Inter-Linkages
between
Exports and
Employment
in **India:** An Update

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INTER-LINKAGES BETWEEN EXPORTS AND EMPLOYMENT IN INDIA: AN UPDATE

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EXECUTIVE SUMMARY

Using Input-Output (IO) analysis, this study provides aggregate and sector level time series estimates of the number of jobs supported by India's merchandise and services exports during the period 1995-2018. Two sets of estimates have been reported. The first set of estimates, for the period 1995-2018 and for 45 sectors, is obtained from the OECD's 'Trade in Employment' (TiM) database. The second set of estimates, for the period 2011-12 to 2017-18 and for 63 sectors, is based on India's official Supply Use Tables (SUT) prepared by the Central Statistical Office (CSO). This study updates an earlier Exim Bank (2016) estimates for the period 1999-2000 to 2012-13. A major advantage of the IO analysis is that it enables us to obtain not only the direct employment effect within an exporting sector but also the indirect employment effects due to the given exporting sectors' backward linkages with other domestic sectors.

As per the OECD-TiM estimates, the total number of jobs supported by Indian exports increased steadily from 35.7 million in 1995 to 73.9 million in 2008. This upward trend was halted briefly in the aftermath of the global financial crisis, as the number of export related jobs declined to 65.1 million in 2009 and 70.1 million in 2010. However, as export growth picked up, the number of jobs tied to exports further increased to 75.1 million in 2011 and reached an all-time peak of 75.6 million in 2012. As export growth slowed down during the post-2012 period, the number of jobs tied to exports gradually declined to 58.2 million in 2018. The SUT based estimates for the period 2011-12 to 2017-18 are similar to the TiM estimates. According to the SUT based estimates, India's exports supported 58.1 million jobs in 2017-18 down from 69.4 million jobs in 2011-12. Manufacturing sector accounts for the largest share of the total number of jobs attributed to exports, followed by services and agriculture.

Exports in 2017-18 supported about 43.4 million jobs for males and 14.7 million jobs for females. About 37.5% of the total number of export related jobs went to the categories of workers with relatively higher educational attainments, consisting of 21.4% for workers with secondary and higher secondary attainment and 16.1% for the category of diploma holders, graduates and post-graduates. About 76% of total export related jobs for workers with secondary and higher secondary attainment can be attributed to manufactured exports. On the other hand, more than half of total export related jobs for the category of diploma holders, graduates and post-graduates can be attributed to exports from the services sector. The analysis suggest that, as compared to a growth strategy based on selling in the domestic market, a strategy based on exports as the main engine of growth can support relatively greater employment opportunities for women workers and for the categories of workers with educational attainments above middle school level.

INTRODUCTION

According to a recent Report from the McKinsey Global Institute, between 2023 and 2030, it is imperative for India to create at least 90 million new non-farm jobs to absorb the 60 million new workers who will enter the workforce based on current demographics, and an additional 30 million workers who could move from farm work to non-farm sectors. To achieve this magnitude of employment growth, India's GDP should grow by 8.0 to 8.5% annually over the next decade (McKinsey Global Institute, 2020). However, given the increasing debt burden of households, firms, and governments, it is unlikely that domestic market would emerge as the engine of Indian growth in the medium term (Chatterjee and Subramanian, 2020). On the other hand, India still has a huge unexploited export opportunity, particularly in low skill manufacturing (Veeramani and Dhir 2016; Chatterjee and Subramanian, 2020). India also has a significant unexploited export potential in industries where global value chains (GVCs) are most common and entrenched (Athukorala, 2014; Veeramani and Dhir, 2017; Ministry of Finance, 2020). This includes network product industries such as electronics, electrical machinery, computers and road vehicles as well as the traditional unskilled labor intensive industries such as apparel, footwear and leather.

Further, in the aftermath of Covid-19 pandemic, there is a growing realization among multinational enterprises (MNEs) that they need to diversify their supply chains in the future. Even before the pandemic, the US-China trade war and rising wages in China have already created incentives for some of the MNEs to relocate supply chains to other parts of Asia. Potential realignment of the global value chains (GVCs) provides an opportunity for India to replace China as the major assembly hub for manufactured exports. This, can create millions of job for India's low skilled labor by accelerating the process of the so-called Lewisian transformation - that is, by transferring the surplus labor from agriculture to higher productivity activities in manufacturing and services sectors. Export growth through the exploitation of these opportunities is a feasible way of increasing gainful and productive employment opportunities for India's burgeoning youth population.

In anticipation of these opportunities, during the recent years, the Government has undertaken a number of policy initiatives to attract globally competitive companies to India. Some of the important measures include the introduction of the Production Linked Incentive scheme (PLIs), corporate tax cuts, simplification of labor laws, ease of doing business reforms, and opening up of various sectors for 100% Foreign Direct Investment (FDI) through the automatic route. Recently, India has signed free trade agreements with United Arab Emirates and Australia and negotiations are underway with European Union, United Kingdom, Canada, Israel and the Eurasian Economic Union. Indeed, India has surpassed the target of US$400 billion in merchandise exports

in the financial year 2022. Merchandise exports stood at US$ 421.9 billion in 2021-22 with a growth rate of about 45% as compared to 2020-21. During this period, the value (in US$) of services exports also recorded robust growth rate of 23.5%[1], amounting to US$ 254.5 billion.

1.1 Mismatch between Economic Growth and Productive Employment

Being the fastest growing major economy in the world, India is expected to be one of the top three economic powers in the world over the next 10-15 years. Its real GDP growth has averaged 6.8% annually since 1992 and more than 270 million people have escaped extreme poverty since 2005 (McKinsey Global Institute, 2020). However, the country's growth turnaround has not been accompanied by a commensurate increase in productive employment opportunities for the masses. India has been facing what some may perceive as a paradox: decades of impressive growth rates have done too little to create productive and inclusive employment growth. During the period 1999-2000 to 2018-19, total employment grew from about 400 million to 476 million at the rate of just 0.7% per annum, much slower than the growth rate of real GDP. Employment in the manufacturing sector, during the same period, increased from 43 million to 53 million at the rate of 0.9% per annum[2].

The slow growth of productive employment is worrisome as India is still characterized by persistent poverty, a burgeoning youth population, and high levels of informal jobs. As per the estimates by the International Labor Organization (ILO), informal employment accounted for about 88% of total employment in the economy (ILO, 2018). A job in the informal sector is usually a fallback option when formal sector jobs are not available. Formal sector jobs provide higher wages, higher job security, better working conditions, and greater opportunities for upward mobility. Limited job creation in the formal economy implies that for many people the only option is to seek poorly paid works in the informal sector. India's growing youth workforce offers a major demographic dividend, but only if the country can create enough good jobs to employ everyone—and that means increasing wages and reducing informal employment.

The apparent mismatch between economic growth and job creation in the formal sector is closely connected to the unique pattern of India's structural transformation. The growth process has not been effective in transferring the large pools of surplus labor from India's agriculture to non-agriculture sectors. Agriculture & allied sector accounted for 17.1% of India's GDP in 2018-19 but employed about 44% of the total workforce (Ministry of Finance, 2021). Despite two decades of economic liberalization, the share of manufacturing value added in India's GDP declined from 15.7% in 1991 to 13% in 2020 (World Bank, 2021). Manufacturing sector accounted for only 11.3% of total employment in the country in 2020[3]. The slow pace of structural change, in terms of transferring the large pools of surplus labor from agriculture to non-agriculture, is the result of an idiosyncratic pattern of India's growth process based on a relatively high level of specialization in skill and capital-intensive industries and services rather than labor-intensive ones (Kochhar et al, 2006; Panagariya, 2007; Chatterjee and Subramanian, 2020). The fast-growing exports from the country are either skilled labor intensive or capital intensive (Veeramani, 2012; Veeramani and Aerath, 2020). Given the fact that India's true comparative advantage lies in labor intensive activities, the pattern of its export specialization is an anomaly. India is yet to fully exploit the opportunities in the export market.

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[1] As compared to the pre-pandemic period of 2019-20, the growth rates of exports during 2021-22 still stand high at 34.6% and 19.4%, respectively, for merchandise and services
[2] Estimates of employment are based on India-KLEMS database
[3] https://ilostat.ilo.org/

1.2 Exports Offer a Viable Path to More (and Better) Job Creation for the Masses

It is important to find ways of increasing the pace at which good jobs are being created in the country. Export growth is one of the feasible strategies to achieve this for a number of reasons.

- Needless to say, the world market is much larger than any domestic market. Domestic markets can be too small to allow companies and sectors reach their optimal size. On the other hand, the opportunity to sell in larger world market gives firms the chance to take advantage of economies of scale. Chatterjee and Subramanian (2020) show that India's domestic market is very small - smaller than the headline GDP number and only a small fraction of the world market.

- Companies can take advantage of price differences between local and international markets increasing their own profits but eventually also national income and employment. This in turn enables the import of intermediate inputs and technologies that cannot be (efficiently) produced domestically.

- Access to global inputs can help improve products and production processes in ways that can make firms more productive, and hence growth.

- Exposure to foreign markets, through both imports and exports, can lead to international knowledge spillovers, learning and technological upgrading and increased domestic productivity.

- Exporting can trigger structural transformation and the development of value-added industries and hence the creation of higher wage jobs.

- Competition from foreign markets imposes discipline on firms and generates incentives to reduce waste and become more efficient.

- A number of empirical studies from different countries show that, in general, exporting firms are bigger, more productive, and pay higher wages to workers than their non-exporting counterparts (see Bernard, Jensen & Lawrence, 1995; Bernard, Jensen, Redding & Schott, 2007; Damijan, Jože P., Polanec, Sašo, Prašnikar & Janez, 2004; Helpman, Melitz & Yeaple, 2004; Bernard & Wagner, 1997; Baldwin & Gu, 2003).

- A recent study by ILO and World Bank shows that informality in the labour market of South Asia declined with increased export orientation and that rising exports per person is associated with rising wages per worker (Artuc, Lopez-Acevedo, Robertson and Samaa, 2019). It finds that increasing exports per worker would result in higher wages for workers generally found in the formal sector and falling informality for many marginalized groups. Scaling up exports in labor-intensive industries could significantly lower informality for groups like rural and less-educated workers. Other workers would also benefit from increasing skills and the participation of women and young workers in the labor force.

1.3 Exports and Jobs: Not a Straightforward Relationship

Whether exports offer a viable path to more (and better) job creation for the masses in India is a question with considerable policy implications. Indeed, the availability of a vast labor force with relatively low skill provides India with a comparative advantage in the production and export of labor-intensive manufactured products. However, the nature of the relationship between exports and domestic job creation is not a straightforward one, and often poorly understood, particularly in the context of rapid spread of GVCs. The spread of GVCs implies that intermediate inputs cross borders several times during the manufacturing process, which in

turn makes the interpretation of trade statistics problematic. For, unlike the way domestic transactions are recorded, trade data are usually collected and reported as gross flows at each border crossing rather than the net value added between border crossings. This leads to double (or multiple) counting, meaning that customs data do not properly capture the domestic value added (DVA) content of a country's exports. Yet, domestic value addition is what really matters for job creation within the borders of a country. Today's complex trade and investment networks imply that understanding of the relationship between exports and employment requires reliable estimates of the DVA content of exports taking into account the input-output (IO) linkages of the exporting sectors that increasingly span borders.

Estimates of the number of jobs supported by exports are produced regularly using input-output (IO) analysis in U.S., Canada, U.K. and EU. The IO tables describe the monetary flows of goods and services in the economy, and the relationships between industries, types of final demand (such as household consumption, exports etc.) and inputs. A major advantage of the IO table based estimation is that it enables us to obtain not only the direct employment effect of exports within a given sector but also the indirect employment effects due to the exporting sectors' backward linkages with other domestic sectors.

Using IO analysis, the present study provides aggregate and sector level time series estimates of the number of jobs supported by India's merchandise and services exports during the period 1995-2018. Using different data sources, two sets of employment estimates attributed to exports are provided. First, using the OECD's 'Trade in Employment' (TiM) database, the estimates of the number of jobs tied to India's merchandise and services exports during the period 1995-2018 are reported. The TiM estimates, based on OECD's Inter-Country Input-Output (ICIO) database, are available on an annual basis for 45 unique sectors covering the whole economy. Second, using the official Supply Use Tables (SUT) prepared by India's Central Statistical Organization (CSO), another set of estimates for the period 2011-12 to 2017-18 are provided. The SUT based estimates are provided for 63 unique sectors covering the whole economy. The present study updates the earlier Exim Bank estimates for the period 1999-2000 to 2012-13[4].

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[4] Inter-Linkages Between Exports and Employment in India, Export Import Bank of India, Occasional Paper No. 179, November 2016

Chapter
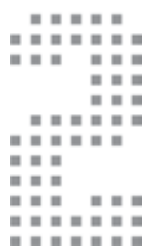
REVIEW OF RELATED LITERATURE

2.1 Export Performance

Liberalization of trade and exchange rate controls has been central to the structural adjustment programs implemented by India since the early 1990s. In order to reduce the anti-export bias of the past protectionist policies, the government introduced a major downward adjustment in the Rupee exchange rate against the major international currencies in July 1991 and full current account convertibility in August 1994. The quantitative restrictions (QRs) on capital and intermediates goods imports were mostly dismantled in 1992, while the ban on importing consumer goods continued until the late 1990s. Customs duties in the manufacturing industries were gradually reduced from about 128% before 1991 to 34% in 1998 and 8.9% in 2008. Following the tariff reductions introduced in March 2007, India's tariff rates had been brought down to a level close to the average for developing countries (Pursell et al 2008). However, from around 2010, India has witnessed some reversal of the trade liberalisation process. India's average import tariffs in manufacturing sector increased slowly but steadily from 12% in 2010 to 15.4% in 2019.

In contrast to the pre-reform period, Indian exports grew faster than world exports during the 1990s and 2000s (Veeramani, 2007, 2012). The first decade of reforms (from 1993-94 to 2001-02) was characterized by a relatively low growth rate of dollar export earnings at 8% per year, while the second decade (2002-03 to 2010-11) stood apart for its strong growth rate of 21% a year. Exports have made a substantial contribution to GDP growth, accounting for about one-third of "exogenous" aggregate demand (Chatterjee and Subramanian, 2020). Capital and skill-intensive commodities and services such as pharma, auto and IT services recorded faster export growth rate than traditional labor-intensive products such as apparel, textiles, leather and footwear (Panagariya, 2008; Veeramani 2012). The share of unskilled labor-intensive industries in India's non-oil merchandise exports declined significantly from 30.7% in 2000 to 16.3% in 2018 (Ministry of Finance, 2020). During 2000-2011, exports grew at an annual rate of 21% and 24%, respectively, for goods and services. However, exports of goods completely stagnated with an annual growth rate of nearly 0% during 2012-19, while the growth rate of services exports declined noticeably to 5.9%. (Veeramani and Aerath 2020; Ministry of Finance, 2020). The financial year 2021-22, however, witnessed a high growth of both merchandise and services exports.

Though India's share in world merchandise exports increased from 0.6% in 1991 to 1.6% in 2020, it remains paltry compared to a whopping 14.7% for China. Veeramani, Aerath and Gupta (2018) show that China-India gap in their world market shares is almost fully driven by a lack of specialization (intensive margin)

by India. On the other hand, India is clearly catching up with China in terms of diversification (extensive margin) across products and markets. The low intensive margin and relatively high extensive margin implies that India has been spreading its exports thinly over many products and trading partners. In contrast, China shows a very high intensive as well as extensive margin. India's low intensive margin is driven by its low level of participation in GVCs and the general bias of India's specialization in favor of capital and skill intensive industries and against unskilled labor-intensive industries. These findings suggest that if India wants to achieve faster export growth, it has to expand the scale of its specialization by focusing in the areas of its comparative advantage – that is, labor intensive activities. Greater participation in GVCs is a pre-requisite for achieving this.

Several studies argue that one of the major reasons for India's lack of specialization in labor-intensive products is its rigid labor laws. While the country has taken major strides in the area of product market liberalization during the last three decades, India's factor markets (labour and land) are still plagued by distortions and policy induced rigidities. In particular, rigid labour laws have created severe exit barriers, discouraged large firms from entering into labour-intensive manufacturing, made it difficult for firms to adjust their employment in response to changes in demand, limited the flexibility of firms in moving workers across tasks, and encouraged firms to remain small and informal (Besley and Burgess, 2004; Kochhar et al, 2006; Panagariya, 2007; Aghion et al, 2008; Ahluwalia et al, 2018). A provision in the Industrial Disputes Act (IDA) 1947 stipulates that factories employing 100 or more regular workers must seek prior consent of the state Government before any retrenchment or closure. Some studies, however, argue that industries had circumvented these laws by increasing the use of temporary or contract workers, for whom these regulations do not apply (Ramaswamy, 2003; Saha et al, 2013; Chaurey 2015). Based on a labour market survey and comparable research in other countries, an OECD report (2007: 13) notes that the "laws governing regular employment contracts in India are stricter than those in Brazil, Chile, China and all but two OECD countries". India's labour laws have created an incentive for firms to choose skill and capital-intensive product lines that employ relatively more white-collar workers who are not classified as 'workmen' and therefore do not enjoy employment protection under IDA. A number of studies show that labour market rigidities have constrained employment, investment, and productivity in the formal manufacturing industries (Besley & Burgess, 2004; Hasan et al., 2007; Mitra & Ural 2008; Aghion et al. 2008; Gupta et al., 2009; Ahsan and Pagés, 2009; and Dougherty et al., 2014)[5].

