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The Diversification and Sophistication of Pakistan's Exports: The Need for Structural Transformation

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Abstract

While export diversification is considered to foster export growth and enhance GDP growth rates, this diversification has not translated into higher exports for Pakistan. In addition to diversification, the country must undergo a structural transformation of its exports to upgrade to a more sophisticated export basket. This entails shifting its comparative advantage from primary to manufactured exports and, further, from a labor-intensive to a more capital-intensive productive structure. In order to explain Pakistan's paradoxical situation, this paper analyzes Pakistan's orientation in the 'product space' as it affects the process and rate of structural transformation. In addition, we assess the sophistication of Pakistan's exports based on their complexity and technological sophistication. Our analysis refutes the traditional argument that diversification leads to greater exports and faster economic development. It also shows that the bulk of the country's productive capabilities are concentrated in the periphery of the product space, which is very weakly connected to the tightly packed industrial core. The export basket is neither complex nor technologically sophisticated, producing low-tech undifferentiated products. It seems that Pakistan is left with few nearby options for structural transformation, leaving it without a path to other, more sophisticated areas in the core of the product space. We argue that accelerating the process of structural transformation will require revisiting industrial policy, strengthening the country's institutions and strategic collaboration between the public and private sectors.

Keywords: Pakistan, structural transformation, technological sophistication, diversification, product space, growth, exports.

JEL classification: F1, F10, F19, F43, O14, O33.

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1. Introduction

According to the recent trade literature, expanding exports coupled with their structural transformation is conducive to sustained economic growth (see, for example, Hausmann & Klinger, 2007; Herzer & Nowak-Lehmann, 2006; Iwamoto & Nabeshima, 2012). Structural transformation, which includes export diversification and product sophistication, is seen as the new engine of growth. It involves the movement of export products up the sophistication chain from primary to manufactured exports that are labor-intensive and eventually on to more resource-intensive products.

The mix of goods exported by a country directly affects economic growth. Improvements in the quality and diversification of these exports reflect structural change (Felipe, 2007). Given a certain level of income, a more 'sophisticated' export basket is indicative of that country's economic growth (Hausmann & Klinger, 2008). This implies that countries usually maintain an export basket that is commensurate with their levels of income. Countries that are able to export products exported by richer countries, i.e., have a more sophisticated export basket, given their level of income, experience accelerated growth. Countries that specialize in unsophisticated export baskets, given their own levels of income, experience sluggish economic performance and find themselves 'stuck' in a low-growth trap.

The evidence suggests that Pakistan has long produced less diversified and less sophisticated products, which are also produced by other low-income countries. This posits an important question. Does the lack of diversification explain Pakistan's weak export performance? We try to answer this by examining the links between export diversification, structural transformation and export growth.

The rest of the paper is organized as follows. Section 2 looks at Pakistan's patterns of export diversification in comparison to India and draws a link with its export performance. Sections 3 and 4 explore alternative and more sophisticated approaches to analyzing the structural transformation of Pakistan's exports. Section 3 looks at its orientation in the 'product space' and identifies several problem areas. Section 4 analyzes the sophistication of Pakistan's export products based on (i) the complexity of exports and (ii) their technological sophistication. Section 5 concludes with some observations, followed by a brief discussion of the prospects for reinvigorating structural transformation for the country.

2. Does Export Diversification Lead to Export Growth?

This section looks at Pakistan's patterns of export diversification relative to India and links these to its export performance.

2.1 Pakistan's Export Diversification

Export diversification pertains to the production and trade of a variety of commodities spread over different sectors of the economy (Ali, Alwang & Siegel, 1991). This implies that having a more diverse export basket fosters export growth and enhances GDP growth rates (Hesse, 2008; Samen, 2010). The channels through which export diversification might positively affect growth include: (i) the Prebisch–Singer hypothesis, which relates to improving the terms of trade by expanding production and diversifying trade commodities (Prebisch, 1962; Singer, 1950); (ii) the 'portfolio effect' by which expansion into varied export sectors can reduce instability in export earnings (Ferreira & Harrison, 2012); and (iii) enhanced aggregate productivity levels due to knowledge spillovers (Herzer & Nowak-Lehmann, 2006). Thus, diversification provides protection against the risks associated with economic instability and volatility in foreign exchange earnings.

Most studies look at the structure of exports to analyze the industrial structure of developing countries. Thus, the export structure of a country may be a good proxy for its industrial structure (see, for instance, Hamid & Khan, 2015; Hausmann, Hwang & Rodrik, 2005; Hausmann & Klinger, 2007, 2008; Lall, Weiss & Zhang, 2005). To understand export structure, the most widely used methodology is by Hausmann et al. (2005), who use a weighted average of the income per capita of the exporters of that product, known as the PRODY, and a weighted average of the income level of the country's export basket, known as the EXPY. PRODY denotes product-level sophistication, which is not indicative of technological sophistication per se. EXPY denotes the level of sophistication of the export basket as a whole and is also a proxy for the country's exports complexity. Given that there is insufficient data to compute PRODY and EXPY for Pakistan's exports, the subsequent sections look at alternative approaches to explaining structural transformation.

From the recent trade literature, it is evident that Pakistan's export performance has stagnated. Felipe (2007) applies the methodology developed by Hausmann et al. (2005) to compare exports between 1986 and 2004. His findings show that Pakistan is producing exports that are also

produced by 'ever poorer countries'. Its EXPY or export sophistication has not shown any improvement and its index in 1986 (4,664) is almost the same as in 2004 (4,628). Similarly, Reis and Taglioni (2013) apply the same methodology and conclude that Pakistan's export basket has not shown any real improvement relative to its comparator group[1] and that, over the past two decades, the country has consistently maintained a 'poorer' export basket, given its level of income.

Hamid and Khan (2015) analyze Pakistan's industrial structure by adapting and applying the industrial sophistication index developed by Lall et al. (2005) to the Pakistan Standard Industrial Classifications in the Census of Manufacturing Industries. They conclude that Pakistan's industrial performance has been poor because (i) its industry has shown a decline in sophistication over time, (ii) there has been no clear movement between sophistication levels and (iii) level 1, the lowest level of sophistication, constitutes about 50 percent of the value-added share of Pakistan's large-scale manufacturing industry.

