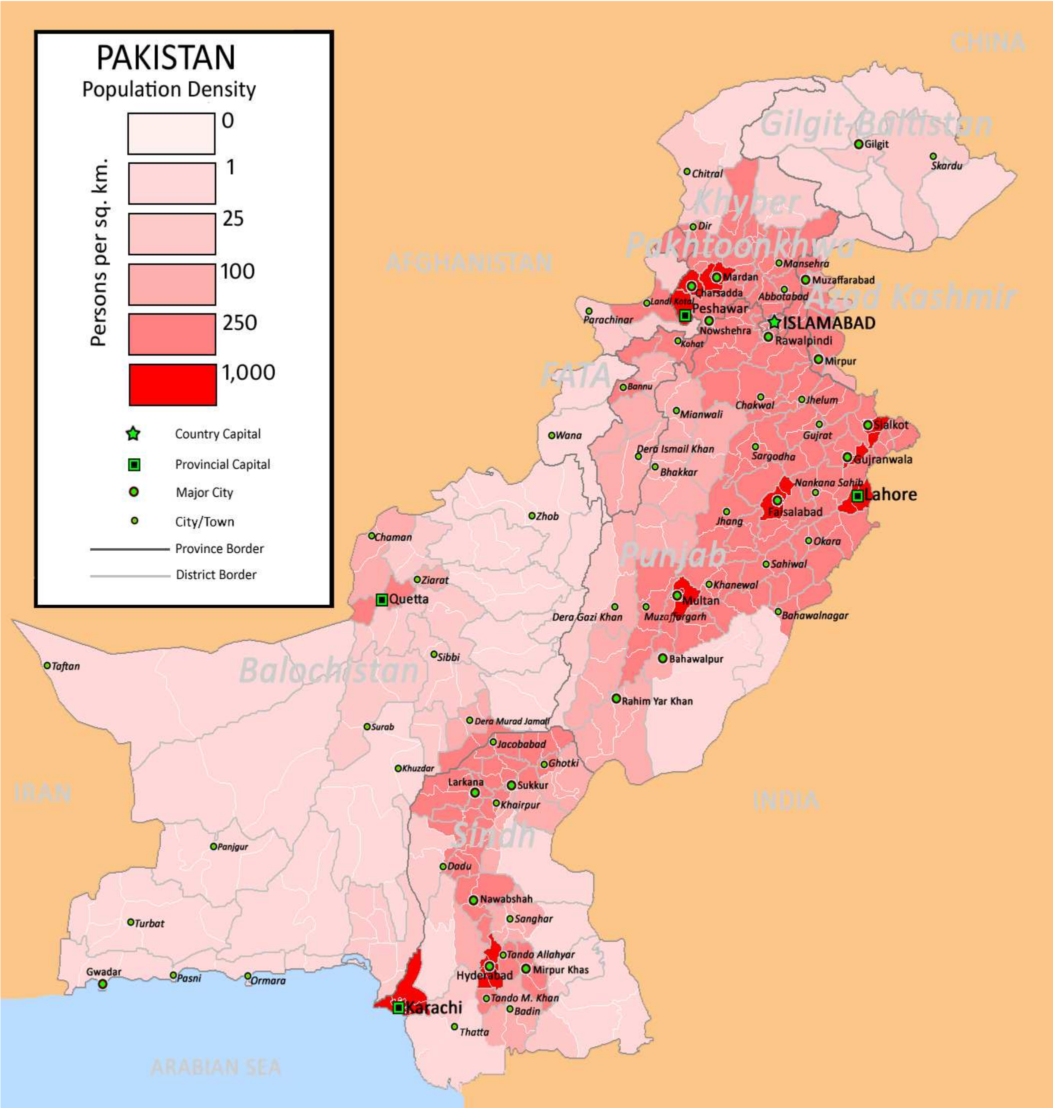
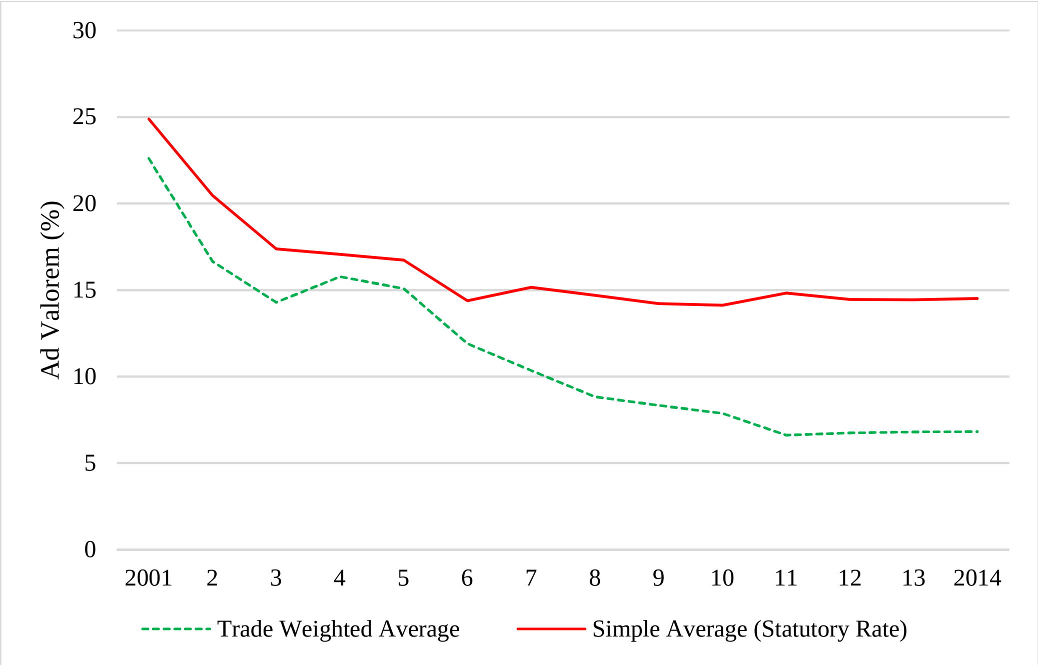


Figure A. 2: Pakistan's Average Customs Duty on Imports



Notes: The chart presents the average rate of customs duty (CD) over time. Besides CD imports attract a range of para-tariffs, such as sales tax, income tax, provincial taxes and port development surcharge. Some of which were also rationalised under the policy reforms launched by the military government.