A recent discussion paper by the RIS (Ravi 2020[6]) emphasizes the importance of exports led growth strategy in job creation, income generation and favourable balance of payments. Greater support in the form of extending short term credit to importers, especially for labour intensive sectors including textiles, leather, engineering, and pharmaceuticals could help in further augmenting exports.

2.2 Participation in Global Value Chains (GVCs)

Global value chains (GVCs) and production networks are central features of the international economy today. World-wide reduction in tariff barriers and technology-led decline in the costs of transportation and communication has made it possible to unbundle the production processes in several industries, with various stages occurring in different countries. Rapid growth of international fragmentation, notably since the 1980s, has led to a major change in the nature and pattern of world trade.

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[5] Bhattacharjea (2021) provides a critical review of these studies
[6] Strategising India's Exports, Dammu Ravi, RIS Discussion Paper 258, November 2020. The author is currently Secretary (Economic Relations) in Ministry of External Affairs, Government of India.

Countries increasingly engage in trade by specializing in particular stages of good's production sequence or tasks rather than in final goods. Trade in parts and components (P&C) has grown much faster than trade in final goods as intermediate products cross national borders multiple times during the production process (see, for example, Feenstra, 1998, Hummels et al, 2001, Athukorala, 2012, Baldwin and Lopez-Gonzalez, 2015). The type of trade that result from interconnected production processes involving a sequential, vertical trading chain stretching across many countries, is described under various terminologies such as trade in value added, fragmentation trade, trade in middle products, task trade and vertical specialization trade.

However, due to its low specialization in labor–intensive product lines, India has been locked out of the GVCs in several manufacturing industries (Athukorala, 2014; Krueger, 2010; Veeramani and Dhir, 2019, Ministry of Finance, 2020). However, since the early 2000's, India's backward participation in GVCs (use of imported inputs to produce for exports) has gradually increased. Veeramani and Dhir (2019) measure the extent of India's backward participation in GVCs, by looking at the share of foreign value added in gross exports (BVAX ratio). The BVAX ratio measures how much foreign value-added is generated for a given unit of exports. In general, higher values of BVAX ratios imply greater backward participation in GVCs (Johnson and Noguera, 2012).

Veeramani and Dhir (2019) find that BVAX ratio for India has increased consistently between 1999-2000 and 2012-13 from 0.14 to 0.35. This implies that India's participation in GVCs has increased over the years. Despite this increase, however, India's participation in GVCs remains significantly lower than that of China and other East and South East Asian countries. The rigidities in India's labor market is one of the major reasons for the low level of India's participation in GVCs.

Veeramani and Dhir (2019) also find that greater participation in GVCs, as captured by an increase in the BVAX ratio, leads to an increase of total domestic value added (DVA) and employment generated in the economy (see also Ministry of Finance, 2020). Multivariate regression analysis shows that a 10% increase in BVAX ratio leads to 17.9% increase in the dollar value of gross exports, which in turn, causes domestic value added (from exports) to increase by 7.7%. Finally, 7.7% increase in domestic value-added increases employment by 13.2%. Overall, the results confirm the positive effect of backward participation in GVCs on domestic value addition and employment. Higher openness with respect to trade and FDI would lead to greater participation in GVCs, which in turn would result in the expansion of domestic output and employment.

Studies show that FDI inflows in India have been primarily domestic market seeking rather export promoting (Aggarwal, 2002). On the other hand, countries like China have been successful in attracting a large amount of export promoting FDI. This is a natural consequence of China's policies, such as very low import tariffs rates for intermediate inputs, to encourage the country's participation in GVCs. In contrast, as Indian industries have been mostly cut off from the GVCs, the country could not attract export promoting FDI. According to World Investment Report 2003 (UNCTAD, 2003), FDI contributed to the rapid growth of China's exports at an annual rate of 15% between 1989 and 2001 (UNCTAD, 2003). In 1989 foreign affiliates accounted for less than 9% of total Chinese exports, but by 2002 they provided half. In contrast, FDI has been much less important in driving India's export growth except in information technology (UNCTAD, 2003, Sharma, 2003, CII 2021).

2.3 Exports and Jobs

A large body of literature analyses the theoretical and empirical link between trade and the labour market outcomes[7]. Economic theory teaches that trade and the gains from specialization can boost aggregate incomes and employment though the extent of gain can vary across sectors.

A number of studies have provided the estimates of export supported jobs, using the IO approach, for different countries and years[8]. Various agencies such as the OECD, European Commission, World Bank, HM Treasury, Statistics Canada, and the US Department of Commerce use IO as a building block to produce estimates of jobs supported by exports. The IO approach enables us to separately identify those sectors which themselves directly export, and the upstream sectors which 'indirectly' export by supplying goods and services to exporting sectors. In other words, IO tables take into account exporting sectors linked with other sectors in the economy, and so capture the full activity in an economy underpinned by exporting activities. For this reason, the IO framework is a widely used method for exploring the relationships between exports and labour incomes/jobs.

Based on the nature of the IO tables used, the studies that estimate the number of export supported jobs can be grouped into two. First, a number of organizations, such as the OECD, the European Commission and the World Bank, produce estimates of the relationship between trade and the labour market for many countries. These estimates are based on multi-nation or multi-regional IO (MRIO) tables[9]. Second, some studies provide estimates for individual countries using single nation IO tables. The primary advantage of the MRIO tables is their geographical coverage and resulting ability to capture employment or jobs linked to GVC activity. The global IO table reports domestic and imported intermediate inputs separately, and reports the exports for the intermediate and for the final uses separately. One can thus trace which goods are exported to which industry and where more accurately. They could answer questions such as "how many jobs in India are supported by the exports of other countries?" and "which sectors in other countries use the exports of Indian sectors?"

The advantages of using a single-nation table are primarily in the additional sectoral detail available, the recentness of the tables, the quality of the data and the consistency with other national data that is included in the modelling. In addition, the large amount of international data harmonization seen for MRIO tables is not required for single-nation tables. This results in less compromise around data quality. In order to obtain comparable tables across countries, MRIO initiatives make use of harmonized inter-county IOT with rather aggregated level of sector classification. On the other hand, India's national IOT from CSO is relatively more disaggregated (for example, 130×130 matrix for the year 2007-08). Official IOT, prepared by the statistical agencies in different countries, form the basis for the construction of MRIO tables. The disadvantages in using single-nation IO tables, however, are that comparisons with other countries are not available on a consistent basis and that the tables are unsuitable for analyzing the impact of GVCs.

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[7] For a survey of the literature, see Cline (1997), Slaughter (1998), Gaston and Nelson (2001), Acemoglu (2002), Ghose (2003), Feenstra and Hanson (2004), Goldberg and Pavcnik (2004), Hoekman and Winters (2005) and Jansen and Lee (2007).

[8] Miller and Blair (2009), and Murray and Lenzen (2013) provide detailed discussion of the application of IO models in issues related to international trade. The discussion in this section covers only those studies which use I-O approach for estimating direct and indirect effects of exports on employment. Studies which analyze the effects of imports on employment and studies which have used alternative methodologies (regression analysis or accounting identity calculations) to estimate the employment effect of exports have not been covered.

[9] Available MRIO tables differ in their coverage of countries, sectors, and years. See Tukker and Dietzenbacher (2013) for a review comparing the various databases.

2.3.1 Studies based on MRIO Tables

A leading MRIO initiative is the OECD's Inter-Country Input-Output (ICIO) tables. These tables provide a globally balanced view of inter-country inter-industry flows of intermediate and final goods and services. The latest set of Tables (2021 edition) provides matrices of inter-industrial flows of goods and services (produced domestically and imported) in current prices (USD million), for 66 countries (including India) and "Rest of the World" as an aggregated region covering 45 industries for the period 1995-2018. These Tables have been used to produce OECD's Trade in Value Added (TiVA) and Trade in Employment (TiM) indicators. TiM indicators provide estimates of employment supported by exports and foreign sources of final demand. That is, they explore the employment supported across countries by the complex trading relationships arising from the GVCs.

The Labour Content of Exports (LACEX) and Jobs Content of Exports (JOCEX) databases, maintained by the World Bank, provide indicators pertaining to the compensation of employees as well as the number of jobs tied to a country's exports (Cali, et al., 2016). They are based on a set of IO tables provided by the Global Trade Analysis Project (GTAP). The JOCEX database provides the quantity of jobs embodied in exports for 11 sectors and up to 88 countries (does not include India) for intermittent years between 1995 and 2011. This database reports the direct contribution of labor – both skilled and unskilled - to exports as well as the indirect contribution through backward linkages with other sectors of the economy. The LACEX dataset provides the (direct and indirect) value of the compensation of employees linked to exports for each sector/country/year, including India. Using LACEX and JOCEX databases, Cali et al (2015) report a number of interesting trends and patterns at the global level.

- Exports supported over 20% of total employment for the sample of 66 countries in 2011.

- The global share of labor value added embodied in gross exports (LVAX share or the labor intensity of exports) has declined since 1995; for each US$100 worth of gross exports, wage payments constituted US$46 and US$40 in 2005 and 2011 respectively. This decline in LVAX share is driven by the group of high income countries while the LVAX share remained flat in middle income countries and increased in low income countries.

- The number of jobs supported by gross exports (JOCEX) declined more rapidly than LVAX share, a result consistent with labor saving technological changes across countries. JOCEX has declined more rapidly in middle income than in high income countries.

- In line with the standard Hecksher-Ohlin trade model, the composition of labor directly contained in exports is skewed toward skilled labor in high-income countries relative to developing countries. However, the skill composition of indirect labor content of exports is found to be similar across income groups, implying that the sectors providing domestic inputs to exports are less subject to the comparative advantage rule than the export sectors themselves. Thus, skilled labor in developing countries is relatively more important for the inputs to the exports than for the exports themselves.

- Manufacturing exports are a key source of labor demand in rest of the economy through backward linkages, especially in middle and low-income countries. Each US$1 of manufacturing export supports a higher level of wages and more jobs in sectors providing domestic inputs to manufacturing than in the manufacturing sector itself. This pattern is particularly important in developing countries.

- Workers in services sectors are the largest beneficiaries of exporting activities globally as the bulk of indirect demand for labor spurred by exports is in services sectors. Overall, the labor value added in

services contained in exports (directly and indirectly) is found to be larger than the entire value of gross services exports. The results confirm the increasing importance of services as enablers of export competitiveness in developing countries.

- Differences in LVAX share across developing countries are driven mainly by differences in the composition of exports rather than sector labor intensities. Middle East and Northern Africa (MENA) region has the lowest LVAX share, a result consistent with the dominance of capital intensive extractive exports with little linkages with the domestic economies. On the other hand, the labor intensity among developing countries is highest in East Asia and the Pacific (EAP), consistent with its export sector being dominated by labor intensive manufacturing and increasing linkages with the domestic economy. The share of direct labor value added in exports is highest in South Asia, a reflection of the large share of India's exports being concentrated in relatively skill intensive services sectors that exhibit high direct labor content and few backward linkages.

- Job intensity of exports is inversely related with a country's income per capita, while the opposite is true for the wage intensity of exports; as countries develop economically, the labor value added share in their exports increases while the jobs share decreases. These contrasting results suggest that average wages increase rapidly enough with the process of economic development to more than compensate the loss in jobs per unit of exports.

Some studies use World Input-Output Database (WIOD) to generate the estimates of employment supported by exports. WIOD provides annual time-series of world input–output tables from 1995 onwards. These tables are based on officially published national input–output tables merged with national accounts data and international trade statistics. The latest version of the WIOD (Release 2016) covers 28 EU Member States, 15 other major economies (including India) as well as the "Rest of the World" as an aggregated region. It provides sectoral breakdown for 56 sectors and covers the period 2000 – 2014.

Using WIOD for the period 1995-2009, Jiang and Milberg (2013) analyse the employment effects of trade in GVCs for a panel of countries. Participation in GVCs imply that countries are trading with each other not just in final goods and services for the purpose of consumption, but also in intermediate goods and services for the purpose of further production. In this situation, five different categories of employment generated by trade can be calculated: (1) domestic labour contained in exports; (2) foreign labour contained in imports; (3) foreign labour contained in exports; (4) domestic labour contained in imports; and (5) third-country labour contained in a country's imports. The first two are the only two components in the absence of GVCs while the last three components are the result of a country's participation in GVCs. A country's exports might contain imports from other countries as intermediates. For example, India may use imported auto components to manufacture and export cars. Auto components imported from foreign countries for the purpose of making cars that are exported is the 'import content of exports' for the given sector/country. In the literature, this is referred to as backward GVC participation[10]. Similarly, a country's imports from foreign countries might contain its own exports to those foreign countries as intermediate inputs. For example, auto components imported by India from the foreign countries may embody iron and steel sourced from India. In this case, a country's imports generate jobs domestically, and correspond to the employment category referred to

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[10] "Domestic labor contained in exports" can be further separated as (1a) domestic labor contained in exports of intermediate goods used for further processing for exports by foreign countries and (1b) domestic labor contained in exports of final goods consumed in the foreign country. For example, South Korea's export of iron and steel to other countries may include iron ore sourced from India. This is referred to as "forward GVC participation". The categorization by Jiang and Milberg (2013), however, do not consider this separation to account for forward GVC participation.

as "domestic labor contained in imports". Finally, if India imports auto components from Japan but the latter imports iron and steel from South Korea as an intermediate input, such trade generates income and employment in the third country (South Korea). This component is referred to as "third-party intermediates trade".

Jiang and Milberg (2013) found that, in 2009, the countries in their panel of 39 countries (including India) generated about 88 million jobs worldwide through their participation in GVC trade, which is about 14% of the total number of jobs generated by international trade that year. For high income countries, trade generated more additional foreign jobs than domestic jobs. On the other hand, for the sample of large emerging countries (China, India, Indonesia and Brazil), domestic jobs significantly exceeded foreign jobs. According to their estimates, for the year 2009, India's exports generated 35 million domestic jobs while its imports generated 9.8 million foreign jobs. As compared to non-GVC trade, GVC trade contained significantly more medium-skill and low-skill jobs than high-skill jobs.

Sousa et al (2012), Arto et al (2015, 2018) and Kutlina-Dimitrova Rueda-Cantuche (2021) use WIOD to provide the estimates of employment supported by EU exports to the rest of the world (see **Table 1**). These estimates show a significant increase of the total number of employment supported by EU exports to the rest of the world from 21.7 million in 2000 to 32.5 million in 2014 and 38 million in 2019. Employment tied to EU exports to rest of the world accounted for 15.3% of total EU employment in 2017 and over 16% in 2019 compared to 10.1% in 2000. Export-related jobs in the EU are, on average, 12% better paid than other jobs. The export wage premium ranges from 5% to 14%, depending on workers' skill level and occupational profile (Kutlina-Dimitrova Rueda-Cantuche, 2021)[11].

Using WIOD database, Rueda-Cantuche, Cernat and Sousa (2019) highlight the growing contribution of services to employment supported by EU exports to the rest of the world, a pattern that reflects the increasing "tradability" of many service activities and the "servicification" of manufacturing. They also observe that export related jobs tend to be medium- or high-skilled and better paid than the average.

Los et al (2015) estimate the impact of exports on driving employment growth in China since 1995 based on WIOD. They found that between 1995 and 2001, fast growth in exports was offset by strong increases in labor productivity with the net effect on employment growth being nil. This was reversed in the period 2001-2006 when exports grew more rapidly than labor productivity growth. Employment grew significantly during this period of rapid export growth, adding 71 million jobs tied to exports.

While Chinese exports mainly consist of manufacturing goods, jobs created to satisfy foreign demand has not been restricted to the manufacturing sector. Timmer et al (2015) find that in 1995 only 29% of the jobs induced by foreign demand originated in the manufacturing sector, while the majority (42%) originated in agriculture. This is not surprising given that production of traditional labor-intensive manufacturing industries such textiles and clothing has strong backward linkages into domestic agriculture. However, as China's export composition has shifted in favor of machinery industries, the sectoral distribution of export induced jobs has

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[11] The labor compensation premium is computed as the ratio of the labor compensation per export-supported worker to labor compensation per worker for the whole economy. This suggests that the productivity of exporting firms is higher than that of firms focused on supplying the domestic market. In fact, the labor productivity in export-related activities is found to be 5.9% higher on average than that of the rest of the economy (Rueda-Cantuche, Cernat and Sousa, 2019).

changed significantly. In 2009, manufacturing accounted for 37% of jobs induced by exports while the share of agriculture declined to 33%.

Kiyota (2016) is another study that used WIOD to estimate the number of domestic employment tied to the exports of final goods from China, Indonesia, Japan, and Korea. This study focuses on the estimates of jobs tied to exports for the final use only, not for intermediate use[12]. Kiyota observed that although more than 80% of exports in the selected countries are from manufacturing industries, a significant number of workers in non-manufacturing industries depend upon manufacturing exports through vertical inter-industry linkages.