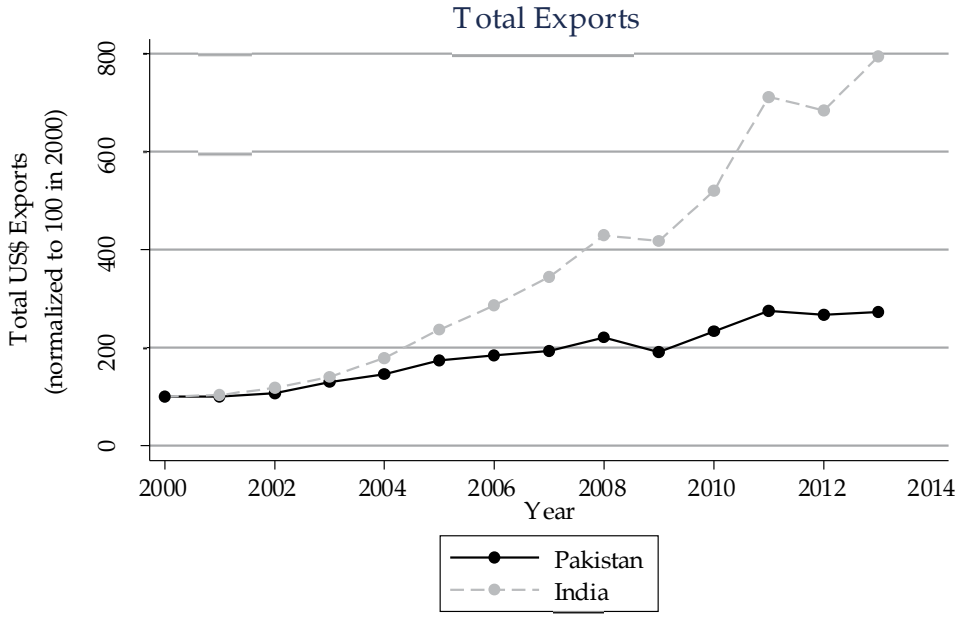
2.2 Can Pakistan's Poor Performance Be Explained by Lack of Diversification?

We compare Pakistan's trade performance with that of India to show how the former is becoming irrelevant in the global arena. Analyzing the performance of Pakistan's exports from 2000 to 2013[2], Figure 1 shows that its total exports are far lower in value relative to India. Not only does Pakistan lag behind India in terms of export growth, but the gap between the two countries' exports is also seen to be increasing. In 2000, the value of India's exports (US$43.2 billion) was approximately six-fold that of Pakistan (US$7.95 billion); by 2013, the value was 11.4 times that of Pakistan (US$292 billion versus US$25.6 billion).

[1] The comparator group for Pakistan includes China, Indonesia, India, Sri Lanka, Malaysia, the Philippines and Thailand (Hausmann & Klinger, 2008).

[2] This analysis has been inspired by a presentation by Dr. Atif Mian (Princeton University) at an International Growth Centre briefing to the finance minister in 2011. Our paper furthers the analysis by using a different industrial classification and more recent data.

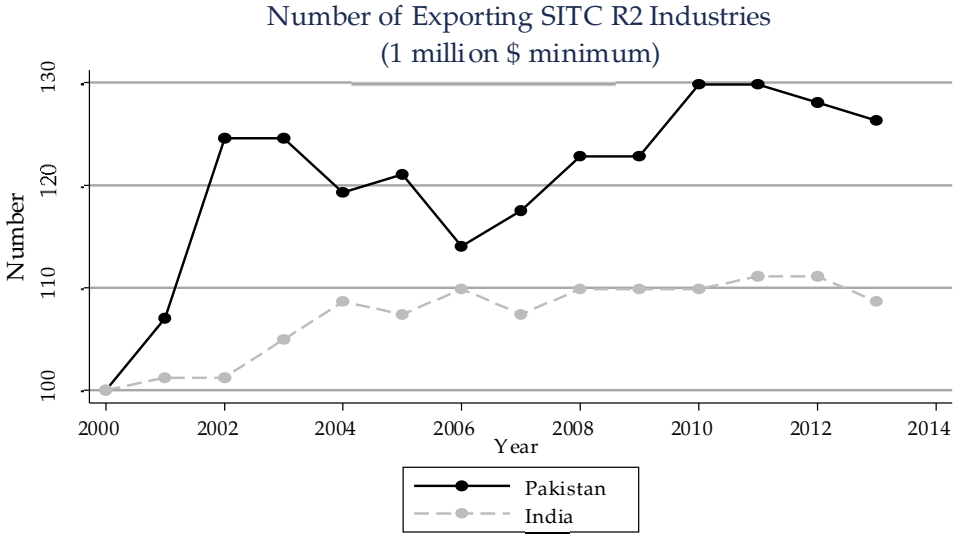
Figure 1: Performance of total exports, India and Pakistan



Note: Total exports have been normalized for the base year 2000.
Source: Authors' calculations based on data from the United Nations Commodity Trade Statistics database, accessed 21 March 2016.

In line with the premise that export diversification has a positive impact on export performance, we analyze the degree of diversification for Pakistan and India. This will help establish if Pakistan's weaker export performance, in comparison to India, can be explained by its lack of diversification in exports. In order to look at the pattern of diversification, we use export data based on the Standard Industrial Trade Classification (SITC) (Revision 2) from the United Nations Commodity Trade Statistics database. Figure 2 shows that, between 2000 and 2013, Pakistan became more diversified than India. Over this period, the number of export sector industries is much greater for Pakistan than for India. However, the trend line for India does not show a very steep gradient – particularly post-2004, the number of exporting industries is fairly constant. Thus, even though Pakistan has become more diversified than India over the years, the latter continues to perform far better in terms of total exports (see Figure 1).

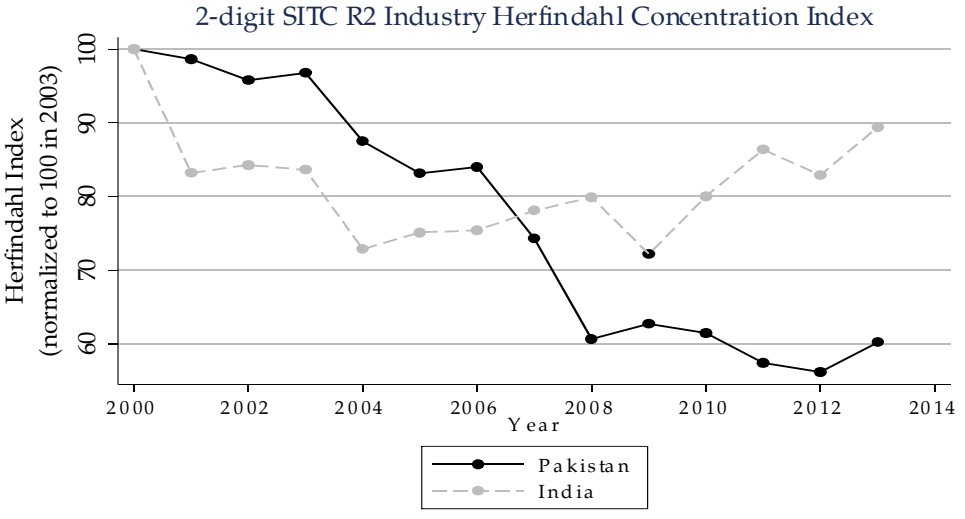
Figure 2: Number of exporting industries contributing at least US$1 million to export earnings



Note: Base year = 2000.
Source: Authors' calculations based on data from the United Nations Commodity Trade Statistics database, accessed 21 March 2016.

The concentration ratio (geographic or product concentration) is also used to measure diversification. We calculate the Herfindahl concentration index (HCI) for Pakistan and India, using data from the UN Comtrade database (SITC, Revision 2). The HCI is an indicator of the concentration of industries in the export market: the greater the index score, the more concentrated the market is. Figure 3 shows that, post-2004, there has been a continuous decline in the index for Pakistan. This confirms the visual analysis in Figure 2, suggesting that the number of products is increasing, indicating greater diversification. However, the HCI for India follows an upward trend, indicating that the country's exports became less diversified after 2004.