2.3.2 Studies based on Single Nation IO Tables

Leontief (1946) provided the pioneering estimation of export dependent employment for the U.S using an I-O table for the year 1939. Since then, a number of studies investigate the impact of exports on the number of jobs within countries using single nation IO tables for different countries and years. Starting from the early 1960s, for a number of years, the U.S. Bureau of Labor Statistics (BLS) and other researchers estimated the labor force involved in producing U.S exports[13].

Based on a survey of literature, **Table 1** reports the latest available estimates of employment supported by exports for different countries including India. The US Department of Commerce has been regularly publishing reports on jobs supported by exports. The recent estimates show that the number of jobs supported by US goods and services exports increased significantly from 7.4 million jobs in 1993 to 10.7 million jobs in 2016 (see **Table 1**). Export-supported jobs accounted for 6.9% of total US employment in 2008.

Estimates by Statistics Canada (2020) show that the number of jobs tied to Canadian exports increased from 3.3 million jobs in 2007 to 3.6 million in 2019. The IO tables published by Statistics Canada include 234 industries and cover every Canadian province. A Report published by the Department for Business Enterprise & Regulatory Reform (2007) shows that the numbers of jobs supported by UK's exports to the world range from 7 to 8 million jobs during the period 1995 to 2004. For the year 2004, exports of goods and services generated about 7 million jobs, of which 4.6 million jobs were tied to exports of goods while services exports generated 2.4 million jobs. Of the 7 million jobs generated in 2004, about 3.6 million jobs were generated by UK's exports to EU while 3.3 million jobs were accounted by exports to non-EU countries. Updated estimates by the Department for International Trade shows that the number of jobs supported by UK's exports stood in the range of 6.1 – 6.5 million during the period 2014-16 (Black et al, 2021). This study also reports that export related jobs paid 7% more than the national median wage, implying that exporting firms are more productive than domestic market oriented firms.

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[12] It may be noted that Kiyota's (2016) estimates of total number of jobs supported by exports are much smaller than other available estimates for the selected countries. This is due to the fact that the previous estimates are for total exports (final and intermediate) while Kiyota's (2016) estimates refers to jobs tied to exports for final use only. As the countries under consideration are major suppliers of intermediate inputs for other countries, it is likely that the numbers reported in Kiyota (2016) seriously underestimates the total number of jobs supported by exports. Thus, we do not report these estimates in Table 1.

[13] Roxon (1967); Aho and Orr (1981); Davis (1992, 1996); Leclair (2002); Tschetter, 2010); Rasmussen and Johnson, (2012) and Rasmussen and Johnson (2015). See Exim Bank (2016) for a detailed discussion of the findings in these studies.

Using Japanese IO data from 1975 to 2006, Kiyota (2012) showed that Japanese employment became increasingly dependent on exports over the period. The total number of jobs (in terms of number of workers) supported by exports increased from 3.6 million in 1975 to 4.1 million in 1990 and to 6.4 million in 2006. The number of jobs supported by exports grew at a faster rate during 1990-2006 as compared to 1975-1990. In 2006, implied employment from exports (6.4 million workers) accounted for 9.9% of total employment. Kiyota notes that the magnitude of employment effects tied to indirect effects exceeded those of the direct effects over almost the entire period with the former accounting for 49.3 – 56.9% during the period. Thus, more than half of the employment effects appeared through intra-industry linkages, with the indirect effect being larger for goods exports than for services exports. The results show that even the industries which are not export-oriented sometimes have heavy export dependence of employment due to the intra-industry linkages with other export-oriented industries.

Using Chinese IO tables from 1997 to 2005, Feenstra and Hong (2010) found that exports had become increasingly important in stimulating employment in China. They noted that for the period 1997–2002, with about 2.5 million jobs being added per year in China, the implied employment growth from exports was modest. However, this situation had changed significantly during 2000-2005 when exports grew much faster and, as result, exports added as much as 7.5 million jobs per year. Chen et al (2012) estimated that US$ 1000 of aggregate (processing plus ordinary) exports led to 0.242 person-years of employment in 2002 and 0.096 person-years of employment in 2007. China's exports of merchandise and commercial services, as per the data from WTO, amounted to US$ 365 billion in 2002 and US$ 1342 billion in 2007. Applying the employment coefficient for aggregate exports, the estimated employment coefficients imply that China's exports supported about 88 million jobs in 2002 and 129 million jobs in 2007. Jobs tied to Chinese exports as a proportion of total employment increased from 12% in 2002 to 17% in 2007.

Kucera et al. (2012) estimates the effects of the 2008–09 trade contraction on employment in India and South Africa by computing the employment content of sectoral exports, including employment via household expenditure due to export-related earnings. Their analysis show that India and South Africa experienced substantial employment declines as a result of trade contraction with the European Union and the United States. A large share of these declines occurred in the non-tradable sector and resulted from income-induced effects, illustrating how a shock originating in the tradable goods sector had strong ripple effects throughout these economies.

Turning to the studies for India, Taylor (1976) and Banerjee (1975) provided the earliest estimates. Taylor's estimates showed that India's manufactured exports in 1964-65 generated about 2.2 million jobs, accounting for 2.7% of total employment. Banerjee (1975) showed that manufactured exports created about 2.2 million jobs in 1964 and 2.4 million jobs in 1970. Estimations by Nambiar (1979) showed that employment associated with India's goods and services exports increased from 4.9 million in 1963-64 to 5.4 million jobs in 1973-74, accounting for roughly 2% of total employment in 1973-74.

Using IOT for the year 1968-69, Chishti (1981) calculated that India's goods and services exports had supported 5.4 million person-years of employment in 1970-71 and 7.2 million person-years of employment in 1975-76. Jobs tied to exports represented 4.3% of total employment in 1975-76, of which 40% was attributed to backward linkages.

A previous study by Exim Bank of India (2016) provided time series estimates of employment supported by Indian exports for 112 sectors for the period 1999-00 to 2012-13[14]. This study finds that the total number of jobs supported by aggregate Indian exports (merchandise plus services) increased from about 34 million in 1999-00 to 62.6 million in 2012-13, with a growth rate of 3.4% per annum. Throughout the period, export related jobs grew significantly faster than that of country's total employment: the share of export-supported jobs in total employment increased from little over 9% in 1999-00 to 14.5% in 2012- 13. During the period 1999-2000 to 2009-10, the share of direct employment (that is, employment in a given sector attributed to its own exports) in total export related employment stood significantly higher than that of indirect employment (employment in a given sector due to its linkage with other exporting sectors). However, the contribution of indirect job creation increased significantly from 38% in 2007-08 to 50% in 2012-13. Backward linkages, particularly from manufacturing to agriculture and services, have become an important source of export related job creation in the country. While the total number of jobs supported by exports increased significantly, jobs supported per million dollar (or billion Rupees) worth of exports declined over the years, a trend consistent with those observed in several other countries.

Das and Kukreja (2020) provided estimates of export supported employment for selected years - 2003-04, 2007-08 and 2013-14. According to their estimates, total number of jobs supported by India's exports increased from 40.2 million in 2003-04 to 78.2 million in 2013-14. Bulk of these jobs has gone to persons with below secondary education, though high skilled jobs supported by exports show higher growth rate than low skilled jobs across sectors. The majority of the jobs generated by exports in agriculture and allied activities has gone to unskilled and low-skilled workers. On the other hand, in case of services exports, the bulk of export related employment was created for high skilled workers.

In sum, exports have become increasingly important for job creation as evident from the increasing share of export related jobs in total employment in several countries. Estimates of the number of jobs supported per million dollars of exports, show a consistent decline over the years in most of the countries due to rising labor productivity. Yet, total number of jobs supported by exports tends to increase as the positive volume effect from export growth more than offsets the negative effect from the rise in labor productivity. Most of the export related jobs in developing countries, especially at the early stage of export growth, went to low skilled workers. Backward linkages, particularly from manufacturing to agriculture and services, have become an important source of export related job creation in many countries.

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[14] Using the IOT for 2003-04, UNCTAD (2013) provides some estimates of the impact of predicted changes in exports on employment for 10 sectors and for the years 2008-09, 2009-10, and 2010

BACKGROUND ON INDIA'S EXPORTS AND EMPLOYMENT: GENERAL TRENDS AND PATTERNS

3.1 Export Growth Performance

During the first decade of economic reforms (1993-94 to 2001-02), India's merchandise exports in dollar grew at the rate of about 8% a year. This is slightly better than the average growth rate of 7% a year in the 1980s but pales in comparison with the growth rate of 18% a year in the 1970s (Veeramani, 2012). **Table 2** shows the average annual growth rates of India's merchandise and services exports for various sub-periods during 2000-01 to 2021-22. Based on export growth performance, three different phases can be identified during the post-2000 period: (i) a relatively long period of high growth from 2000-01 to 2011-12, and (ii) a period of stagnation or low growth from 2012-13 to 2020-21 and (iii) signs of a growth rebound since 2021-22.

In stark contrast to the first decade of the reforms, India's merchandise exports recorded an exceptionally high growth rate of 20% a year during 2000-01 to 2011-12 (**Table 2**). During this period, oil exports grew faster than non-oil exports; the share of refined petroleum exports in total merchandise exports increased steadily from 3.4% in 2000 to 17.2% in 2010 (**Table 5**). The growth rates reported in **Table 2** are based on export data from Reserve Bank of India (RBI) in terms of current US dollars. **Table 3** reports the growth rates based on export values in constant as well as current US dollars. Export values in current US dollars, obtained from WTO, have been deflated using US GDP deflator (base year: 2015). To provide a comparative perspective, **Table 3** also reports the growth rates of world exports. It may be noted that the growth rates based on current dollar values in **Table 2** and **Table 3** do not match exactly as the WTO data used in **Table 3** are on a calendar year (January to December) basis while the RBI data used in **Table 2** are on a financial year basis (April to March).

It can be seen that India's merchandise exports in real dollar terms grew at a respectable rate of 17.8% per annum during 2000-2011. India's share in world exports of merchandise increased steadily from 0.66% in 2000 to 1.65% in 2011. Since 2012, however, as the growth of world exports turned negative, the value of India's merchandise exports declined with a negative growth rate of 1.7% during 2012-2020. India's share in world merchandise exports remained more or less unchanged since 2011 (**Figure 1**). The growth rates of merchandise exports, however, witnessed a remarkable turnaround in 2021, with a growth rate of about 42% during January-December 2021 as compared to the same period in 2020. This growth turnaround is driven by the significant recovery of world exports, which grew at the rate of 26.5% in 2021.

Services exports in current US dollars grew relatively faster than merchandise exports at the rate of 18% per year during 1993-94 to 2001-02 and at the rate of 24% a year during 2000-01 to 2011-12. In terms of

constant US dollars, services exports grew at the rate of 21.7% per annum during 2000-2011. Barring a small drop in 2009, India's share in world exports of commercial services increased steadily from 1.1% in 2000 to 3.1% in 2011 (**Figure 1**). The period 2012-15 witnessed significant slowdown in the growth rate of services exports with a growth rate of just 0.8% per annum. India's share in world exports of services declined for two consecutive years in a row - 2013 and 2014. Since 2014, however, India's exports of services steadily increased from 3% to 4.1% in 2020. The value of services exports recorded a growth rate of 14.5% during January-September 2021 as compared to the same period in 2020.

Comparing the growth performance of Indian exports with that of the world, India's exports of both merchandise and services were found to grow faster than world exports during the period 2000-2011 (**Table 3**). During this period, when world merchandise and services exports grew at the rate of 8.4% and 9.2% respectively, India's exports recorded much higher growth rates of 17.8% and 21.7%, respectively. During 2012-20, however, the dollar value of both world and Indian merchandise exports recorded negative growth rate of 1.7%. As far as services exports are concerned, during 2012-20, India's growth rate (3.7% per annum) was somewhat higher than that of the world (0.8% per annum). The strong correlation of India's exports with world exports is evident from **Figure 2**, which depicts the annual growth rates of exports for India and World.

3.2 Composition of Exports

Turning to the compositional changes in India's export basket, **Figure 3** depicts the values and shares of exports for three sector groups – (i) 'agriculture, hunting, forestry, fishing, mining and quarrying' (henceforth, agriculture); (ii) 'manufacturing'; and (iii) 'services, including utilities and construction' (henceforth, services). **Figure 3** is constructed using export data from the OECD's ICIO tables. The share of manufactured products in total exports stood above 60% during the period 1995-2003, before declining gradually to 55% by 2008. Subsequently, this figure increased to 59% by 2013 and then declined again, reaching 54% in 2018. The share of services exports increased consistently from the range of 32%-34% during the period 1995-2000 to about 42% by 2008. This figure declined subsequently, reaching 38% in 2013, before increasing steadily to 44% by 2018. The share of agriculture in total exports halved from about 4% in 1995 to about 2% by 2018.

As mentioned earlier, the estimates of export related jobs in this study are based on two alternative sets of IO tables – OECDs ICIO tables and the official SUTs prepared by the CSO[15]. It is useful to examine whether the export basket look different based on data from these two alternative sources (**Figure 4**). It can be seen that the SUT data shows a somewhat higher share for the manufacturing exports as compared to the ICIO data, while the latter shows a somewhat higher share for services exports as compared to the former[16].

Table 4 reports the values and shares of India's exports at the ICIO sector level for selected years (1995, 2010, 2015 and 2018). The sectors are placed in the Table in the descending order of their export shares in total exports in 2018. The top sector in the export basket is 'computer programming, consultancy and information

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[15] In order to construct the ICIO time series, India's official IO tables (for the years 1998-99, 2003-04 and 2007-08) are benchmarked on consistent time-series from the National Accounts Statistics (NAS). The NAS data on gross output, value added, imports, exports and final use by use category are used to generate the time series of IO tables using an algorithm known as RAS method (Temurshoev and Timmer, 2011).

[16] This difference could be related to the fact that the SUTs are based on new series of NAS with 2011-12 as the base year while the ICIO is based on the earlier series. As per the new series of NAS, the share of manufacturing sector in India's GDP was found to significantly higher than what was previously thought. For the year 2011-12, for example, the share of manufacturing sector in GDP was 14.7% as per the old NAS series which was revised upward to 17.4% in the new series (Nagaraj and Srinivasan, 2016). Thus, the higher (lower) share of manufactured (services) exports obtained from the SUT data as compared to the ICIO data could be a reflection of the differences in the two versions of NAS.

services', accounting for 19.3% of total exports in 2018, up from 11.5% in 1995. Other major sectors in the export basket (with their 2018 shares in parentheses) are: 'coke and refined petroleum' (9.4%); 'textiles, wearing apparel, leather and related products' (7.6%); 'manufacturing n.e.c (6.6%, mainly on account of gems and jewelry); 'wholesale and retail trade' (5.5%); and 'food products, beverages and tobacco' (5.4%). Over the years, the export shares of traditional labor-intensive manufacturing sectors (such as 'textiles, wearing apparel, leather and related products'; 'manufacturing n.e.c'; and 'food products, beverages and tobacco') recorded a relative decline while capital and skill-intensive sectors (such as 'computer programming, consultancy and information services'; 'chemicals'; 'professional, scientific and technical activities'; and 'pharmaceuticals, medicinal chemical and botanical products') show a relative increase.

Table 5 reports the values and shares of merchandise exports at the 3-digit level of International Standard Industrial Classification (ISIC) for selected years including for the year 2021. The sectors are placed in the Table in the descending order of their export shares in total merchandise exports in 2021. It can be seen that the acceleration of export growth during the period 2000-2010 has been accompanied by some important changes in export composition. The industry groups that increased their shares in the export basket during this period include 'refined petroleum'; 'other chemicals' (mostly, pharmaceuticals); 'iron and steel'; 'precious and non-ferrous metals'; 'general purpose machinery'; 'motor vehicles and parts'; 'iron ores, television and radio equipment etc'. On the other hand, the shares of traditional labor-intensive industries such as 'textiles'; 'garments'; 'manufacturing n.e.c' (mostly, gems and jewelry); 'footwear and leather'; and 'food processing' have declined. Between 2015 and 2021, the industry groups that have increased their shares in the export basket include 'refined petroleum'; 'chemicals' (including pharmaceuticals); 'iron and steel'; 'iron ore'; 'general purpose machinery'; 'television and radio equipment'; 'other food' etc. On the other hand, the shares of industry groups such as 'manufacturing n.e.c'; 'apparel'; 'precious and non-ferrous metals'; 'spinning, weaving and finishing of textiles'; 'motor vehicles'; 'footwear and, leather' etc have declined.

The composition of services export across different categories is shown in **Table 6**. 'Telecommunications, computer, and information services' account for one-half of India's total services exports. The second largest category of services exports is 'other business services', accounting for about 24% of total services exports in 2020-21, up from 19% in 2015-16. This is followed by 'transport' and 'travel'. Between 2015-16 and 2020-21, the share of 'transport' increased from 9% to 10.6% while Covid-19 related restrictions led to a significant decline in the export share of 'travel' from 14% to 4%.

3.3 Employment, Output, Exports and Employment Coefficients across Sectors

Table 7 reports the percentage distribution of employment, output and exports across ICIO sectors and for three time points – 1995, 2010, 2015 and 2018. In addition, these tables report sector-wise employment coefficients – that is, the ratio of employment to value of output (Rs Crores at current prices). As can be seen from **Section 4**, employment coefficients play a crucial role in the estimation of the number of jobs tied to exports.