Figure 3: 2-digit SITC (Revision 2) industry HCI



Note: Total exports have been normalized for the base year 2000.
Source: Authors' calculations based on data from the United Nations Commodity Trade Statistics database, accessed 21 March 2016.

To sum up, Pakistan seems to have diversified into more varieties of export categories than India, which is concentrating more on fewer sectors. Yet India's export growth is much higher than Pakistan's and follows a rising trend. This refutes the traditional argument that diversification necessarily leads to greater exports and faster economic development. Instead, we observe that, in addition to diversification, the nature of exports are significant in achieving accelerated growth (Hausmann & Klinger, 2008; Hausmann et al., 2005).

If not diversification, then *what*? To answer this, Sections 3 and 4 explore alternative explanations for Pakistan's poor export performance, including (i) the nature of export products explained through the concept of 'product space' and (ii) the sophistication of export products explained through economic complexity and technological sophistication.

3. The Nature of Exports: Product Space

The evidence suggests that, in order to achieve development, product diversification is not enough. The country must also undergo a structural transformation of its exports to upgrade to a more sophisticated export basket. This entails diversifying into newer and more sophisticated products. Pakistan's export performance in comparison to other countries

in the region is alarming. According to Hausmann and Klinger (2008), its relative position has worsened since the 1960s, so much so that the country now has the lowest level of export sophistication among its comparators.

Product space is a network of the connections of all proximities linking pairs of commodities that are most likely to be co-exported by many countries (Hausmann et al., 2013). A country's location in the product space is particularly important as it affects the process and rate of structural transformation. This, in turn, depends on shifting the relative comparative advantage (RCA) from labor-intensive to capital-intensive products, achieved by investing in physical and human capital. However, the inability to diversify remains as each product involves highly specialized inputs that are not necessarily adaptable to other products. Transformation in a country's productive structure depends on the level of its factor endowments and on how easily its product-specific capabilities can adapt to other products, as signified by the country's location in the 'product space' (Hidalgo, Klinger, Barabasi & Hausmann, 2007).

Diversifying into new products requires varying degrees of substitutability and new inputs, for example, specialized skills, research and development (R&D) and infrastructure. These barriers are lower for nearby products that require less adaptation of existing capabilities. Thus, in order to achieve the transformation, a country needs to identify products in a heterogeneous – as opposed to a homogeneous – product space so that moving to nearby products or diversifying is easier (Hausmann & Klinger, 2007).

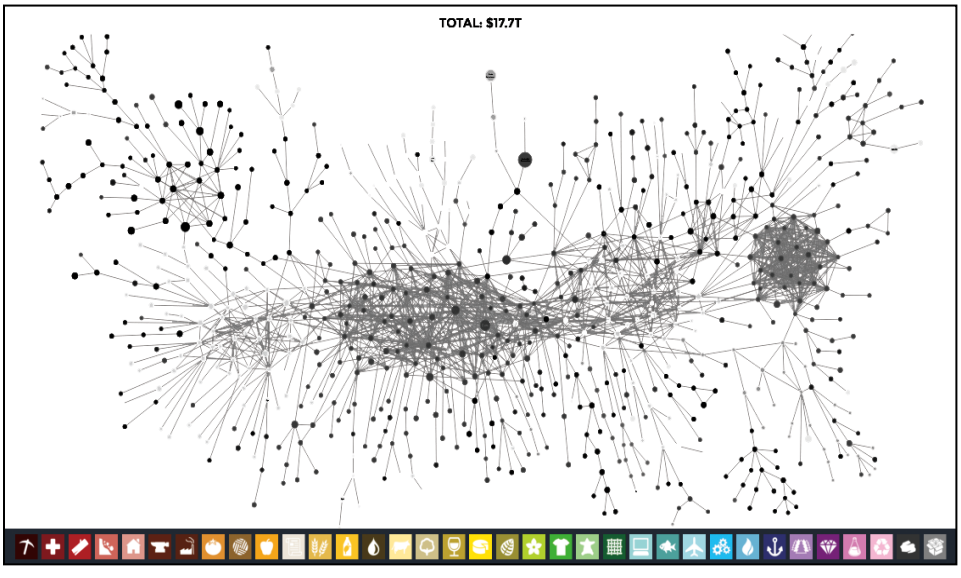
3.1 Structure of Product Space

The structure of product space is particularly important as it affects how easily a county can achieve the structural transformation of its products. This structure can be explained with a metaphor, wherein the products are trees in a forest, which represents the product space. The trees (or products) are at a certain distance from one another based on their capabilities; the distance between trees indicates the similarity of their required capabilities. Firms are the monkeys that live in these trees. At large, new activities are more likely to be developed in a tightly connected product space in which monkeys already live (i.e., where firms are already producing), as fewer and similar capabilities will be required to add newer products to the export basket (Felipe, 2007; Hausmann et al., 2013). On the contrary, if a country specializes in exporting peripheral products, then moving to newer products, i.e., restructuring, will be difficult because it

will require accumulating very different capabilities, thus impeding the process of structural transformation.

Figure 4 visualizes the shape of the forest or product space, showing export opportunities for the world in 2013. The size of the total world market is US$17.7 trillion (The Observatory of Economic Complexity, n.d.).

Figure 4: Product space of world exports, 2013



Source: The Observatory of Economic Complexity database, accessed 22 March 2016.

Each node in Figure 4 is a product. These products are connected by grey lines that represent the possibility of the products being co-exported. The product space has a core of closely connected products that are more likely to be co-exported and a periphery where products are weakly connected and require different production capabilities.

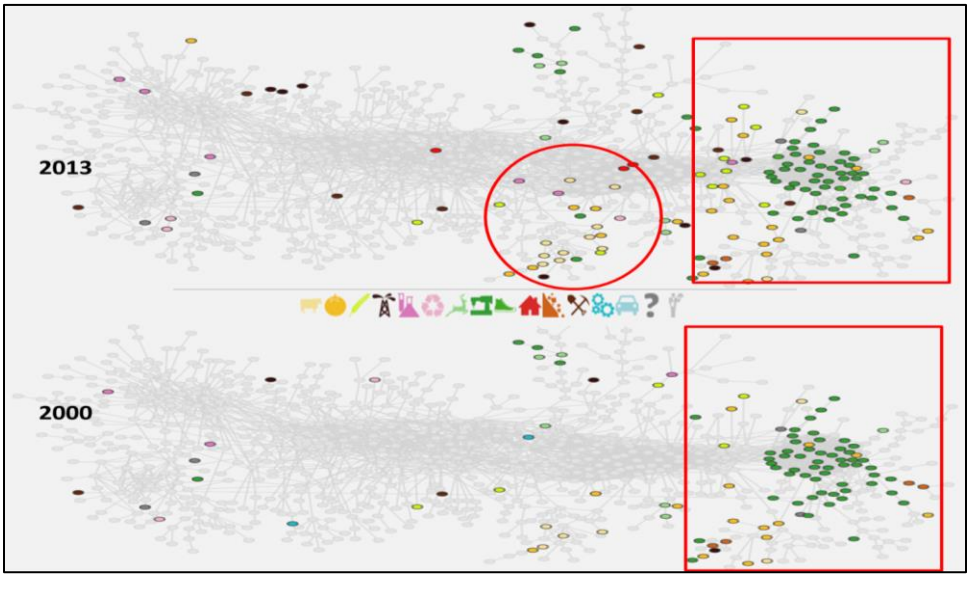
The color of a node represents the technological intensity of the product. The blue nodes, which lie mostly in the core, represent high-tech products such as machinery, electrical goods and transportation. The purple nodes lie mostly in the periphery and represent low-tech products such as chemicals and allied industries and plastics and rubber. The green nodes, also in the periphery, require low technological intensity and represent products such as textiles, garments, footwear and leather. The red and orange nodes represent resource- and agro-based products such as