It may be noted, at the outset, that the employment coefficients (number of workers employed per Rs 1 crore worth of output) have experienced a consistent decline over the years for almost all sub-sectors. This could be driven by various factors: (i) with inflation, Rs 1 crore worth of output would represent decreasing real output over time; (ii) labor productivity would have increased over time; (iii) low-skilled labor savings due to skill-biased technological change and (iv) increasing share of capital and skill-intensive products in the export basket.

Comparing export and employment shares across sectors, a notable asymmetry is observed; certain sectors that account for the major shares in total employment do not appear prominently in the export basket and vice versa. This mismatch between export and employment shares is related to two major sector specific characteristics – 'factor intensity' and 'tradability'. The sectors that accounts for the largest and increasing share of exports are either skill-intensive or capital-intensive such as 'computer programming, consultancy and information services', 'chemicals', 'professional, scientific and technical activities' and 'pharmaceuticals, medicinal chemical and botanical products' while the employment is largely concentrated in agriculture and low-skill intensive services and manufacturing. Export shares of traditional labor-intensive sectors (such as 'textiles', 'wearing apparel', 'leather and related products'; 'manufacturing n.e.c'; and 'food products, beverages and tobacco') record a relative decline. As compared to traditional labor-intensive industries, capital and skill intensive industries do not generate significant number of direct employment for low-skilled workers, leading to a decline of employment coefficients.

While 'agriculture, hunting and forestry' accounts for a small share in total exports (1.3% in 2018), its share in total employment (44.8%) and output (10.4%) is the highest. The disproportionate concentration of employment – largely informal and low paid - in this sector is a reflection of insufficient formal job opportunities in manufacturing and services. Export growth, particularly in labor-intensive manufacturing industries, has the potential to create productive job opportunities for the surplus labor engaged in India's agriculture. In the absence of productive employment in the formal sectors, a large share of India's work force is also engaged in informal service sector jobs in 'wholesale and retail trade' (8.7%), construction (7.9%) and 'miscellaneous service activities' (6.3%), the export shares of the latter two sectors being very small as they are mostly 'non-tradable'.

While the sub-sector of 'computer programming, consultancy and information services' account for 19.4% of total exports in 2018, its share in total output (3.1%) and employment (0.4%) are significantly smaller. Employment coefficient in this sector has declined significantly from about 6 jobs in 2010 to 2 jobs in 2018. As this sector is highly skill-intensive, its relatively low share in total employment is not surprising.

'Coke and refined petroleum products' is the second major exporting sector (9.4%), but it holds a very small employment share (0.04%). This mismatch in export and employment shares in 'coke and refined petroleum' is not surprising as the high value of exports in this sub-sector is based on processing of imported materials. Therefore, net export earnings and domestic value added are much smaller than what the statistics on gross exports would indicate, leading to the low share in total employment.

Traditional labor-intensive exporting sectors ('textiles, leather and footwear'; 'manufacturing n.e.c'; 'food products'; and 'beverages and tobacco') contribute a relatively higher share in total employment as compared to capital and skill-intensive exporting sectors ('professional, scientific and technical activities'; 'basic metals'; 'chemicals'; 'machinery and equipment'; 'motor vehicles'; 'rubber and plastics', 'electrical equipment'; 'pharmaceuticals'; and 'computer, electronic and optical equipment').

It must be noted that while some of the top exporting sectors may contribute little in terms of direct employment, they may significantly contribute to employment indirectly through backward linkage effects. As pointed out earlier, the IO framework helps to capture not only the direct effect of exports on employment but also the indirect effects of exporting sectors through their backward linkages with other sectors.
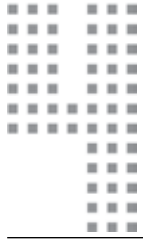
ESTIMATION OF JOBS SUPPORTED BY INDIAN EXPORTS: DATA AND METHODOLOGY

This section discusses in detail the data and methodology involved in the estimation of the number of jobs supported by Indian exports.

4.1 Input-Output Methodology for Estimating Export-Supported Jobs

Based on the concept of backward linkages of a given sector with other sectors within an economy, the number of direct plus indirect jobs supported by exports from 'n' sectors can be estimated as[17]:

$$e = l(I - A^d)^{-1}\hat{X} \tag{1}$$

where l is $1 \times n$ vector containing employment coefficients (labor/output ratios) for each sector j, $\hat{X}$ is a $n \times n$ diagonal matrix of exports from n sectors, $(I - A^d)^{-1}$ is the inverse Leontief matrix that measures the total direct and indirect uses of each commodity i by each sector j[18]. A^d is $n \times n$ domestic coefficient matrix, whose elements (denoted as a_{ij}) measure the amount of domestic input from sector i required to produce one unit of output in sector j. I is an identity matrix with ones on the diagonal and zeros elsewhere. e is the resulting $1 \times n$ vector of employment supported by exports. By summing the appropriate elements of these vectors, the aggregate number of jobs supported by exports from broad sector groups (agriculture, manufacturing and services) and for the economy as a whole are obtained. The aggregate estimates of export related employment may be denoted as $\sum e_j$ where e_j are the individual elements of the vector e.

The total employment in (1) can be decomposed into direct and indirect (backward linkage) effects as shown below.

$$e^d = l(\widehat{I - A^d})^{-1}\hat{X} \tag{1a}$$

$$e^{bw} = e - e^d \tag{1b}$$

where $(\widehat{I - A^d})^{-1}$ is a matrix consisting of the diagonal elements of $(I - A^d)^{-1}$ and zeros elsewhere; e^d and e^{bw} are respectively vectors of direct and indirect employment tied to exports from n sectors. Note that e^{bw}

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[17] The method used in this study, for estimating export related employment, makes use of Leontief's (1936) input-output approach.
[18] Each element of Leontief inverse matrix indicates input requirement from i^{th} sector if there is a unit increase of the final-use (consumption, foreign trade, or investment) of jth sector's output.

in equation (1b) measures the employment attributable to sector j's backward linkages with all upstream sectors i within the economy. For example, exports of 'automobiles' generates domestic employment within the automobile sector (e^d) as well as in other upstream sectors (e^{bw}), such as 'iron & steel', 'plastics & rubber, and 'electrical machinery' whose outputs are used as inputs by the automobile sector. It is possible that employment embodied in industry j's gross exports can exceed total employment in industry j. This is because the employment embodied in gross exports (e) includes both the direct employment in the exporting industry j and, employment in other (upstream) domestic industries that supply inputs to industry j.

Following the IO approach outlined above, two sets of estimates of employment tied to Indian exports are provided. The first sets of estimates are based on the 2022 release of the OECD's "Trade in employment (TiM)" database. This database provides the estimates of employment tied to exports from 45 Indian sectors, covering the whole economy, during the period 1995-2018. The TiM estimates are based on OECD's ICIO database. The second set of estimates is based on the official SUTs compiled by India's CSO, under the Ministry of Statistics and Program Implementation. The SUTs allow to obtain the estimates at a relatively more disaggregated level (63 sectors) though for a shorter time period (2011-12 to 2017-18).

The basic idea of the IO approach is that the structural characteristics of a national economy can be quantitatively described in terms of "technical input coefficients". Technical coefficient measures the requirement of some input per unit of some output – for example, the amount of steel needed to produce one automobile. The IO tables/SUTs provide the data required for the computation of the technical input coefficients for all sectors of the national economy. The CSO had been compiling and publishing IO tables once in five years. The latest year for which official IO table is available for India is 2007-08. However, for the period 2011-12 to 2015-16 the CSO published annual SUTs.

Like IO tables, the SUTs classify the use (as input into another sector's production or as final demand) of each sector's output. In other words, these tables show the value of industry i's output used (i) as an input by industry j, (ii) as final products by households and governments (consumption) or firms (stocks and gross fixed capital formation) and (iii) as exports. For estimating the number of export related jobs created through backward linkage effects, it is important to estimate the domestic coefficient matrix A^d. The IO tables and SUTs compiled by CSO, however, report total input use without separating imported inputs from domestically produced inputs. From the perspective of the present study, this is an important limitation. If imported inputs are not subtracted from total input use, one would overestimate the number of domestic jobs generated through backward linkage effects. The study uses a standard proportionality assumption to separate imported inputs from domestic inputs, which enables us to construct a time series of domestic use tables (DUT) based on official SUTs. A detailed discussion of data and methodology involved in the preparation of year specific DUT from SUTs is provided in **Appendix 1**. See Horvát, Webb and Yamano (2020) for a detailed discussion of data and methodology involved in the compilation of OECD's TiM estimates.

4.2 Limitations of IO based Estimation

The IO based estimation assumes that (i) labor productivities (expressed as output/employment) for exporting firms are the same as those for firms producing goods and services for domestic markets, and (ii) exporting firms have the same share of imported intermediates, in relation to output, as domestic firms. However, international trade research over the last two decades, since the paper by Bernard and Jensen (1995),

indicates that, in general, exporting firms have higher labor productivity. This is especially true for developing countries. Exporting firms, which are well integrated into GVCs, also tend to have a higher share of imported intermediates for a given output. Both differentials, in productivity and in intermediates use, imply that estimates of employment associated with exporting activities may be marginally biased upward.

However, there are reasons to believe that the estimates are significantly biased downward. First, the calculations based on IO tables cannot be described as full general equilibrium estimates of the impacts of exports on employment. From a dynamic perspective, it is important to consider the employment gains due to various positive spillover effects from exports such as learning by exporting, exploitation of economies of scale, gains from innovation etc. More importantly, the estimate of indirect employment does not include various 'multiplier' effects. That is, the employment generated as a result of the purchase of food, clothing and housing by workers whose jobs are attributable to exports are not considered. Also, the employment required to produce the capital equipment purchased by export industries are not taken into account. These considerations would suggest that the analysis based on a static IO framework may underestimate the true magnitude of employment induced by exports.

Chapter
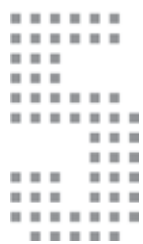
ESTIMATES OF EMPLOYMENT SUPPORTED BY INDIAN EXPORTS

The estimates of the number of employment supported by India's exports at the aggregate level (Section 5.1), for sector groups (Section 5.2) and at the disaggregated sector level (Section 5.3) are provided in the following sections.

5.1 Aggregate Level Estimates

Table 8 and **Figure 5** reports the estimates of total number of employment (in millions) supported by India's aggregate merchandise and services exports over different time periods up to the year 2018. Three sets of estimates are reported: (i) based on OECD's Trade in Employment (TiM) database for the period 1995-2018; (ii) the estimates by Export-Import Bank of India (2016) based on IO tables/SUTs for the period 1999-00 to 2012-13; and (iii) estimates based on SUTs for the period 2011-12 to 2017-18.

According to the OECD-TiM estimates, the total number of jobs supported by Indian exports increased steadily from 35.7 million in 1995 to 73.9 million in 2008. This upward trend was halted briefly in the aftermath of the global financial crisis, as the number of export related jobs declined to 65.1 million in 2009 and 70.1 million in 2010. However, as export growth picked up, the number of jobs tied to exports further increased to 75.1 million in 2011 and reached an all-time peak of 75.6 million in 2012. As export growth slowed down during the post-2012 period, export related jobs gradually declined to 58.2 million jobs in 2018.

The estimates of export tied jobs by Export-Import Bank of India (2016), for the period 1999-00 to 2012-13, are found to be somewhat lower than the TiM estimates for the same period, but the overall trends and turning points in the two series are similar (See **Figure 5**). The difference in the absolute levels of employment is due to the fact that the IO tables used for estimation in the two sources are not identical in terms of sector disaggregation and data compilation methodology[19]. The SUT based estimates for the period 2011-12 to 2017-18, however, are closer to the TiM estimates (see **Figure 5**). According to the SUT based estimates, India's exports supported 58.1 million jobs in 2017-18, similar to the TiM estimates of 58.2 million jobs in 2018. Both TiM and SUT based estimates shows a decline of export related jobs since 2013, which is not surprising as export growth slowed down significantly during 2013-2018 as compared to 2000-2012.

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[19] The estimates by Export-Import Bank of India (2016) is based on a highly disaggregated (112×112) IO tables while the TiM estimates are based on a relatively aggregated IO tables (that is, 45×45 in the 2021 edition of ICIO tables). The new SUT based estimates for the period 2011-12 to 2017-18 make use of 63×63 tables. The data compilation methodology involved in the estimation of year-specific technical coefficients are also different across these databases as discussed in detail in Export-Import Bank of India (2016), Horvát, Webb and Yamano (2020), and Appendix 1 of this study, respectively.

It may be noted that export related jobs grew significantly faster than total employment until about 2012. As a result, the share of export-supported jobs in total employment in the country increased from little over 9% in 1995 to the peak of 16.1% in 2012, before declining to 12.2% in 2018 (TiM database, **Figure 6**). The SUT based estimates show that the share of export related employment in total domestic employment declined from 15.3% in 2012-13 to 11.8% in 2017-18. The declining share of export related jobs in total employment since 2012 is consistent with the decline in India' trade openness – exports and imports as a share of GDP – during this period (**Figure 7**).

Estimates based on both TiM database and SUT shows that indirect employment through backward linkages accounts for over a half of total export related employment. For example, indirect employment accounted for 52.5% of total export related jobs in 2018 (up from 50.1% in 2010). The SUT based estimates shows that the contribution of indirect employment in total export related employment increased marginally from 52.1% in 2011-12 to 52.7% in 2017-18 (**Figure 8**).

Figure 9 shows that the number of export-supported jobs per million dollar worth of exports declined steadily over the years. The estimates reveal that one million dollar worth of exports supported about 889 jobs in 1995 compared to 108 jobs in 2018. The observed decline in the number of jobs per million dollar worth of exports is consistent with the general pattern observed for other countries (Cali et. al, 2016). Despite this decline, however, employment intensity of Indian exports is found to be higher than the similar estimates available for other major countries, including US and China. For example, US$1 million worth of US exports supported only 6.6 jobs in 2009 and 5.2 jobs in 2014 (Rasmussen and Johnson, 2015). Available estimates for China suggest that US$1 million worth of its exports supported 140 jobs in 2007 (Chen et al, 2012) as compared to 282 jobs for India for the same year.

Declining employment intensity of exports is partly driven by improvements in labor productivity over the years and partly as a result of a change in the composition of gross exports in favor of more skill and capital-intensive products. As seen in **Table 4**, the share of skill and capital-intensive sectors in India's exports has increased significantly at the cost of traditional labor-intensive products over the years. The trends observed in **Figure 9** are consistent with these changes in the composition of India's exports.

Table A1 in Appendix 2 reports the number of employment (in 000s) embodied in Indian exports to top 25 partner countries for selected years – 1995, 2015 and 2018. It may be noted that exports to the USA accounted for the largest share of total export tied domestic employment in India. This is followed by UK, Germany, Singapore, Japan, France, Saudi Arabia, Korea, Italy, Thailand, Viet Nam etc.

5.2 Estimates for Sector Groups: Agriculture, Manufacturing and Services

Table 9 and **Figure 10** shows export supported number of jobs (in millions) for three broad sector groups – agriculture, manufacturing and services. The total number of export-supported jobs for agriculture increased from 3.2 million in 1995 to the peak of 8 million in 2012 and then declined to 3.4 million in 2018 (TiM database). The SUT based estimates reveal a similar trend for the post-2012 period with a decline of export-supported jobs in agriculture from 7.3 million in 2012-13 to 4.3 million in 2017-18.

Within the manufacturing sector, as per the TiM database, the total number of jobs tied to exports more than doubled from 23.2 million in 1995 to 47.5 million in 2013. However, as India's export growth slowed

down, the number of export related jobs for manufacturing sector gradually declined to 33 million by 2018. It can be seen that the major increase in aggregate export supported jobs observed during the period 1995-2012 was mainly brought about by the manufacturing sector. Between 1995 and 2012, aggregate number of export supported jobs increased by 40 million. It can be seen that manufacturing sector contributed to about 59% (23.5 million) of this increase, followed by services (29%, 11.6 million) and agriculture (12%, 4.9 million). The SUT based estimates show that manufactured exports supported 43.4 million jobs in 2017-18 as compared to 54.1 million jobs in 2011-12.

Within the services sector, the total number of export-supported jobs increased steadily from 9.3 million jobs in 1995 to 20.9 million in 2012 and 21.8 million in 2018. Unlike for agriculture and manufacturing, export related jobs attributed to the services sector have not recorded a decline during the post-2012 period. The SUT based estimates suggest that 10.4 million jobs in 2017-18 can be attributed to services exports, up from 9.2 million in 2011-12. The estimates of the number of jobs attributed to services exports is found to be higher in the TiM database as compared to the SUT based estimates. On the other hand, the number of jobs tied to manufactured exports is found to be higher in the SUT based estimates as compared to the TiM estimates[20].

Panels (a) and (b) in **Figure 10** shows the shares of these broad sector groups in total export supported jobs based on TiM and SUT based estimates, respectively. The composition of employment across the broad sectors showed some changes over the years. As per the estimates in Panel (a), the share of agriculture in total export related jobs declined from 8.9% in 1995 to 5.8% in 2018. Throughout the period, jobs attributed to manufactured exports accounted for the largest share of export related employment though its share has declined from about 65% in 1995 to 56.7% in 2018. On the other hand the share of jobs tied to services increased from 26% in 1995 to 37.5% in 2018. The SUT based estimates in panel (b) shows similar trends. Between 2011-12 and 2017-18, the share of agriculture and manufacturing in total export related employment declined, respectively, from 8.7% to 7.4% and from 78% to 74.7%. On the other hand, the share of jobs attributed to services exports increased from 13.3% to 17.8%.

Figure 11 depicts the share of indirect employment, through backward linkages, in total export-supported jobs within each of the sector groups. Overall, the two datasets –TiM and SUT – provide similar patterns with respect to the relative importance of direct versus indirect effects across sector groups. The manufacturing sector can be seen as clearly different from both services and agriculture in terms of indirect employment shares. Indirect employment generally accounts for more than 60% of total export-supported jobs in the manufacturing sector, implying that manufacturing exports plays an important role in generating employment in agriculture and services sectors through backward linkage effects. In contrast, a significant share of employment attributed to the exports of agriculture and services are due to the direct effects. Indirect employment accounts for less than 10% of total jobs supported by agriculture; this proportion is found to be less than 50% for services.

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[20] As noted above, the differences in TiM and SUT-based estimates stems from the fact that the IO tables used for estimation in the two sources are not identical in terms of sector disaggregation and data compilation methodology. Further, as noted in sub-section 3.2, manufactured exports accounts for a higher share of total exports in SUT as compared to that in ICIO table. On the other hand, services exports accounts for a higher share of total exports in ICIO table as compared to that in SUT.

Table 10 reports the number of jobs created per million dollar worth of exports for each sector groups. It can be seen that 1 million dollar worth of agricultural exports could generate about 350 jobs in 2018 (TiM database). Compared to agriculture, the number of jobs attributed to 1 million dollar worth of manufacturing or services exports are much smaller – that is, about 127 and 97 jobs, respectively, in 2018. It must be noted, however, that employment generated in manufacturing and services are generally better paying compared to that in agriculture. For all sectors, the number of jobs created per million dollars of exports declined over the years partly due to an improvement in labor productivity and partly due to changes in export composition within each of the sector groups. TiM database and SUT provide broadly similar estimates of jobs per million dollar worth of exports from agriculture and manufacturing, while the estimates for service sector show some variance across the two data bases.

Table A2 through A4 in **Appendix 2** reports the number of employment (in 000s) embodied in Indian exports by sector groups to top 25 partner countries for selected years – 1995, 2015 and 2018. It may be noted that, for all three sector groups, exports to the USA accounted for the largest share of total export tied domestic employment in India. This is followed by countries like UK, Germany, Singapore, Japan, France, Saudi Arabia, Korea, Italy, Thailand, Viet Nam, Brazil etc.

Table 11 through **Table 16** summarizes the trends and patterns of export-supported employment at the sub-sector level within each of the three sector groups. For each sector group, the estimates of jobs supported by sub-sector level exports are reported as well as the percentage contribution of indirect employment to total export-supported employment. The TiM estimates are reported for selected years – 1995, 2005, 2012, 2015 and 2018 – while the SUT based estimates are reported for all years from 2011-12 to 2017-18.

Within 'Agriculture', export related jobs have been largely generated by a range of agricultural crops such as cotton, fruits & vegetables, wheat, sugar cane, gram & pulses, oil seeds, maize etc. The number of export related jobs in the sector of 'agriculture, hunting and forestry' more than doubled from 2.6 million in 1995 to 7.5 million in 2012, but then declined to 3.1 million in 2018. Export supported jobs in agriculture have been primarily attributed to the direct effect. The relative insignificance of indirect effect implies that most of the agricultural crops have weak backward linkages with manufacturing and services sectors, even as some agricultural products may have strong forward linkages with certain manufacturing industries.

Within the group of manufacturing, the sub-sectors that accounted for the largest number of export related jobs include 'food products', 'other manufacturing', 'wearing apparel', 'textiles', 'chemicals', 'basic metals' etc. Exports from the top three manufacturing sub-sectors – 'food products', 'miscellaneous manufacturing' (mainly gems and jewelry) and 'textile products' – created direct plus indirect jobs in the range of 22-28 million in 2018. After registering a significant increase during 1995-2012, the number of jobs tied to exports has declined since 2012 in a number of manufacturing sub-sectors. For most of the manufacturing sub-sectors, as opposed to agriculture, indirect effects through backward linkages accounts for a very large share of export related employment. The sub-sector of 'miscellaneous manufacturing' (driven by gems and jewelry) is a notable exception, where most of the export related jobs are created through the direct effect.

Within services, the sub-sectors that accounted for the largest shares of export related employment include 'computer programming, consultancy and information services', 'wholesale and retail trade', 'accommodation and food service' and 'professional, scientific and technical activities'. The number of employment attributed to exports from these sectors within services, unlike those within manufacturing and agriculture, record consistent increases during the entire period, including the sub-period after 2012.

5.3 Estimates by Gender, 2017-18

Using SUT, this section provides the break-up of export related employment for males and females for the year 2017-18[21]. It is evident that, at the economy-wide level, about three-fourths of total export related employment went to males. In 2017-18, Indian exports supported about 43.4 million jobs for males and 14.7 million jobs for females (**Table 17**). Exports of agriculture supported about 3 million jobs for males and 1.3 million jobs for females. Female employment constitutes about 29% of total jobs supported by agricultural exports. Manufactured exports have supported about 32 million (74%) jobs for males and 11.4 million (26%) jobs for females. Exports of services supported 8.3 million (80%) jobs for males and 2.1 million (20%) jobs for females.

Among the three sector groups, the share of export related jobs for females in total export related jobs is found to be the highest for agriculture (29.1%), followed by manufacturing (26.2%) and services (20.3%). Out of the total direct (indirect) jobs supported by agriculture 29.4% (22.9%) of the jobs went to women. For males, in contrast, the share of indirect employment tied to agriculture exports is found to be higher (77.1%) than that of direct employment (70.6%). A similar pattern can be observed for jobs tied to services exports with females jobs having a greater share of direct employment (21.4% of total direct employment tied to services exports) as compared to indirect employment (18.5% of total indirect employment tied to services exports). Manufacturing, however, exhibit a reverse pattern with a higher share of indirect employment for females (27.3% of total direct employment tied to manufactured exports) as compared to direct employment (24.6% of total indirect employment tied to services exports). This pattern reflects the fact that some of the manufacturing sectors have strong backward linkages with certain agriculture sectors (for example, cotton, tobacco, plantation etc) where women workers are intensively employed.

Table 18 reports the number of jobs supported by exports at the sub-sector level within each of the three sector groups. This table also reports the percentage contribution of indirect employment to total export related employment at the sub-sector level. For each sector groups, the sub-sectors are listed in the descending order of the number of export supported jobs for women. Within manufacturing, export of 'wearing apparel' supported about 2 million export related jobs for women, of which about 80% are direct jobs. This sub-sector supports the largest number of export related jobs for women followed by 'textiles' (1.6 million), 'grain mill products' (1.5 million), 'meat, fish, fruit, vegetables, oils and fats' (1.3 million) and 'other manufacturing' (1.3 million).

The manufacturing sub-sectors that support the largest number of jobs for men include 'miscellaneous manufacturing' (5.8 million mainly due to gems and jewellery), 'textiles' (3.6 million), 'grain mill products' (3.6 million), 'wearing apparel' (3.4 million) and 'meat, fish, fruit, vegetables, oils and fats' (3.2 million). Within services, the sub-sectors that record the largest number of export related jobs for women include 'IT and information services' (0.8 million), 'education & research' (0.5 million) and 'other business services' (0.3 million). These sectors also support large number of jobs for men: 'IT and information services'' (3.7 million), 'other business services' (1.9 million) and 'education & research' (0.7 million).

Female employment intensity (FEI, the share of female workers in total employment) in exports may differ from that in total production as the product composition of the former could be different from the latter. **Figure 12** provides a comparison of female employment intensity in exports and total production. It is evident

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[21] TiM database does not provide estimates based on gender. Estimation by gender categories requires separate employment coefficients (l) for males and females for each sector j; these coefficients have been estimated using PLFS data for 2017-18.

that, at the aggregate level, the FEI in the export basket (25.4%) is higher than that in total production (23.3%). Among the three sector groups, manufacturing and services show higher FEI in exports as compared to total production whereas an opposite pattern can be observed for agriculture. These findings suggest that, as compared to the composition of total production, India's export basket in manufacturing and services are biased towards sectors with relatively higher FEI. Thus, a strategy based on exports of manufacturing and services as the key driver of growth can support greater employment opportunities for women as compared to a strategy based on selling mostly in the domestic market.

5.4 Estimates by Educational Attainment of Workers, 2017-18

Using SUT, this section provides the break-up of export related employment for workers with different levels of educational attainment for the year 2017-18[22]. It can be seen that, at the aggregate level, about 21% (12.6 million) of total export related jobs went to workers with no formal schooling (see **Table 19 and Figure 13**). The bulk of these jobs are supported by manufactured exports (10.2 million) and mainly (81%) due to its backward linkages. About 18% (10.7 million) of total export related jobs were created for workers with educational attainment up to the primary level. Again, the majority of these jobs (9 million) are attributed to manufactured exports. Workers with middle school attainment accounted for 22% (13 million) of total export supported jobs, of which 10.6 million jobs are tied to manufactured exports.

Out of the total number of jobs tied to exports, about 37.5% is found to be relatively high skilled jobs, consisting of 21.4% of jobs (12.4 million) for workers with secondary and higher secondary attainment and 16.1% of jobs (9.4 million) for the category of diploma holders, graduates and post-graduates. About 76% (9.4 million) of total export related jobs for workers with secondary and higher secondary attainment can be attributed to manufactured exports. On the other hand, more than half (55%, 5.1 million) of total export related jobs for the category of diploma holders, graduates and post-graduates can be attributed to exports from the services sector. As expected, about 76% of these high skilled jobs attributed to services exports are due to the direct effect.

More than three-fourth of the jobs (direct plus indirect) supported by agriculture exports went to relatively low-skilled workers – that is, the categories of workers with educational attainment at the middle level or lower, including those with no formal schooling. The large majority of these jobs are due to the direct effect of exports from agriculture. While the share of jobs for workers with no formal schooling is the highest for agricultural exports (1.5 million, 35.3%), this proportion is the lowest for services exports (0.9 million, 8.7%). Workers with no formal schooling accounts for 23.5% (10.6 million) of total jobs supported by manufactured exports, more than 80% of which being attributed to indirect effect. The share of export related jobs for workers with up to primary enrollment is found to be broadly similar for agriculture (0.9 million, 21.1%) and manufacturing (8.96 million, 20.7%). This proportion is the lowest for services (0.8 million, 7.6%). As far as the jobs for workers with middle school attainment are concerned, it is found that the share is the highest for jobs supported by manufactured exports (10.6 million, 24.6%) followed by agriculture (0.9 million, 21.6%) and services (1.5 million, 13.8%).

As expected, high skilled jobs accounted for only 22% of total jobs supported by agriculture exports - that is, workers with secondary and higher secondary attainment (0.8 million, 17.4%) and workers with diploma

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[22] TiM database does not provide estimates based on gender. Estimation by gender categories requires separate employment coefficients (l) for males and females for each sector j; these coefficients have been estimated using PLFS data for 2017-18.

and above (0.2 million, 4.6%). High skilled jobs accounted for about 70% of export supported jobs by the services sector – that is, workers with secondary and higher secondary attainment (2.3 million, 21.4%) and workers with diploma and above (5.1 million, 48.5%). High skilled jobs constitute about 31% of total jobs tied to manufactured exports - workers with secondary and higher secondary attainment (9.4 million, 21.8%) and workers with diploma and above (4 million, 9.3%).

Table 20 reports the number of export supported employment by educational attainment at the sub-sector level within each of the three sector groups. Within services, the sub-sectors that support the largest number of high-skilled jobs are 'IT and information services', 'other business services' and 'education & research'. Within manufacturing, exports from the top two sub-sectors – 'miscellaneous manufacturing' and 'wearing apparel' – mainly support jobs for workers with middle school, secondary and higher secondary attainments. However, it is important to note that these sectors also support a significant number of jobs for workers with diploma and higher qualifications, almost half of which could be attributed to the indirect effect.

The composition of direct export supported jobs by educational attainment across sector groups is shown in **Figure 14**. Again, low skilled jobs account for more than three-fourths of direct export related jobs in agriculture. For services, in contrast, more than 80% of direct export related jobs went for relatively high skilled workers, with the respective shares being 61.6% for workers with diploma and higher attainment and 19.6% for workers with secondary and higher secondary attainment. As to the nature of jobs supported by manufactured exports, the share of direct high skilled jobs (38%) is found to be higher than the share of total (direct plus indirect) high skilled jobs.

The skill composition of jobs supported by exports may differ from that by total production as the product composition of the former could be different from the latter. **Figure 15** provides a comparison of the skill composition (measured by educational attainment of workers) of direct jobs supported by exports with that of total production. It is evident that exports offer a greater potential to support more skilled jobs as compared to production for the domestic market. For higher educational attainment categories starting from middle school level, export basket is associated with higher share of employment as compared to the basket of total production (panel d, **Figure 15**). Workers with diploma and higher qualifications, for example, account for 22.2% of total export related jobs while this share is only 13.6% for total domestic production. Similarly, workers with secondary and higher secondary attainment account for 23.3% of export supported jobs as compared to 21.4% of jobs supported by total production. On the other hand, domestic production seems to support higher shares of jobs for workers with no formal schooling and for workers with up to primary attainment.

Such differences are starker for services exports (Panel c, **Figure 15**). It can be seen that 61.6% of jobs tied to services exports went to workers with diploma and higher qualifications; however, only 23% of jobs tied to total services output went to this highly skilled category of workers. For manufacturing, exports (as compared to total production) support higher shares of jobs for workers with middle school, secondary and higher secondary attainments. For agriculture, the skill composition of jobs supported by exports looks similar to that of total production. The patterns at the sector group level suggest that, as compared to the composition of total output, India's export basket in manufacturing and services are biased towards sectors that employ higher share of relatively more skilled workers. Overall, the findings imply that, as compared to a strategy based on selling in the domestic market, a growth strategy based on exports as the main driver can support greater employment opportunities for relatively high skilled workers and can improve the quality of jobs.

CONCLUSION
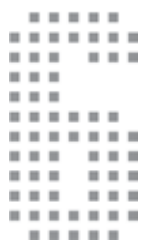
Using Input-Output (IO) analysis, this study provides aggregate and sector level estimates of the number of jobs attributed to India's aggregate - merchandise and services - exports during the period 1995-2018. Two sets of estimates have been reported. The first set of estimates is from the OECD's 'Trade in Employment' (TiM) database while the second set is based on India's official Supply use tables (SUT) prepared by the CSO. As per the OECD-TiM estimates, the total number of jobs supported by Indian exports increased from 35.7 million in 1995 to an all-time peak of 75.6 million in 2012. As export growth slowed down during the post-2012 period, the number of jobs tied to exports gradually declined to 58.2 million in 2018. The SUT based estimates are similar to the TiM estimates.

Manufacturing sector accounts for the largest share of the total number of jobs attributed to exports, followed by services and agriculture. Export related jobs grew faster than that of country's total employment: the share of export-supported jobs in total employment increased from little over 9% in 1995 to 16.1% in 2012, before declining to 12.2% in 2018. Backward linkages, particularly from manufacturing to agriculture and services, have become an important source of export related job creation in the country.

Exports in 2017-18 supported about 43.4 million jobs for males and 14.7 million jobs for females. About 37.5% of the total number of export related jobs went to the categories of workers with relatively higher educational attainments, consisting of 21.4% for workers with secondary and higher secondary attainment and 16.1% for the category of diploma holders, graduates and post-graduates. The analysis suggest that, as compared to a growth strategy based on selling in the domestic market, a strategy based on exports as the main engine of growth can support relatively greater employment opportunities for women workers and for the categories of workers with educational attainments above middle school level.

Potential realignment of the global value chains (GVCs) in the coming years provides an opportunity for India to replace China as an assembly hub for manufactured exports. This can create millions of jobs for India's burgeoning youth population. Econometric analysis confirm that the involvement of Indian industries into GVCs have led to domestic gains in terms of increased exports, domestic value added (DVA) and employment (Veeramani and Dhir, 2022). Based on imported parts and components, India has a potential to emerge as a major hub for final assembly in several industries. Since this strategy involves processing or assembly of imported parts and components, DVA per unit of exported good would decline. However, since the scale of operations is very large, the potential for total domestic value addition and job creation is very high.

Greater involvement of domestic industries in GVCs must form an essential part of the "Make in India" initiative. It is essential to abolish tariff rates for intermediate inputs and address the issue of inverted tariff structure in several Indian industries (Veeramani and Basu, 2021). The tariff structure becomes inverted when the duty rate for the overall finished good is lower than that of its component parts. Such distortions in the tariff structure could render the relevant manufacturing process uncompetitive in the country concerned. It is also important to incentivize greater specialization in labor-intensive industries, processes and product lines within GVCs. A flexible labour market, with appropriate social safety nets, is necessary for firms to participate in GVCs. The ongoing reform attempts to create greater flexibility in the Indian labor market should continue. A liberal FDI policy is also critical to encourage investment by the lead firms within GVCs. In sum, policies should aim to reduce input tariffs, rationalize the tariff structure, implement key factor market reforms, provide an enabling environment for the entry of lead firms and to reduce the service link costs of linking production blocks across countries.