wood, glass, minerals, petroleum and chemicals. The yellow nodes represent agro-based products such as vegetable and animal products. To sum up, the core of the product space mostly comprises technologically sophisticated products, while the periphery represents low-tech, less sophisticated products. Thus, movement toward the core from the periphery implies structural transformation and favorable diversification.

3.2 Structure of Pakistan's Product Space

The product space of Pakistan's exports in 2013 (Figure 5) reveals that its orientation is largely peripheral. There is almost no production in the tightly packed industrial core of the product space where structural transformation is easier. Instead, the bulk of the country's productive capabilities is concentrated in the periphery, in the green nodes that represent sectors such as garments, textiles and footwear. While this cluster is tightly connected within itself, it is very weakly connected to the rest of the space. Thus, Pakistan is left with few nearby options for structural transformation around these sectors. This also leaves the country without a path to other, more sophisticated areas in the core of the product space.

Figure 5: Product space of Pakistan's exports, 2013 and 2000

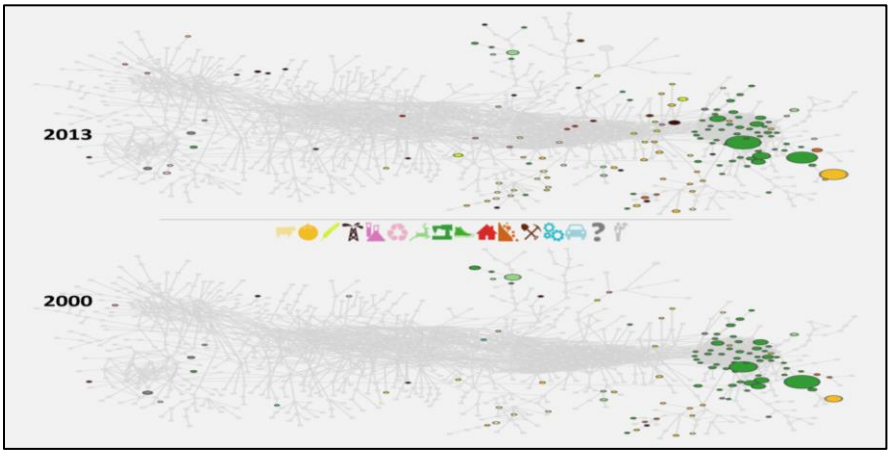


Note: Each node is a product that Pakistan exports, with an RCA index greater than or equal to 1, i.e., when its share of the country's export basket is greater than its share of world exports.
Source: The Atlas of Economic Complexity database, accessed 22 March 2016.

It is important to analyze Pakistan's location in the product space over the years. Figure 5 compares its position in 2000 and 2013, indicating that there has been no significant shift in Pakistan's exports, not has it acquired new areas of the product space. Pakistan has also been unable to diversify into more technologically sophisticated products toward the core of the product space. The only change we see is the addition of a few black nodes, representing mineral products such as chromium ore, and red nodes representing precious stones and jewelry in the periphery. Moreover, a new cluster of orange nodes has developed in 2013; these are mainly primary products such as animal and vegetable products with little or no significant contribution to exports. Overall, Pakistan's RCA seems to lie in peripheral products that require few capabilities. While structural transformation is easier for high-income countries located at the core of the product space, the diffusion to nearby peripheral products is relatively ineffective for poorer countries such as Pakistan.

Structural transformation requires not just an increase in the value of a country's exports, but also some movement toward more sophisticated products. While the value of Pakistan's total exports has more than doubled from US$7.95 billion in 2000 to US$25.6 billion in 2013 (The Atlas of Economic Complexity, n.d.), a closer look at the composition of exports is crucial because this directly affects patterns of specialization (Hidalgo et al., 2007). Figure 6 visualizes the product space similar to Figure 5, but with the size of each node representing the export share of that product in Pakistan's total exports.

Figure 6: Product space (export share) of Pakistan's exports, 2013 and 2000

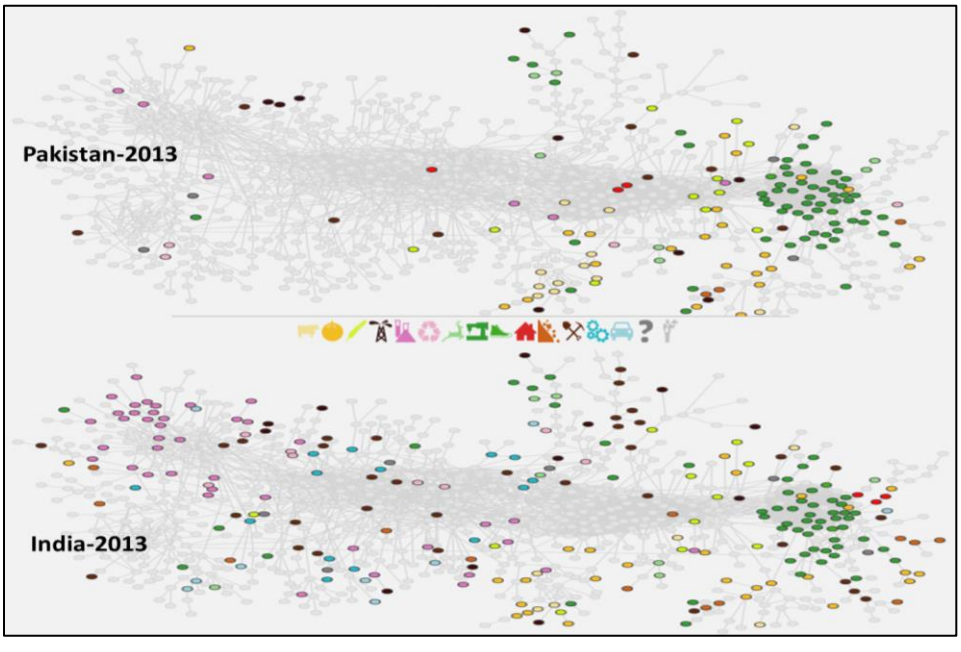


Note: Each node is the export share of the product relative to the country's total exports.
Source: The Atlas of Economic Complexity database, accessed 22 March 2016.