Acemoglu, D. (2002) 'Technical Change, Inequality, and the Labor Market', *Journal of Economic Literature* 40(1): 7-72.

Aggarwal, Aradhana (2002): "Liberalisation, Multinational Enterprises and Export Performance: Evidence from Indian Manufacturing", *Journal of Development Studies*, Vol 38(3).

Aghion, P., R. Burgess, S.J. Redding, and F. Zilibotti. 2008. "The unequal effects of liberalization: Evidence from dismantling the License Raj in India." *American Economic Review* 98 (4): 1397-1412.

Ahluwalia, R., R. Hasan, M. Kapoor, and A. Panagariya. 2018. "The impact of labor regulations on jobs and wages in India: evidence from a natural experiment." *Columbia, SIPA Working Paper No. 2018-02*.

Aho, C. Michael, and James A. Orr (1981) "Trade-sensitive employment: who are the affected workers?" *Monthly Labor Review*, 104, 2, pp. 29-35.

Ahsan, A., and C. Pages. 2009. "Are all labor regulations equal? Evidence from Indian manufacturing." *Journal of Comparative Economics* 37 (1): 62-75.

Arto, I., Rueda-Cantuche, J.M., Amores, A.F., Dietzenbacher, E., Sousa, N., Montinari, L. and Markandya, A. (2015) EU exports to the World: Effects on Employment and Income, Luxembourg: Publications Office of the European Union.

Arto, Iñaki José M. Rueda-Cantuche, Antonio F. Amores, Erik Dietzenbacher, Nuno Sousa, Letizia Montinari and Anil Markandya (2015) "EU exports to the world: effects on employment and income" Luxembourg: Publications Office of the European Union.http://trade.ec.europa.eu/doclib/docs/2015/june/tradoc_153503.PDF

Arto, I., Rueda-Cantuche, J.M., Cazcarro, I., Amores, A.F., Dietzenbacher, E. Kutlina-Dimitrova, Z. and Román, M. V. (2018), EU exports to the World: Effects on Employment, Publications Office of the European Union, Luxembourg, 2018

Artuc, E., Lopez-Acevedo, G., Robertson, R., and Samaa, D (2019), "Exports to Jobs: Boosting the Gains from Trade in South Asia" International Labour Organization (ILO) and World Bank Washington, DC.

Aswicahyono Haryo and Manning Chris (2011) "Exports and job creation in Indonesia before and after the Asian Financial Crisis", *Working Paper No. 2011/11*, Arndt-Corden Department of Economics, Crawford School of Economics andGovernment, Australian National University.

Athukorala, P. (2012). Asian trade flows: trends, patterns and prospects. *Japan and the World Economy*, 24 (2), 150–162.

Athukorala, P. (2014). How India fits into global production sharing: Experience, prospects and policy options, *India Policy Forum*, 10 (2013/14) (pp. 57–116). New Delhi: Sage Publications

Baldwin, J. R., & Gu, W. (2003). Export-market participation and productivity performance in Canadian manufacturing. Canadian Journal of Economics/Revue Canadienne D`Economique, 36(3), 634–657.

Baldwin, R. and Lopez-Gonzalez, J. (2015). Supply-chain trade: a portrait of global patterns and several testable hypotheses. *The World Economy*, 38 (11), 1682-1721.

Banerji, Ranadev (1975), Exports of Manufactures from India: A Perspective Appraisal of the Emerging Pattern, Tubengen, J.C.B. Mohr.

Bernard, A. B., Jensen, J. B., & Lawrence, R. Z. (1995). Exporters, Jobs, and Wages in U.S. Manufacturing: 1976-1987. Brookings Papers on Economic Activity. Microeconomics, 1995, 67. https://doi.org/10.2307/2534772

Bernard, Andrew B., & Wagner, J. (1997). Exports and success in German manufacturing. *Weltwirtschaftliches Archiv*, 133(1), 134–157. https://doi.org/10.1007/BF02707680

Bernard, A. B., Jensen, J. B., Redding, S. J., & Schott, P. K. (2007). Firms in International Trade. Journal of Economic Perspectives, Volume 21, Number 3, Summer 2007, Pages 105–130

Bernard, A. B., Jensen, J. B., Redding, S. J., & Schott, P. K. (2011). The Empirics of Firm Heterogeneity and International Trade. 40.

Besley, T., and R. Burgess. 2004. "Can labor regulation hinder economic performance? Evidence from India." *The Quarterly Journal of Economics* 119 (1): 91-134.

Bhattacharjea, A. 2021. "Labour market flexibility in Indian manufacturing: A critical survey of the literature," *International Labour Review*, International Labour Organization, 160(2), 197-217.

Black, J., Spowage, M., Cooper, B., Watts, R., and McGeoch, A (2021), "Estimating the relationship between exports and the labour market in the UK", Department for International Trade (2021), United Kingdom.

Calì, M., J. Francois, C. H. Hollweg, M. Manchin, D. A. Oberdabernig, H. Rojas-Romagosa, S. Rubinova and P. Tomberger (2016). "The Labor Content of Exports Database." Policy Research Working Paper No. 7615, World Bank, Washington, DC.

Chatterjee, S., and A. Subramanian. 2020. "India's inward (re) turn: Is it Warranted? Will it Work?" *Ashoka Center for Economic Policy Paper No. 1*.

Chaurey, R. 2015. "Labor regulations and contract labor use: evidence from Indian firms." *Journal of Development Economics* 114: 224-232.

Chen Xikang, Cheng Leonard K, Fung K C, Lau Lawrence J, Sung Yun-Wing, Zhu K, Yang C, Pei J and Duan Y (2012) "Domestic value added and employment generated by Chinese exports: A quantitative estimation", *China Economic Review* 23, 4, pp. 850–864

Chishti, Sumitra (1981) "Exports and employment in India", *Economic and Political Weekly*, 16, 42/43, Oct. 17-24, pp. 1710-1714

Cline, W. R. (1997) Trade and Income Distribution, Washington, DC: Institute for International Economics.

Confederation of Indian Industries (CII), (2021), *Foreign Trade and Investment in India: Unlocking Key Opportunities through Strategic Reforms,* Delhi.

Damijan, J. P., Polanec, S., Janez P. (2004). Self-selection, Export Market Heterogeneity and Productivity Improvements: Firm Level Evidence from Slovenia. LICOS Discussion Papers. Discussion Paper 148/2004

Das, D K and Kukreja, P (2020) "Value Addition, Jobs and Skills: A Study of India's Exports" ICRIER Working Paper No 39, Indian Council for Research in International Economic Relations, New Delhi.

Davis Lester A (1992) "U.S. jobs supported by merchandise exports, U.S. Dept. of Commerce, Economics and Statistics Administration, April.

Davis Lester A (1996) "U.S. jobs supported by goods and services, 1983–1994,"U.S. Department of Commerce, Economics and Statistics Administration, November

Department for Business Enterprise & Regulatory Reform (DBERR, 2007), "The jobs content of UK trade 1995-2004, Employment Relations Occasional Paper, December, London. http://www.berr.gov.uk/publications

Dougherty, S., V. Frisancho, and K. Krishna. 2014. "State-level labor reform and firm-level productivity in India." *India Policy Forum* 10: 1-56.

Exim Bank of India (2016) "Inter-Linkages between Exports and Employment in India", *EXIM Bank Occasional Paper 179*.

Feenstra, R.C. (1998). Integration of trade and disintegration of production in the global economy. *The Journal of Economic Perspectives*, 12 (4), 31–50.

Feenstra, R.C., and G.H. Hanson. 1997. "Productivity measurement and the impact of trade and technology on wages: estimates for the US, 1972-1990." *NBER Working Paper* w0652.

Feenstra, Robert C., and Chang Hong. 2010. China's exports and employment. In: *China's Growing Role in World Trade*, edited by Robert C. Feenstra and Shang-Jin Wei, pp. 167–199. Chicago, IL: University of Chicago Press.

Gaston, N. and Nelson, D. (2000) 'Globalization and Wages in OECD Economies: Linking Theory with Evidence' in J. Francois, D. Roland-Holst and D. van der Mensbrugghe (eds.) *Globalization and Employment Patterns: Policy, Theory and Evidence*, Oxford: Oxford University Press

Ghose, A. K. (2003) Jobs and Incomes in a Globalizing World, Geneva: International Labour Office.

Goldberg, P. K. and Pavcnik, N. (2004) 'Trade, Inequality and Poverty: What Do We Know? Evidence from Recent Trade Liberalization Episodes in Developing Countries', *NBER Working Paper 10593*, Cambridge, MA: National Bureau of Economic Research.

Gupta, P., R. Hasan, and U. Kumar. 2009. "Big reforms but small payoffs: Explaining the weak record of growth in Indian manufacturing." *India Policy Forum 2008-09* 5: 59-108.

Hasan, R., D. Mitra, and K.V. Ramaswamy. 2007. "Trade reforms, labor regulations, and labor-demand elasticities: empirical evidence from India." *The Review of Economics and Statistics* 89 (3): 466-481.

Helpman, E., Melitz, M. J., & Yeaple, S. R. (2004). Export Versus FDI with Heterogeneous Firms. *American Economic Review*, 94(1), 300–316. https://doi.org/10.1257/000282804322970814

Hoekman, B. and Winters, A. (2005) 'Trade and Employment: Stylized Facts and Research Findings', *Policy Research Working Paper 3676*, Washington, DC: World Bank.

Horvát, P., C. Webb and N. Yamano (2020), "Measuring employment in global value chains", OECD Science, Technology and Industry Working Papers, No. 2020/01, OECD Publishing, Paris,

Hummels, D., Ishii, J. and Yi, K.M. (2001). The nature and growth of vertical specialization in world trade. *Journal of International Economics*, 54 (1), 75–96.

International Labour Office (ILO) (2018), "Women and men in the informal economy: A statistical picture", Geneva. https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/documents/publication/wcms_626831.pdf

Jansen, M and Lee, D (2007) "Trade and Employment Challenges for Policy Research", A joint study of the International Labour Office and the Secretariat of the World Trade Organization, Geneva.

Jiang, X., and W. Milberg (2013). Capturing the Jobs from Globalization: Trade and employment in global value chains. Working Paper No. 30, Capturing the Gains Programme, University of Manchester, United Kingdom.

Johnson, R.C. and Noguera, G. (2012). Accounting for intermediates: production sharing and trade in value added. *Journal of International Economics*, 86 (2), 224–236.

Kiyota, Kozo (2012) "Exports and jobs: the case of Japan, 1975–2006". *Contemporary Economic Policy*, 30, 4, pp. 566–583.

Kiyota, Kozo (2016) "Exports and employment in China, Indonesia, Japan, and Korea", *Asian Economic Papers*, 15, 1, pp 57-72.

Kochar, K., U. Kumar, R. Rajan, A. Subramanian, and I. Tokatlidis. 2006. "India's pattern of development: What happened, what follows?" *Journal of Monetary Economics* 53 (5): 981-1019.

Krueger, Anne O. (2010), 'India's Trade with the World: Retrospect and Prospect', in Sharkar Acharya and Rakesh Mohan (eds), *India's Economy: Performance and Challenges*. New Delhi: Oxford University Press, pp. 399–429.

Kucera, D., L. Roncolato, and E. von Uexkull (2012). Trade Contraction and Employment in India and South Africa during the Global Crisis. World Development, 40(6): 1122-34.

Kutlina-Dimitrova, Z., Rueda-Cantuche , J M. (2021), "More Important than Ever: Employment Content of Extra-EU Exports" Chief Economist Note, European Commission https://trade.ec.europa.eu/doclib/html/157517.htm

Leclair Mark S (2002) "Export composition and manufacturing employment in the US during the economic downturn of 1991-92", *Economic Systems Research*, 14, 2, pp.147-156.

Leontief, Wassily (1946) "Exports, imports, domestic output, and employment" *Quarterly Journal of Economics,* 60, 2, pp. 171-193.

Los Bart, Timmer Marcel P, de Vries Gaaitzen J (2015) "How important are exports for job growth in China? A demand side analysis", *Journal of Comparative Economics*, 43, 1, pp. 19–32.

McKinsey Global Institute (2020), "India's turning point: An economic agenda to spur growth and jobs" August. https://www.mckinsey.com/featured-insights/india/indias-turning-point-an-economic-agenda-to-spur-growth-and-jobs

Miller, R.; Blair, P. *Input-Output Analysis: Foundations and Extensions*; 2nd ed.; Cambridge University Press: Cambridge, UK, 2009; p. 750.

Ministry of Finance (2020) "Creating Jobs and Growth by Specializing to Exports in Network Products" Chapter 5, in *Economic Survey 2019-20*, Government of India

Ministry of Finance (2021) *Economic Survey 2020-21*, Government of India, https://www.indiabudget.gov.in/economicsurvey/

Mitra, D., and B.P. Ural. 2008. "Indian manufacturing: a slow sector in a rapidly growing economy." *The Journal of International Trade and Economic Development* 17 (4): 525-559.

Murray, J. and M. Lenzen, eds. (2013), *The Sustainability Practitioner's Guide to Multiregional Input-Output Analysis*, Common Ground Publishing LLC: Champaign, Illinois, US.

Nambiar, R G (1979) "Employment through Exports: a study of India", *Indian Journal of Industrial Relations*, 15, 1, pp. 1-18.

Organization for Economic Corporation and Development . (2007). OECD economic surveys: India (Vol. 2007/14). Paris: OECD Publishing. OECD report

Panagariya, A. 2007. "Why India lags behind China and how it can bridge the gap." *World Economy* 30 (2): 229-248.

Panagariya, A. (2008). *India: The Emerging Giant*, New York: Oxford University Press

Pursell, G., N. Kishor, and K. Gupta. 2008. "Manufacturing protection in India since independence." In R Jha (ed). *The Indian economy sixty years after independence*, London: Palgrave Macmillan.

Ramaswamy, K.V. 2003. "Globalization and industrial labor markets in South Asia: some aspects of adjustment in a less integrated region." *East-West Center Economic Series* 54.

Rasmussen, Chris and Johnson, Martin (2012) "Jobs supported by exports, 1993–2011", U.S. Department of Commerce, Office of Competition and Economic Analysis, International Trade Administration

http://www.trade.gov/mas/ian/build/groups/public/@tg_ian/documents/webcontent/tg_ian_003978.pdf

Rasmussen, Chris and Johnson, Martin (2015) "Jobs supported by exports 2014: an update", U.S. Department of Commerce, Office of Trade and Economic Analysis, International Trade Administration

http://www.trade.gov/mas/ian/build/groups/public/@tg_ian/documents/webcontent/tg_ian_005406.pdf

Rasmussen, C (2017) "Jobs Supported by Exports 2016: An Update", Office of Trade and Economic Analysis, International Trade Administration, Department of Commerce, United States https://legacy.trade.gov/mas/ian/build/groups/public/@tg_ian/documents/webcontent/tg_ian_005543.pdf

Roxon, Daniel (1967) "Domestic jobs attributable to U.S. exports" *Monthly Labor Review*, 90, 12, pp. 12-20.

Rueda-Cantuche, J, M., Cernat, L and Sousa, N (2019), "Trade and jobs in Europe: The role of mode 5 service exports", *International Labour Review*, 158(1)

Saha, B., K. Sen, and D. Maiti. 2013. "Trade openness, labour institutions and flexibilisation: theory and evidence from India." *Labour Economics* 24: 180-195

Sharma, K (2003), "Factors determining India's export performance", *Journal of Asian Economics*, 14 (3) , pp. 435-446

Slaughter, M. J. (1998) 'International Trade and Labor-Market Outcomes: Results, Questions, and Policy Options', *The Economic Journal* 108(450): 1452-1462.

Sousa, Nuno, Rueda-Cantuche Jose M, Arto, Iñaki and Andreoni, V (2012) "Extra EU exports and employment", *Chief Economist Note*, European Commission. http://trade.ec.europa.eu/doclib/docs/2012/may/tradoc_149511.%202_24.05.2012.pdf

Statistics Canada, 2020. Table 12-10-0100-01 Value added in exports, by industry, provincial and territorial. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1210010001

Taylor William G (1976) "Manufactured exports and employment creation in developing countries : some empirical evidence", *Economic Development and Cultural Change*, 24, 2, pp. 355-373

Timmer, M. P., Dietzenbacher, E., Los, B., Stehrer, R. and de Vries, G. J. (2015), "An Illustrated User Guide to the World Input–Output Database: the Case of Global Automotive Production", *Review of International Economics*, 23, pp. 575–605.

Tschetter, John (2010) "Exports support American jobs" U.S. Department of Commerce, International Trade Administration, *International Trade Research Report no. 1*, http://trade.gov/publications/pdfs/exports-support-american-jobs.pdf

Tukker, A., and E. Dietzenbacher (2013). Global Multiregional Input–Output Frameworks: An introduction and outlook. *Economic Systems Research*, 25(1): 1-19.

United Nations Conference on Trade and Development (UNCTAD, 2003), "*World investment report 2003: FDI policies for development: National and international perspectives*", Geneva.

United Nations Conference on Trade and Development (UNCTAD, 2013) "Impact of the global slowdown on India's exports and employment" http://unctad.org/en/PublicationsLibrary/webditctncd2009d1_en.pdf

Veeramani, C (2007): "Sources of India's Export Growth in Pre- and Post-Reform Periods", *Economic & Political Weekly*, 42 (25), 23-29 June, 2419-27

Veeramani, C. (2012), 'Anatomy of India's Merchandise Export Growth, 1993-94 to 2010-11', *Economic and Political Weekly,* 47, 1, 94-102.

Veeramani, C and Dhir, Garima. 2016. "India's export of unskilled labor-intensive products: a comparative analysis" in C. Veeramani and R Nagaraj (ed) *International Trade and Industrial Development in India: Emerging Trends, Patterns and Issues*, Orient Blackswan.

Veeramani, C and Dhi, Garima. 2017. "Make What in India?" in S Mahendra Dev (ed), *India Development Report 2017*, Oxford University Press, New Delhi.

Veeramani, C., Aerath, Lakshmi. and Gupta, Prachi (2018) "Intensive and extensive margins of exports: What can India learn from China?", *The World Economy*, Vol 41 (5), 2018, Wiley.

Veeramani, C and Dhir, Garima (2019) "Reaping Gains from Global Production Sharing: Domestic Value Addition and Job Creation by Indian Exports" *IGIDR Working Paper No WP-2019-024*, Indira Gandhi Institute of Development Research, Mumbai.

Veeramani, C and Aerath, Lakshmi (2020) "Emerging Trends and Patterns of India's Trade Flowsin A Comparative Asian Perspective", in Suresh Chand Aggarwal, Deb Kusum Das, Rashmi Banga (eds), *Accelerators of India's Growth-Industry, Trade and Employment: Festschrift in Honor of Bishwanath Goldar*, Springer, 2020.

Veeramani, C and Basu, Anwesha (2021) "Fix inverted tariff structures to boost industrial growth in India", Mint, 27 January 2021

Veeramani, C and Dhir, Garima (2022) "Do developing countries gain by participating in global value chains? Evidence from India" Review of World Economics, 158, pp 1011–1042

World Bank (2021), World Development Indicators, https://databank.worldbank.org/source/world-development-indicators
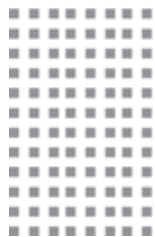
TABLES & FIGURES

Table 1: Estimates of Jobs Supported by Exports, Survey of Literature

	Country	Year	Jobs Supported	
			Million	**% of total emp.**
Tschetter (2010)	USA	1993 2008	7.4 10.3	- 6.9
Rasmussen (2017)	USA	2000 2005 2010 2015 2016	10.0 8.9 10.0 10.9 10.7	-
Statistics Canada (2020)	Canada	2007 2010 2015 2019	3.3 2.8 3.2 3.6	
Sousa et al (2012)	EU*	2000 2007	22.0 25.0	
Arto et al (2015)	EU*	1995 2011	18.6 31.2	-
Arto et al (2018)	EU*	2000 2007 2014 2017(p)	21.7 26.5 32.5 36.0	10.1 11.1 14.3 15.3
Kutlina-Dimitrova Rueda-Cantuche (2021)	EU*	2000 2010 2014 2019(p)	21.7 26.8 31.6 38.1	
DBERR (2007)	UK	2004	7.0	-
Department for International Trade (2021)	UK	2014 2015 2016	6.1 6.1 6.5	22.0 21.6 22.6

		Country	Year	Jobs Supported	
				Million	% of total emp.
Kiyota (2012)		Japan	1990	4.1	6.4
			2000	5.9	9.0
			2006	6.4	9.9
Chen et al (2012)		China	2002	88.0	12.0
			2007	129.0	17.0
Aswicahyono and Manning (2011)		Indonesia	2000	18.0	19.0
			2005	15.8	17.0
Nambiar (1979)		India	1963/64	4.9	-
			1973/74	5.4	2.0
Chishti (1981)		India	1970/71	5.4	3.7
			1975/76	7.2	4.3
Exim Bank of India (2016)**		India	1999-00	34.00	9.2
			2004-05	52.10	12.8
			2009-10	44.50	11.1
			2012-13	62.60	14.5
Das and Kukreja (2020)		India	2003-04	40.21	
			2007-08	44.68	
			2013-14	78.23	

*EU exports to non EU countries; **Exim Bank's estimates for India are available for all years during 1999-00 to 2012-13 (see Exim Bank, 2016 for the full time series); p stands for predicted values

Source: Literature survey

Table 2: Growth Rates of India's Exports (valued in US$ million) (% change)

	Oil	Non-Oil	Total	Services	Merchandise plus services
2000-01 to 2011-12	39.79	18.41	20.35	24.10	21.44
2012-13 to 2020-21	-7.85	1.70	0.22	5.46	2.12
April 2021-February 2022	150.11* (43.15)**	36.25* (26.16)**	46.09* (28.42)**	22.49* (16.02)**	36.19* (23.44)**

Note: Growth rates are calculated using semi-logarithmic regressions; data on financial year(April to March) basis.

Source: Authors' estimation using data from RBI (BoP Statistics); data for 2021-22 is from the Department of Commerce, Government of India; * growth vis-à-vis April 2020-February 2021; ** growth vis-à-vis April 2019-February 2020.

Table 3: Growth Rates of India's and World's Exports (valued in constant US$ million) (% change)

	India		World	
	Merchandise	**Services**	**Merchandise**	**Services**
2000-2011	17.82	21.68	8.44	9.20
	(20.43)	(24.37)	(10.84)	(11.62)
2012-2020	-1.71	3.68	-1.69	0.75
	(0.12)	(5.35)	(0.11)	(2.37)
2021(January -September)	41.89	14.45	26.55	n.a
	(43.82)	(16.00)	(28.26)	n.a

Note: Growth rates are calculated using semi-logarithmic regressions; figures in parentheses are growth rates in current US$; data on calendar year basis.

Source: Authors' estimation using data from WTO

Table 4: Composition of India's Exports, Selected Years

	1995		2010		2015		2018	
Description	**Value (US$ Million)**	**Share (%)**	**Value (US$ Million)**	**Share (%)**	**Value (US$ Million)**	**Share (%)**	**Value (US$ Million)**	**Share (%)**
Computer programming, consultancy and information services	4597	11.5	53373	14.8	77960	18.4	103771	19.3
Coke and refined petroleum	3627	9.0	36473	10.1	39092	9.2	50380	9.4
Textiles, wearing apparel, leather and related products	3504	8.7	28730	8.0	34016	8.0	41033	7.6
Manufacturing n.e.c.; repair and installation of machinery and equipment	4055	10.1	22210	6.2	29608	7.0	35646	6.6
Wholesale and retail trade; repair of motor vehicles	1715	4.3	17512	4.9	21164	5.0	29693	5.5
Food products, beverages and tobacco	2300	5.7	19936	5.5	22632	5.3	28902	5.4
Basic metals	2540	6.3	18934	5.3	23569	5.5	23034	4.3
Chemical and chemical products	1128	2.8	11830	3.3	16249	3.8	22851	4.2
Professional, scientific and technical activities	1263	3.1	7987	2.2	13818	3.3	18938	3.5
Pharmaceuticals, medicinal chemical and botanical products	897	2.2	8106	2.3	12058	2.8	15349	2.9
Machinery and equipment n.e.c	1448	3.6	12630	3.5	12201	2.9	15169	2.8
Land transport and transport via pipelines	977	2.4	9887	2.7	10750	2.5	13668	2.5
Administrative and support services activities	1541	3.8	18571	5.2	10008	2.4	13151	2.4
Motor vehicles, trailers and semi-trailers	1084	2.7	9426	2.6	10767	2.5	13108	2.4
Accommodation and food service activities	903	2.2	6258	1.7	8556	2.0	12132	2.3
Financial and insurance activities	640	1.6	6878	1.9	8724	2.1	11229	2.1

Description	1995		2010		2015		2018	
	Value (US$ Million)	Share (%)	Value (US$ Million)	Share (%)	Value (US$ Million)	Share (%)	Value (US$ Million)	Share (%)
Publishing, audiovisual and broadcasting activities	642	1.6	6677	1.9	8275	1.9	11001	2.0
Electrical equipment	956	2.4	8261	2.3	7509	1.8	9334	1.7
Other transport equipment	493	1.2	8670	2.4	5344	1.3	7750	1.4
Fabricated metal products	710	1.8	5358	1.5	6399	1.5	7349	1.4
Computer, electronic and optical products	403	1.0	3515	1.0	4736	1.1	7143	1.3
Rubber and plastics products	647	1.6	5585	1.6	6283	1.5	6935	1.3
Agriculture, hunting, forestry	969	2.4	8136	2.3	5588	1.3	6897	1.3
Air transport	342	0.9	3671	1.0	4734	1.1	6337	1.2
Warehousing and support activities for transportation	213	0.5	3782	1.1	3514	0.8	4771	0.9
Other non-metallic mineral products	234	0.6	1943	0.5	4477	1.1	3663	0.7
Wood and products of wood and cork	797	2.0	3056	0.8	2709	0.6	3531	0.7
Real estate activities	267	0.7	1745	0.5	2136	0.5	3059	0.6
Telecommunications	138	0.3	1756	0.5	2269	0.5	3017	0.6
Paper products and printing	156	0.4	1401	0.4	1576	0.4	1811	0.3
Mining and quarrying, non-energy producing products	531	1.3	4275	1.2	3292	0.8	1621	0.3
Water transport	93	0.2	1195	0.3	1178	0.3	1397	0.3
Arts, entertainment and recreation	83	0.2	695	0.2	889	0.2	1251	0.2
Education	50	0.1	297	0.1	472	0.1	669	0.1
Fishing and aquaculture	24	0.1	196	0.1	538	0.1	659	0.1
Other service activities	37	0.1	317	0.1	437	0.1	619	0.1
Human health and social work activities	31	0.1	239	0.1	326	0.1	463	0.1
Electricity, gas, steam and air conditioning supply	8	0.0	73	0.0	316	0.1	390	0.1
Mining support service activities	12	0.0	111	0.0	208	0.0	271	0.1
Mining and quarrying, energy producing products	61	0.2	325	0.1	258	0.1	202	0.0
Postal and courier activities	3	0.0	34	0.0	41	0.0	56	0.0
Water supply; sewerage, waste management and remediation activities	0	0.0	0	0.0	0	0.0	0	0.0
Construction	0	0.0	0	0.0	0	0.0	0	0.0
Public administration and defence; compulsory social security	0	0.0	0	0.0	0	0.0	0	0.0
Activities of households as employers	0	0.0	0	0.0	0	0.0	0	0.0
	40119	100	360050	100	424676	100	538249	100

Source: OECD's TiVA database

Table 5: Composition of Exports, International Standard Industrial Classification (ISIC), 3-digit level

ISIC code	Product description	2000 US$ Million	2000 Share (%)	2010 US$ Million	2010 Share (%)	2015 US$ Million	2015 Share (%)	2021 US$ Million	2021 Share (%)
232	Refined petroleum	1395	3.4	36951	17.2	30973	11.9	54700	13.9
369	Manufacturing n.e.c.	8012	19.3	32288	15.0	32616	12.5	38126	9.7
242	Other chemicals	1946	4.7	11300	5.3	20425	7.8	33240	8.4
241	Basic chemicals	2290	5.5	12163	5.7	14593	5.6	27476	7.0
271	Iron and steel	1323	3.2	10612	4.9	8289	3.2	23610	6.0
151	Meat, fish, fruit, vegetables, oils	2456	5.9	7168	3.3	11464	4.4	15070	3.8
11	Growing of crops	1845	4.5	9305	4.3	9970	3.8	14489	3.7
181	Wearing apparel	5272	12.7	9226	4.3	14906	5.7	12934	3.3
272	Precious and non-ferrous metals	413	1.0	8571	4.0	11529	4.4	12225	3.1
291	General purpose machinery	485	1.2	4302	2.0	6548	2.5	11728	3.0
172	Other textiles	1924	4.6	4891	2.3	7538	2.9	10900	2.8
171	Spinning, weaving and finishing of textiles	3503	8.5	7353	3.4	9045	3.5	10632	2.7
153	Grain mill products,	666	1.6	2490	1.2	6946	2.7	10512	2.7
292	Special purpose machinery	428	1.0	2722	1.3	5006	1.9	8218	2.1
289	Other fabricated metal products	1114	2.7	3532	1.6	5935	2.3	7976	2.0
341	Motor vehicles	297	0.7	5778	2.7	7148	2.7	7952	2.0
343	Parts and accessories of motor vehicles	353	0.9	2546	1.2	4777	1.8	7579	1.9
322	Television and radio	23	0.1	2000	0.9	804	0.3	6437	1.6
154	Other food products	399	1.0	1711	0.8	2632	1.0	6127	1.6
269	Non-metallic mineral	476	1.2	1528	0.7	2536	1.0	4840	1.2
252	Plastics	313	0.8	1753	0.8	2730	1.0	4628	1.2
251	Rubber products	319	0.8	1589	0.7	2264	0.9	4317	1.1
351	Ships and boats	45	0.1	4221	2.0	4063	1.6	4290	1.1
311	Electric motors, generators	160	0.4	1671	0.8	2050	0.8	4192	1.1
131	Iron ores	355	0.9	6147	2.9	211	0.1	4159	1.1
359	Transport equipment	263	0.6	1060	0.5	2247	0.9	4027	1.0
173	Knitted and crocheted fabrics	711	1.7	2107	1.0	3448	1.3	3748	1.0
353	Aircraft and spacecraft	61	0.1	1656	0.8	4348	1.7	3700	0.9
331	Medical appliances	206	0.5	1242	0.6	1907	0.7	3527	0.9
210	Paper products	149	0.4	701	0.3	1032	0.4	2816	0.7
312	Electricity distribution	85	0.2	1235	0.6	1700	0.7	2522	0.6
192	Footwear	624	1.5	1643	0.8	2771	1.1	2338	0.6
142	Mining and quarrying	66	0.2	913	0.4	1964	0.8	2228	0.6
191	Tanning and dressing of leather	832	2.0	1641	0.8	2566	1.0	2143	0.5
243	Man-made fibers	202	0.5	1132	0.5	1524	0.6	1821	0.5
281	Structural metal products	98	0.2	832	0.4	1572	0.6	1772	0.5
361	Furniture	37	0.1	464	0.2	697	0.3	1712	0.4

ISIC code	Product description	2000 US$ Million	2000 Share (%)	2010 US$ Million	2010 Share (%)	2015 US$ Million	2015 Share (%)	2021 US$ Million	2021 Share (%)
319	Other electrical equipment	215	0.5	731	0.3	969	0.4	1552	0.4
141	Stone, sand and clay	265	0.6	651	0.3	989	0.4	1180	0.3
321	Electronic valves	121	0.3	1455	0.7	616	0.2	1138	0.3
313	Insulated wire and cables	38	0.1	330	0.2	563	0.2	1019	0.3
261	Glass and glass products	118	0.3	381	0.2	701	0.3	1005	0.3
20	Forestry, logging	265	0.6	708	0.3	1199	0.5	986	0.3
300	Office, accounting and computing machinery	213	0.5	606	0.3	556	0.2	777	0.2
202	Manufacture of products of wood	30	0.1	139	0.1	310	0.1	688	0.2
332	Optical instruments	39	0.1	212	0.1	405	0.2	671	0.2
314	Accumulators, primary cells and batteries	35	0.1	236	0.1	199	0.1	605	0.2
401	Production, collection and distribution of electricity	0	0.0	0	0.0	25	0.0	576	0.1
231	Coke oven products	1	0.0	199	0.1	19	0.0	520	0.1
323	Television and radio	79	0.2	391	0.2	505	0.2	513	0.1
293	Domestic appliances	50	0.1	214	0.1	403	0.2	467	0.1
152	Dairy products	35	0.1	194	0.1	160	0.1	373	0.1
160	Tobacco products	42	0.1	165	0.1	296	0.1	357	0.1
221	Publishing	363	0.9	348	0.2	261	0.1	353	0.1
352	Railway and tramway	7	0.0	46	0.0	76	0.0	353	0.1
155	Beverages	29	0.1	172	0.1	346	0.1	340	0.1
315	Electric lamps	25	0.1	169	0.1	243	0.1	288	0.1
342	Bodies for motor vehicles	11	0.0	38	0.0	72	0.0	231	0.1
222	Printing	21	0.1	112	0.1	154	0.1	206	0.1
12	Farming of animals	14	0.0	110	0.1	185	0.1	182	0.0
132	Non-ferrous metal ores	92	0.2	642	0.3	396	0.2	166	0.0
101	Hard coal	33	0.1	102	0.0	101	0.0	98	0.0
333	Watches and clocks	43	0.1	43	0.0	85	0.0	83	0.0
50	Fishing	87	0.2	238	0.1	329	0.1	64	0.0
182	Dressing and dyeing of fur	0	0.0	0	0.0	3	0.0	23	0.0
201	Sawmilling and planning of wood	1	0.0	20	0.0	32	0.0	11	0.0
233	Nuclear fuel	0	0.0	0	0.0	1	0.0	5	0.0
102	Lignite	0	0.0	0	0.0	0	0.0	3	0.0
111	Crude petroleum	5	0.0	35	0.0	124	0.0	1	0.0
103	Peat	0		0	0.0	0	0.0	0	0.0
402	Gas	0	0.0	6	0.0	0	0.0	0	0.0
120	Uranium and thorium ores	0		0	0.0	0		0	
	Total	**41423**	**100**	**215142**	**100**	**261099**	**100**	**393549**	**100**