The green nodes constitute the largest share of the country's exports; these represent resource-based products such as textiles and garments. Following the green nodes are the yellow nodes, which also constitute a major share of total exports – again, representing primary exports such as rice.

A comparison of the structure of product space for India and Pakistan (Figure 7) in 2013 shows that India's exports are more spread out compared to Pakistan, thus making the movement to more sophisticated products at the core more likely.

Figure 7: Structure of product space: Pakistan and India, 2013



Note: Each node is a product that Pakistan exports, with an RCA index greater than or equal to 1, i.e., when its share of the country's export basket is greater than its share of world exports.
Source: The Atlas of Economic Complexity database, accessed 22 March 2016.

To return to our initial argument about diversification, in Section 2.1 we argued that diversification does guarantee not good performance in exports, as demonstrated by our analysis of the HCI (Figure 3). While Pakistan is more diversified than India, Pakistan's position in the product space suggests that its exports are concentrated in the periphery, making it difficult to diversify further under the existing structure of production. On the other hand, while India's exports are less diversified according to the

HCI, its position in the product space is more amenable to shifting production toward more sophisticated products at the core of the product space. This suggests that a country's location in the product space is key. India seems to have found a path of movement from the periphery toward the core of the product space. This export diversification, coupled with structural transformation, is what has resulted in economic growth and trade development for India. The primary nature of exports and location in the periphery without linkages to the core of the product space is one explanation for Pakistan's poor export performance.

4. Export Sophistication

The second approach focuses on the sophistication of Pakistan's exports by looking at their economic complexity and technological sophistication to see if this explains the country's poor export performance.

4.1 Economic Complexity

Hausmann et al. (2013) describe economic complexity as a measure of the intricate network of interactions and productive knowledge that a society mobilizes. The embedded knowledge or capabilities of a society are crucial to production and, therefore, the type of products produced in a country depends on the knowledge it has accumulated. Knowledge can be explicit or tacit. Explicit knowledge is obtained from external sources and transferred easily; tacit knowledge, on the other hand, is hard to embed in people and entails a long, costly process. It is the lack of tacit knowledge that restricts growth and development.

There is a causal relationship between knowledge and development – countries bearing complex knowledge are capable of producing complex products, and these are also the most prosperous economies (Hausmann et al., 2013). Therefore, "economic complexity is not just a symptom or an expression of prosperity: it is a driver" (Hausmann et al., 2013, p. 27). Moreover, economic complexity can be measured by the degree of diversity and ubiquity in the products exported, which in turn are crude measures of the capabilities available to a country (Yaméogo, Nabassaga & Ncube, 2014).[3] Diversity is defined as the number of products exported with a comparative advantage, whereas a product's ubiquity is the number of countries that can produce that product.

[3] See Hausmann et al. (2013) for details on the derivation of different economic complexity measures.

Economic complexity can be measured by analyzing the mix of products a country is able to make and can be increased by moving toward producing, and becoming competitive in, more complex products. Thus, a diverse and complex mix of products is synonymous with a diverse and complex economy. In 2000, Pakistan had an economic complexity index (ECI) of –0.8 and ranked at 94 out of 125 countries in the world. In 2013, not having improved much in terms of complexity, with an ECI of –0.66, Pakistan ranked at 89 out of 124 countries in the world (The Atlas of Economic Complexity, n.d.).

While the ECI is a number unique to each country and measures the average complexity of its products, the product complexity index (PCI) is a number unique to each product that measures its level of complexity (Yildirim, 2014). We use export data at the 3-digit SITC level (Revision 2) from the UN Comtrade database to list the top ten export products, based on their export share. Data from the Atlas of Economic Complexity yields PCI values for the period 2000–13 for the top ten exports in 2013. The average PCI scores for this period and the export share of the products are presented in Table 1, where the products are ranked according to their PCI value and not their export share.

Table 1: Average PCI scores (2000–13) and export share of top ten exports, 2013

SITC code	Product	PCI	As % of exports
651	Textile yarn	-0.21	9.06
848	Articles of apparel, clothing accessories, nontextile headgear	-0.37	2.79
842	Men's and boys' outerwear, textile fabrics, not knitted or crocheted	-0.61	4.21
843	Women's, girls' and infants' outerwear, textile, not knitted or crocheted	-0.70	2.94
846	Undergarments, not knitted or crocheted	-0.81	3.50
658	Made-up articles, wholly or chiefly of textile materials, n.e.s.	-1.40	14.51
845	Outerwear, knitted or crocheted, not elastic or rubberized	-1.07	3.20
61	Sugar and honey	-1.08	2.26
652	Cotton fabrics, woven (not incl. narrow or special fabrics)	-1.47	11.11
42	Rice	-1.98	8.40

Note: The table shows the PCI scores (in descending order) for Pakistan's top ten exports in 2013, accounting for 62 percent of its total exports.
Source: Authors' calculations based on the following data: (i) PCI values from The Atlas of Economic Complexity: http://atlas.cid.harvard.edu/rankings/product/2013/, accessed 15 March 2016; (ii) export values from the United Nations Commodity Trade Statistics database, accessed 21 March 2016.

The PCI index ranges from 2.2 to –3.2 for 1,220 products; a high value indicates a relatively complex product while a low PCI represents a less complex product. Table 1 shows that the PCI values for the country's top ten exports range from –0.21 to –1.98. The negative range indicates that Pakistan's top exports rank poorly in terms of PCI. This implies that these products are neither complex nor sophisticated and do not require advanced technologies. Therefore, there is a need to transform these products into higher value-added products generating greater foreign exchange revenue and improving domestic employment.

4.2 Technological Sophistication of Exports

Technology plays a significant role in trade patterns. According to Lall (2000), the evolution of export patterns is dependent on the following: the interaction of technical progress internationally, degree of exposure to foreign competition, local capabilities and the rate of increase in wages. Moreover, different export structures have different implications for the growth and industrial development of a country. Technologically intensive structures offer better growth prospects owing to products with greater export demand, more scope for the application of scientific knowledge and spillovers in new skills and knowledge. Countries with simple technological structures, such as Pakistan, experience slower growing markets with limited learning potential and little scope for technological upgrading and, therefore, fewer spillovers to other activities (Lall, 2000).

According to Nixson (1990), developing countries adopt rapid industrialization strategies that start with relatively simple technologies that have the potential to be labor-intensive and absorb excess labor. Therefore, establishing a broad, robust industrial base is not only crucial for development, but also for long-term growth. Rodrik (2006) states that a dynamic industrial base can result in sustained growth. While Felipe (2007) argues that Pakistan is experiencing "relative stagnation in the manufacturing sector", an updated study by Hamid and Khan (2015) describes the situation as much worse: not only is the manufacturing sector experiencing stagnation, it may also be on the path to "premature deindustrialization."

Studies show that countries with complex productive structures have the advantage of producing goods that other countries cannot. This is because the required human and physical capital along with technological and institutional capabilities is not available everywhere. Therefore, rich countries tend to export complex or more sophisticated products while

poor countries are restricted to exporting primary, low-tech products (see, for instance, Hidalgo & Hausmann, 2009; Hausmann et al., 2013).

Based on Lall's (2000) technological classification of exports, we identify three main categories: primary products, manufactured products and other transactions. Manufactured products are further categorized as resource-based, low-technology, medium-technology and high-technology manufactures. According to Lall, technological intensity is a combination of the innovation taking place in R&D as well as the ability of an economy to reduce costs and achieve economies of scale. The categorization does not reflect the level of technology involved in production activities and upgrading over time. Activities at different levels of technological complexity can fall under the same product category for the purpose of aggregation. Therefore, while we are able to roughly ascertain which category a product falls under, we cannot distinguish between quality differences or the processes involved in production.

Using this categorization, we categorize Pakistan's exports based on export data from UN Comtrade at the 3-digit SITC level (Revision 2). Figure 8 shows the trend in Pakistan's export performance on the technological front for the period 2000–13. Pakistan relies heavily on exporting low-technology products, which constitute the biggest share of its total exports, followed by primary, resource-based, medium-technology and high-technology products, respectively. These low-tech products have simple skill requirements and are undifferentiated; they compete mainly on price, making labor cost an element of cost competitiveness. They represent the green cluster of nodes in the periphery of the product space (see Figures 5 and 6).

The share of primary exports has risen over the years and stands at almost 18 percent of exports in 2013. Moreover, high-tech and medium-tech products, which are located at the core of the product space, do not contribute significantly to Pakistan's total exports. The greatest share ever achieved for high-tech products was 1.54 percent in 2007, but this has never exceeded 2 percent of total exports. The share of medium-tech products also remains below 10 percent.

Figure 8: Pakistan's export performance, 2000–13

Source: Authors' calculations based on data from the United Nations Commodity Trade Statistics database (accessed 21 March 2016), applied to Lall's (2000) technological classification of exports.

Figure A1 in the Appendix uses SITC 3-digit (Revision 2) data from UN Comtrade to classify exports by technological intensity and share of total exports. In 2013, within the category of low-tech (LT1) products, the largest share of exports (56.8 percent) was that of textiles, garments and footwear. The figure further illustrates that, within primary products, rice constitutes 8.4 percent of total exports, followed by dried fruit (1.7 percent) and cotton (1.3 percent). Agro-based exports, constituting 5.5 percent, are dominated by sugar and honey. Similarly, lime, cement and building products dominate the resource-based 'other' (RB2) category. Medium-tech 'process' goods constitute only 6 percent of total exports and woven manmade fabric, along with alcohols, phenols and their derivatives, are more than half of this category. The share of high-tech products is less than 2 percent of total exports.

Based on these numbers, it is clear that Pakistan's exports are restricted to low-tech products that are based on primary resources and involve a low level of technology in manufacturing. In addition, the diminishing share of low-tech products and the growth of primary exports is cause for concern because it suggests deteriorating terms of trade in the

future (see Table A1 in the Appendix for a detailed description of the products exported under each category).

5. Some Observations and the Way Forward

Studies show that the differences in specialization patterns across countries are economically meaningful and determine the quality of countries' export baskets (Hausmann et al., 2005). Pakistan's export performance can be described as paradoxical. While its exports have become more diversified over the past decade, this diversification has not translated into higher exports. Our understanding of why diversification has not paid off for Pakistan is explained by the location of its exports in the product space. Pakistan's exports lie in the peripheral region – in order words, Pakistan is not located in the densely populated area of the product space, leaving it without a path to diversifying exports into a more sophisticated structure of production.

Pakistan's export basket is neither complex nor technologically sophisticated. Producing low-tech, undifferentiated products implies that these products compete on price, with labor costs being a major element of cost competitiveness. By not moving up the value chain, Pakistan is facing competition from lower-income countries exporting low-tech products at more competitive wage rates (Felipe, 2007; Hausmann & Klinger, 2008; Haque, 2014). Meanwhile, countries in the comparator income group have explored the product space and moved to new, high-wage, capital-intensive activities.

Weak institutions pose a public good problem whereby firms are unable to keep private the benefits of opening up to new export markets: any activity is quickly imitated, leading to an "entrepreneurial gamble" (Cadot, Carrère & Strauss-Kahn, 2011). Moreover, Pakistan's industrial policy does not appear to be in consonance with its export policy. For instance, to produce sophisticated products, it would have to reduce the cost of intermediate inputs. In the case of imported intermediary goods, the import policy needs to be revisited. The current import policy is on the opposite track – in March 2016, the Pakistan government doubled the regulatory duty on iron and steel imports to 30 percent.[4] Such taxation is discouraging for the engineering industry, which lies at the core of the product space.

[4] https://www.thenews.com.pk/print/107228-Govt-doubles-regulatory-duty-on-iron-steel-imports-to-30pc#

Furthermore, we must be cognizant of the future of the existing top exports. According to the Pakistan Economic Survey for 2015/16, cotton manufactures account for 55.4 percent of Pakistan's total exports. However, globally cotton constitutes only 33 percent of apparel consumption because synthetic fibers are a substitute for cotton with about a 60 percent share. The policy of heavy taxation or restrictions on the import of synthetic products needs to be revisited for Pakistan to produce textile products that are higher up on the value chain and growing in demand.

Instead of just 'picking the winners', as Felipe (2007) aptly puts it, Pakistan's industrial policy needs to create broad-based incentives for exporters and involve public–private partnerships that will encourage private entrepreneurs to take risks and invest in new activities by sharing the cost of R&D. This will help identify any market failures that impede structural transformation and further transform the economy by allowing institutions of change to evolve.

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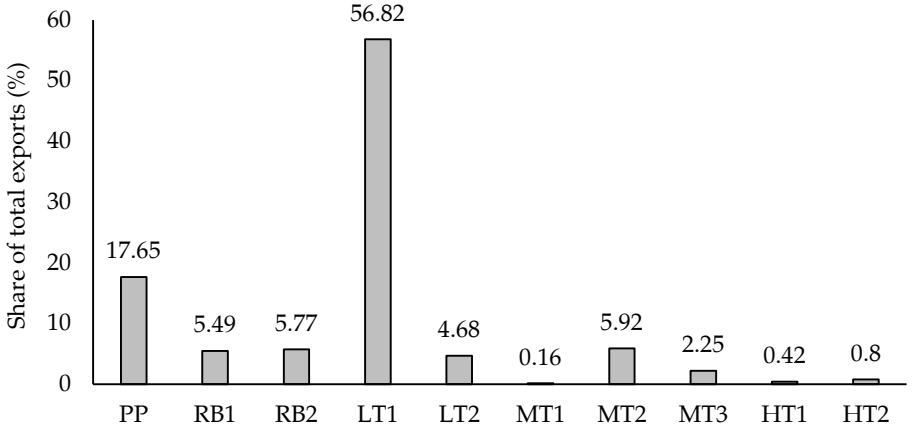
Appendix

Figure A1: Technological classification of exports as a share of total exports, 2013



Note: Based on SITC 3-digit, Revision 2 classification.
PP = primary products, RB1 = agro-based products, RB2 = other resource-based products, LT1 = textiles, garments and footwear, LT2 = other low-technology products, MT1 = automotive products, MT2 = process products, MT3 = engineering products, HT1 = electronic and electrical products, HT2 = other high-technology products.
Source: Authors' calculations based on data from the United Nations Commodity Trade Statistics database (accessed 21 March 2016) applied to Lall's (2000) technological classification of exports.

Table A1: Technological classification of exports, 2013

Commodity code/description		Trade value (US$)	Export share (%)
Primary products (PP)			17.650
1	Live animals for food	15,942,863	0.053
11	Meat: fresh, chilled, frozen	212,498,500	0.846
22	Milk and cream	91,861,370	0.366
25	Eggs, birds: fresh, preserved	7,240,980	0.029
34	Fish: fresh, chilled, frozen	217,609,529	0.866
36	Shellfish: fresh, frozen	102,539,411	0.408
41	Wheat etc., un-milled	39,173,847	0.156
42	Rice	2,110,992,349	8.403
43	Barley, un-milled	66,233	0.000
44	Maize, un-milled	30,661,850	0.122
45	Cereals n.e.s., un-milled	150,373	0.001
54	Vegetables etc.: fresh, simply preserved	237,581,508	0.946
57	Fruit, nuts: fresh, dried	434,135,873	1.728
71	Coffee and substitutes	124,394	0.000
72	Cocoa	1,521	0.000
74	Tea and mate	14,133,202	0.056
75	Spices	62,531,000	0.249
81	Feeding stuff for animals	91,288,501	0.363
91	Margarine and shortening	675	0.000
121	Tobacco: unmanufactured, refuse	23,900,103	0.095
211	Hides, skins, excl. furs: raw	742,573	0.003
222	Seeds for soft fixed oils	65,625,901	0.261
223	Seeds for other fixed oils	5,343,348	0.021
232	Natural rubber, gums	43,491	0.000
244	Cork: natural, raw, waste	9,895	0.000
245	Fuelwood n.e.s., charcoal	755	0.000
246	Pulpwood, chips, wood waste	19,838	0.000
261	Silk	140,706	0.001
263	Cotton	313,412,688	1.248
268	Wool (excl. tops), animal hair	15,924,451	0.063
271	Fertilizers, crude	1,627,457	0.007
273	Stone, sand and gravel	83,304,558	0.332
277	Natural abrasives n.e.s.	67,593	0.000
278	Other crude minerals	122,506,513	0.488
291	Crude animal materials n.e.s.	48,771,728	0.194
292	Crude vegetable materials n.e.s.	30,671,741	0.122
322	Coal, lignite and peat	309,968	0.001
341	Gas, natural and manufactured	430	0.000
681	Silver, platinum, etc.	8,681	0.000

Commodity code/description		Trade value (US$)	Export share (%)
682	Copper, excl. cement copper	42,888,752	0.171
684	Aluminum	601,713	0.002
685	Lead	11,262,657	0.045
686	Zinc	766,471	0.003
Resource-based products			11.259
RB1: agro-based			5.487
12	Meat: dried, salted, smoked	73,457	0.000
14	Meat: prepared, preserved, n.e.s. etc.	1,268,989	0.005
23	Butter	516,565	0.002
24	Cheese and curd	31,165	0.000
35	Fish: salted, dried, smoked	12,981,337	0.052
37	Fish etc.: prepared, preserved, n.e.s.	11,377,934	0.045
46	Wheat etc., meal or flour	209,006,254	0.832
47	Other cereal meals, flour	5,498,103	0.022
48	Cereal etc. preparations	74,670,038	0.297
56	Vegetables etc.: preserved, prepared	27,997,278	0.111
58	Fruit: preserved, prepared	53,411,599	0.213
61	Sugar and honey	568,391,733	2.263
62	Sugar: candy, nonchocolate	73,401,798	0.292
73	Chocolate and products	207,018	0.001
98	Edible products, preparations n.e.s.	25,255,041	0.101
111	Nonalcoholic beverages n.e.s.	7,538,772	0.030
112	Alcoholic beverages	33,994	0.000
122	Tobacco: manufactured	2,496,753	0.010
233	Rubber: synthetic, reclaimed	5,209,904	0.021
248	Wood: shaped, sleepers	18,123	0.000
251	Pulp and waste paper	220,500	0.001
264	Jute, other textile-based fibers	20,035	0.000
269	Waste of textile fabrics	39,562,166	0.158
423	Fixed vegetable oils, soft	195,945	0.001
424	Fixed vegetable oils, nonsoft	4,203,298	0.017
431	Processed animal/vegetable oils etc.	150,613,833	0.600
621	Materials of rubber	1,929,974	0.008
625	Rubber tyres, tubes etc.	7,334,099	0.029
628	Rubber articles n.e.s.	1,153,388	0.005
633	Cork manufactures	287	0.000
634	Veneers, plywood, etc.	5,251,928	0.021
635	Wood manufactures n.e.s.	11,426,948	0.046
641	Paper and paperboard	77,064,943	0.307
RB2: other			5.772

Commodity code/description		Trade value (US$)	Export share (%)
281	Iron ore, concentrates	4,793,215	0.019
282	Iron and steel scrap	14,221,794	0.057
287	Base metal ores, conc. n.e.s.	116,160,351	0.462
288	Nonferrous metal scrap n.e.s.	125,160,317	0.498
289	Precious metal ores, waste n.e.s.	25,752	0.000
323	Briquets, coke, semi-coke	289,313	0.012
334	Petroleum products, refined	525,964,153	2.094
335	Residual petroleum products n.e.s.	641,998	0.003
411	Animal oils and fats	55,702	0.000
511	Hydrocarbons n.e.s., derivatives	15,156,846	0.060
514	Nitrogen-function compounds	252,024	0.001
515	Organic/inorganic compounds etc.	99,037	0.000
516	Other organic chemicals	680,093	0.003
522	Inorganic elements, oxides, etc.	10,633,564	0.042
523	Other inorganic chemicals etc.	22,436,237	0.089
531	Synthetic dyes, natural indigo, lakes	6,239,897	0.025
532	Dyes n.e.s., tanning products	104,980	0.000
551	Essential oils, perfumes etc.	982,418	0.004
592	Starch, inulin, gluten, etc.	19,500,502	0.078
661	Lime, cement, building products	552,598,949	2.200
662	Clay, refractory building products	2,484,030	0.010
663	Mineral manufactures n.e.s.	14,810,927	0.059
664	Glass	8,642,368	0.034
667	Pearls, precious, semiprecious stones	5,273,650	0.021
689	Nonferrous base metals n.e.s.	75,686	0.000
Low-technology products			61.503
LT1: textiles, garments and footwear			56.823
611	Leather	528,955,798	2.106
612	Leather etc., manufactures	14,978,822	0.060
613	Fur skins: tanned, dressed	297,282	0.001
651	Textile yarn	2,275,512,911	9.058
652	Cotton fabrics, woven	2,790,070,484	11.107
654	Other woven textile fabric	3,910,776	0.016
655	Knitted etc. fabrics	32,628,432	0.130
656	Lace, ribbons, tulle etc.	11,784,772	0.047
657	Special textile fabrics, products	41,067,040	0.164
658	Textile articles n.e.s.	3,645,884,429	14.513
659	Floor coverings etc.	128,316,932	0.511
831	Travel goods, handbags	33,305,672	0.133
842	Men's outerwear, not knitted	1,056,655,507	4.206
843	Women's outerwear, not knitted	738,558,991	2.940

Commodity code/description		Trade value (US$)	Export share (%)
844	Undergarments, not knitted	26,477,645	0.105
845	Outerwear, knitted, nonelastic	803,725,950	3.199
846	Undergarments, knitted	878,298,401	3.496
847	Textile clothing accessories n.e.s.	456,530,433	1.817
848	Headgear, nontextile clothing	699,649,869	2.785
851	Footwear	107,829,218	0.429
LT2: other products			4.680
642	Paper etc., precut, articles thereof	24,766,515	0.099
665	Glassware	7,934,693	0.032
666	Pottery	1,111,751	0.004
673	Iron, steel: shapes etc.	2,672,061	0.011
674	Iron, steel: universals, plates, sheets	12,308,516	0.049
676	Railway rails etc.: iron, steel	18,043,744	0.072
677	Iron, steel wire (excl. w/ rod)	135,758	0.001
679	Iron, steel castings, unworked	749,242	0.003
691	Structures and parts n.e.s.	51,223,441	0.204
692	Metal tanks, boxes etc.	7,123,230	0.028
693	Wire products, nonelectric	666,806	0.003
694	Steel, copper: nails, nuts etc.	2,342,438	0.009
695	Tools	10,650,319	0.042
696	Cutlery	82,327,050	0.328
697	Base metal household equipment	45,473,707	0.181
699	Base metal manufactures n.e.s.	8,005,288	0.032
821	Furniture, parts thereof	100,832,479	0.401
893	Articles of plastic n.e.s.	94,108,318	0.375
894	Toys, sporting goods, etc.	221,215,945	0.881
895	Office supplies n.e.s.	6,318,000	0.025
897	Gold, silverware, jewelry	431,960,238	1.720
898	Musical instruments, parts	3,240,468	0.013
899	Other manufactured goods	42,451,838	0.169
Medium-technology manufactures			4.680
MT1: automotive			0.157
781	Passenger motor vehicles excl. buses	1,312,437	0.005
782	Lorries, special motor vehicles n.e.s.	5,202,243	0.021
783	Road motor vehicles n.e.s.	3,352,493	0.013
784	Motor vehicle parts, accessories n.e.s.	22,259,080	0.089
785	Cycles etc., motorized or not	7,342,382	0.029
MT2: process			5.915
266	Synthetic fibers to spin	950,319	0.004

Commodity code/description		Trade value (US$)	Export share (%)
267	Other manmade fibers	444,815	0.002
512	Alcohols, phenols etc.	356,735,398	1.420
513	Carboxylic acids etc.	23,422,118	0.093
533	Pigments, paints, etc.	37,288,659	0.148
553	Perfumery, cosmetics, etc.	19,294,789	0.077
554	Soap, cleansing etc. preparations	40,540,018	0.161
572	Explosives, pyrotechnic products	310,145	0.001
582	Products of condensation etc.	233,587,133	0.930
583	Polymerization etc. products	119,851,709	0.477
584	Cellulose derivatives etc.	133,232	0.001
585	Plastic material n.e.s.	120,057,787	0.478
591	Pesticides, disinfectants	6,480,134	0.026
598	Misc chemical products n.e.s.	13,656,540	0.054
653	Woven manmade fiber fabric	412,220,234	1.641
671	Pig iron etc.	2,786,205	0.011
672	Iron, steel: primary forms	9,662,030	0.039
678	Iron, steel: tubes, pipes etc.	87,572,244	0.349
786	Trailers, nonmotor vehicles n.e.s.	628,875	0.003
791	Railway vehicles	29,925	0.000
882	Photo, cinema supplies	336,075	0.001
MT3: engineering			2.253
711	Stream boilers and aux plants	1,404,494	0.006
713	Internal combustion piston engines	6,142,974	0.025
714	Engines and motors n.e.s.	2,122,269	0.008
721	Agricultural machinery excl. tractors	5,714,018	0.023
722	Tractors, nonroad	33,949,447	0.135
723	Civil engineering equipment etc.	9,910,121	0.039
724	Textile, leather machinery	13,957,565	0.056
725	Paper etc. mill machinery	655,256	0.003
726	Printing, bookbinding machinery, parts	872,612	0.004
727	Food machinery, nondomestic	8,118,421	0.032
728	Other machinery for special industries	9,164,996	0.037
736	Metal working machines, tools	3,885,149	0.016
737	Metal working machinery n.e.s.	536,292	0.002
741	Heating, cooling equipment	17,106,955	0.068
742	Pumps for liquids etc.	5,884,095	0.023
743	Pumps n.e.s., centrifuges etc.	10,065,458	0.040
744	Mechanical handling equipment	2,173,280	0.009
745	Nonelectric machinery, tools n.e.s.	5,756,833	0.023
749	Nonelectric machinery parts, accessories n.e.s.	2,533,596	0.010

Commodity code/description		Trade value (US$)	Export share (%)
763	Sound recorders, phonographs	164,316	0.001
772	Switchgear etc., parts n.e.s.	3,557,542	0.014
773	Electrical distributing equipment	8,124,323	0.032
775	Household-type equipment n.e.s.	70,996,357	0.283
793	Ships and boats etc.	12,670,738	0.050
812	Plumbing, heating, lighting equipment	7,466,942	0.030
872	Medical instruments n.e.s.	315,731,666	1.257
884	Optical goods n.e.s.	1,941,576	0.008
885	Watches and clocks	1,364,153	0.005
951	War firearms, ammunition	3,934,969	0.016
High-technology manufactures			1.221
HT1: electronic and electrical			0.416
716	Rotating electric plants	13,019,405	0.052
718	Other power generating machinery	1,781,606	0.007
751	Office machines	159,953	0.001
752	Automatic data processing equipment	1,389,723	0.006
759	Office, ADP machinery parts, accessories	2,366,468	0.009
761	Television receivers	22,161	0.000
764	Telecom equipment, parts, accessories n.e.s.	55,089,046	0.219
771	Electric power machinery n.e.s.	3,032,825	0.012
774	Electro-medical, x-ray equipment	2,124,771	0.009
776	Transistors, valves etc.	41,297	0.000
778	Electrical machinery n.e.s.	25,511,509	0.102
HT2: other			0.805
524	Radioactive etc. material	172,796	0.001
541	Medicinal, pharm products	169,570,093	0.675
712	Steam engines, turbines	186,610	0.001
792	Aircraft etc.	2,495,940	0.010
871	Optical instruments	55,432	0.000
874	Measuring, controlling instruments	29,744,476	0.118
881	Photo apparatus, equipment n.e.s.	8,058	0.000

Note: Based on SITC 3-digit, Revision 2 classification.
Source: Authors' calculations based on data from the United Nations Commodity Trade Statistics database (accessed 7 March 2016) and Lall's (2000) technological classification of exports.