Source: Authors' estimation using UN-Comtrade-WITS database

Table 6: Composition of India's Services Exports (% Share)

	2015-16	2020--21
Manufacturing services on physical inputs owned by others	0.12	0.14
Maintenance and repair services	0.10	0.08
Transport	9.08	10.60
Travel	13.78	4.12
Construction	1.01	1.27
Insurance and pension services	1.30	1.15
Financial services	3.20	2.11
Charges for the use of intellectual property	0.32	0.64
Telecommunications, computer, and information services	49.62	50.02
Other business services	18.79	23.85
Personal, cultural, and recreational services	0.86	1.13
Government goods and services	0.37	0.31
Others	1.45	4.58

Source: Authors' estimation using data from RBI (BoP Statistics)

Table 7: Employment, Output, Export and Employment Coefficients across Sectors

	Employment share (%)				Gross Output share (%)				Export share (%)				Employment coefficients (Employment / Gross output in Rs Crores)			
	1995	2010	2015	2018	1995	2010	2015	2018	1995	2010	2015	2018	1995	2010	2015	2018
Agriculture, hunting, forestry	63.81	52.02	47.87	44.80	16.15	10.54	10.75	10.35	2.42	2.26	1.32	1.28	747.9	155.4	81.7	58.8
Wholesale and retail trade; repair of motor vehicles	5.34	7.05	7.94	8.66	5.41	5.99	6.88	7.23	4.27	4.86	4.98	5.52	186.9	37.0	21.2	16.3
Construction	3.57	6.67	7.65	7.87	10.88	12.04	10.56	10.43	0.00	0.00	0.00	0.00	62.1	17.4	13.3	10.3
Miscellaneous service activities	2.88	4.74	5.36	6.27	1.06	1.17	1.33	1.47	0.09	0.09	0.10	0.12	514.4	127.1	73.8	58.1
Education	1.84	2.79	3.40	4.08	1.72	1.90	2.33	2.59	0.13	0.08	0.11	0.12	203.5	46.2	26.8	21.4
Land transport and transport via pipelines	2.47	3.28	3.40	3.82	3.48	3.86	4.11	3.98	2.44	2.75	2.53	2.54	134.0	26.8	15.2	13.0
Public administration and defence; compulsory social security	1.64	2.48	2.54	2.72	3.39	3.75	3.89	4.10	0.00	0.00	0.00	0.00	91.9	20.9	12.0	9.0
Textiles, textile products, leather and footwear	2.84	3.12	3.13	2.72	3.06	3.34	4.00	3.63	8.73	7.98	8.01	7.62	175.6	29.4	14.4	10.2
Administrative and support services	1.29	1.54	2.23	2.63	1.49	1.64	2.81	3.47	3.84	5.16	2.36	2.44	164.6	29.4	14.6	10.3
Manufacturing n.e.c.; repair and installation of machinery and equipment	1.85	2.19	1.98	1.97	0.98	1.07	1.61	1.38	10.11	6.17	6.97	6.62	358.6	64.8	22.5	19.5
Human health and social work activities	0.80	1.20	1.50	1.80	0.88	0.98	1.25	1.38	0.08	0.07	0.08	0.09	171.0	38.8	22.1	17.7
Food products, beverages and tobacco	1.69	1.96	1.67	1.45	4.67	5.09	4.86	5.31	5.73	5.54	5.33	5.37	68.6	12.1	6.3	3.7
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	1.25	1.35	1.22	1.16	0.11	0.10	0.09	0.08	0.00	0.00	0.00	0.00	2160.7	437.1	239.6	190.5
Accommodation and food service activities	0.71	0.93	1.09	1.14	1.35	1.49	1.46	1.44	2.25	1.74	2.01	2.25	99.4	19.7	13.7	10.7
Arts, entertainment and recreation	0.37	0.61	0.72	0.82	0.19	0.21	0.25	0.26	0.21	0.19	0.21	0.23	371.6	91.8	53.3	42.0
Financial and insurance activities	0.73	0.76	0.79	0.81	3.94	3.85	4.03	4.04	1.59	1.91	2.05	2.09	35.0	6.3	3.6	2.7
Professional, scientific and technical activities	0.53	0.63	0.73	0.72	0.29	0.32	0.43	0.45	3.15	2.22	3.25	3.52	349.7	62.5	30.9	21.9
Other non-metallic mineral products	0.82	0.94	0.84	0.71	1.34	1.46	1.40	1.46	0.58	0.54	1.05	0.68	116.2	20.2	10.9	6.6
Fabricated metal products	0.45	0.52	0.58	0.55	1.29	1.41	1.13	1.12	1.77	1.49	1.51	1.37	65.9	11.6	9.4	6.7
Wood and products of wood and cork	1.10	0.80	0.68	0.55	0.48	0.34	0.37	0.34	1.99	0.85	0.64	0.66	431.1	73.8	33.7	21.9
Warehousing and support activities for transportation	0.28	0.38	0.37	0.50	0.73	0.81	0.82	0.90	0.53	1.05	0.83	0.89	73.1	14.6	8.3	7.6
Computer programming, consultancy and information services	0.30	0.36	0.45	0.44	1.75	1.94	2.94	3.12	11.46	14.82	18.36	19.28	32.8	5.9	2.8	1.9
Fishing and aquaculture	0.43	0.32	0.40	0.42	0.60	0.45	0.61	0.67	0.06	0.05	0.13	0.12	134.9	22.0	12.0	8.6

	Employment share (%)				Gross Output share (%)				Export share (%)				Employment coefficients (Employment / Gross output in Rs Crores)			
	1995	2010	2015	2018	1995	2010	2015	2018	1995	2010	2015	2018	1995	2010	2015	2018
Mining and quarrying, non-energy producing products	0.37	0.43	0.36	0.41	0.25	0.55	0.43	0.52	1.32	1.19	0.78	0.30	280.1	24.5	15.4	10.6
Basic metals	0.41	0.47	0.51	0.38	4.47	4.63	3.79	3.44	6.33	5.26	5.55	4.28	17.5	3.2	2.5	1.5
Electricity, gas, steam and air conditioning supply	0.15	0.31	0.37	0.33	2.44	2.66	2.91	2.72	0.02	0.02	0.07	0.07	11.4	3.6	2.3	1.6
Water supply; sewerage, waste management and remediation activities	0.09	0.19	0.25	0.29	0.31	0.34	0.45	0.55	0.00	0.00	0.00	0.00	55.3	17.6	10.1	7.2
Paper products and printing	0.21	0.22	0.26	0.26	0.72	0.77	0.72	0.68	0.39	0.39	0.37	0.34	55.6	9.1	6.6	5.2
Chemical and chemical products	0.22	0.26	0.24	0.22	2.41	2.63	2.65	2.41	2.81	3.29	3.83	4.25	17.0	3.1	1.7	1.2
Machinery and equipment, nec	0.09	0.12	0.17	0.19	1.76	1.92	1.53	1.61	3.61	3.51	2.87	2.82	9.8	2.0	2.0	1.6
Postal and courier activities	0.20	0.13	0.14	0.17	0.25	0.14	0.14	0.15	0.01	0.01	0.01	0.01	153.7	30.7	17.4	15.1
Motor vehicles, trailers and semi-trailers	0.14	0.15	0.17	0.16	2.16	2.36	2.49	2.48	2.70	2.62	2.54	2.44	12.4	2.0	1.2	0.9
Rubber and plastics products	0.12	0.14	0.14	0.14	1.02	1.11	1.17	1.15	1.61	1.55	1.48	1.29	22.5	4.1	2.2	1.7
Electrical equipment	0.06	0.08	0.12	0.13	1.09	1.19	1.11	1.13	2.38	2.29	1.77	1.73	10.7	2.1	1.9	1.5
Mining and quarrying, energy producing products	0.28	0.15	0.12	0.11	1.53	1.59	1.22	1.15	0.15	0.09	0.06	0.04	35.1	3.1	1.9	1.3
Telecommunications	0.15	0.18	0.14	0.11	1.31	1.45	1.52	1.23	0.34	0.49	0.53	0.56	21.4	3.9	1.7	1.2
Pharmaceuticals, medicinal chemical and botanical products	0.10	0.11	0.10	0.11	1.00	1.09	1.19	1.19	2.24	2.25	2.84	2.85	19.4	3.1	1.5	1.2
Publishing, audiovisual and broadcasting activities	0.10	0.10	0.10	0.09	0.46	0.41	0.52	0.55	1.60	1.85	1.95	2.04	40.8	7.4	3.3	2.3
Real estate activities	0.14	0.12	0.10	0.09	5.32	4.27	4.43	4.21	0.67	0.48	0.50	0.57	4.9	0.9	0.4	0.3
Other transport equipment	0.05	0.05	0.05	0.05	0.71	0.78	0.77	0.78	1.23	2.41	1.26	1.44	12.4	2.0	1.2	0.9
Coke and refined petroleum products	0.03	0.03	0.05	0.04	6.34	6.92	3.60	3.32	9.04	10.13	9.21	9.36	0.9	0.1	0.2	0.2
Air transport	0.03	0.04	0.03	0.04	0.28	0.31	0.33	0.37	0.85	1.02	1.11	1.18	17.9	3.6	1.6	1.3
Water transport	0.03	0.04	0.03	0.03	0.10	0.11	0.09	0.08	0.23	0.33	0.28	0.26	56.7	11.3	6.9	6.2
Computer, electronic and optical equipment	0.01	0.02	0.03	0.03	0.56	0.61	0.68	0.73	1.01	0.98	1.12	1.33	4.6	1.0	0.8	0.5
Mining support service activities	0.01	0.01	0.01	0.01	0.27	0.40	0.33	0.35	0.03	0.03	0.05	0.05	7.9	0.7	0.4	0.3

Table 8: Number of Employment (millions) Tied to India's Aggregate Exports (Merchandise plus Services)

OECD-TiM		EXIM Bank of India (2016)		New Estimates based on SUT	
Year	Million	Year	Million	Year	Million
1995	35.7				
1996	34.2				
1997	35.5				
1998	37.6				
1999	39.5	1999-00	34.0		
2000	45.8	2000-01	37.9		
2001	46.0	2001-02	41.2		
2002	51.9	2002-03	43.5		
2003	54.5	2003-04	43.6		
2004	63.2	2004-05	52.1		
2005	65.5	2005-06	53.5		
2006	67.2	2006-07	53.5		
2007	68.0	2007-08	49		
2008	73.9	2008-09	54.1		
2009	65.1	2009-10	44.5		
2010	70.1	2010-11	49.3		
2011	75.1	2011-12	58	2011-12	69.4
2012	75.6	2012-13	62.6	2012-13	68.8
2013	74.6			2013-14	70.3
2014	66.8			2014-15	62.6
2015	59.8			2015-16	57.6
2016	58.2			2016-17	56.6
2017	56.6			2017-18	58.1
2018	58.2				

Note: OECD-TiM estimates are as per the calendar year (January-December) while Exim Bank of India (2016) and the new SUT based estimates are for the Indian financial year (April- March)

Table 9: Number of Employment (millions) Tied to India's Exports by Sector Groups

Year	TiM Database			Year	SUT based estimates		
	Agriculture	Manufacturing	Services		Agriculture	Manufacturing	Services
1995	3.2	23.2	9.3				
1996	3.0	22.1	9.1				
1997	3.2	23.0	9.3				
1998	3.3	24.7	9.6				
1999	3.5	26.1	9.9				
2000	4.5	30.6	10.7				
2001	4.5	31.2	10.4				
2002	5.3	35.1	11.5				
2003	5.4	36.8	12.2				
2004	6.3	41.4	15.5				
2005	6.4	42.4	16.7				
2006	7.0	42.5	17.8				
2007	6.9	43.7	17.5				
2008	7.8	46.1	20.0				
2009	6.3	40.9	17.9				
2010	7.2	43.6	19.4				
2011	7.9	47.2	20.1	2011-12	6.0	54.1	9.2
2012	8.0	46.7	20.9	2012-13	7.3	50.9	10.5
2013	6.4	47.5	20.7	2013-14	6.4	51.9	12.0
2014	5.4	41.0	20.4	2014-15	5.8	45.7	11.2
2015	3.9	35.8	20.1	2015-16	4.2	43.4	10.1
2016	3.3	35.1	19.8	2016-17	4.2	42.2	10.2
2017	3.1	33.0	20.6	2017-18	4.3	43.4	10.4
2018	3.4	33.0	21.8				

Note: Agriculture also includes mining & allied activities; Services also include construction, electricity, gas, water supply etc

Table 10: Number of Jobs per US$ million Worth of Exports across Sector Groups

	TiM Database			SUT based estimates		
	Agriculture	Manufacturing	Services	Agriculture	Manufacturing	Services
1995	1990.6	928.7	685.1			
1996	1889.7	868.3	659.5			
1997	1793.7	819.1	608.0			
1998	1818.4	839.0	605.2			
1999	1777.0	817.5	560.4			
2000	1839.0	783.8	558.3			
2001	1849.6	815.3	522.3			
2002	1860.4	786.9	480.0			
2003	1590.9	687.7	399.9			
2004	1401.7	594.9	323.5			
2005	1184.3	485.7	260.3			
2006	1022.9	395.6	219.4			
2007	807.4	322.9	179.7			
2008	739.6	282.0	161.4			
2009	727.9	282.1	170.2			
2010	550.4	211.4	137.3			
2011	462.3	186.5	122.1	323.9	186.0	65.0
2012	539.5	178.0	122.9	419.6	178.5	72.1
2013	477.8	168.5	115.7	405.0	170.5	79.0
2014	463.7	152.8	113.8	430.4	154.3	70.5
2015	392.2	149.6	114.6	431.4	172.5	65.0
2016	419.2	145.1	108.8	404.6	157.3	61.5
2017	359.4	124.3	97.3	365.2	142.6	55.3
2018	350.1	112.6	92.7			

Table 11: Employment Supported by Exports: Agriculture, Mining and Allied Activities

	Employment (millions)					Indirect Employment (% of total employment)				
	1995	2005	2012	2015	2018	1995	2005	2012	2015	2018
Agriculture, hunting, forestry	2.6	5.67	7.45	3.32	3.1	1.1	1.4	1.9	2.1	2.3
Mining and quarrying, non-energy producing products	0.55	0.7	0.52	0.47	0.2	11.7	20.5	18.9	29.9	30.5
Fishing and aquaculture	0.01	0.02	0.05	0.06	0.1	17.2	15.7	25.5	33.3	35.1
Mining and quarrying, energy producing products	0.02	0.02	0.01	0.01	0	63.6	65.4	72.4	76	77.2
Mining support service activities	0	0	0	0	0	72.7	76.5	66.7	86	85.4

Source: TiM

Table 12: Employment Supported by Exports: Manufacturing

	Total Employment (millions)					Indirect Employment (% of total employment)				
	1995	2005	2012	2015	2018	1995	2005	2012	2015	2018
Food products, beverages and tobacco	4.63	9.82	11.96	8.86	8.32	88.7	90.1	90.6	88.9	90.5
Manufacturing n.e.c; repair and installation of machinery and equipment	7.15	11.32	12.87	7.15	7.18	33.3	41.7	37.0	31.3	26.6
Textiles, textile products, leather and footwear	5.06	10.33	11.53	7.93	7.07	57.1	60.7	60.3	51.7	52.0
Chemical and chemical products	0.47	1.28	1.48	2.15	2.11	82.9	83.1	80.2	89.6	88.7
Basic metals	0.60	1.40	1.75	1.97	1.44	70.2	78.3	75.6	77.2	80.2
Wood and products of wood and cork	1.61	2.22	0.78	1.01	0.92	28.8	42.1	44.8	34.3	35.6
Pharmaceuticals, medicinal chemical and botanical products	0.55	0.81	1.04	0.81	0.81	89.0	84.9	86.4	83.6	82.8
Machinery and equipment, nec	0.35	0.76	0.58	0.84	0.80	86.3	88.2	81.1	80.5	78.4
Fabricated metal products	0.25	0.70	0.66	0.76	0.70	35.9	53.5	48.0	46.9	49.2
Motor vehicles, trailers and semi-trailers	0.29	0.55	0.55	0.71	0.68	84.4	84.7	84.8	87.9	88.0
Coke and refined petroleum products	1.04	1.05	0.96	0.89	0.62	98.7	97.6	94.3	92.6	88.9
Rubber and plastics products	0.48	0.72	0.82	0.75	0.60	89.1	86.8	86.1	87.6	86.3
Electrical equipment	0.27	0.53	0.71	0.55	0.54	86.8	87.8	81.9	82.1	80.9
Computer, electronic and optical equipment	0.10	0.20	0.17	0.31	0.37	94.1	94.1	90.0	91.9	92.5
Other transport equipment	0.12	0.23	0.29	0.35	0.35	82.5	75.9	84.5	87.1	85.6
Other non-metallic mineral products	0.14	0.29	0.34	0.57	0.31	31.1	37.3	33.6	38.8	41.2
Paper products and printing	0.09	0.22	0.22	0.19	0.17	64.7	66.7	65.8	54.7	51.2

Source: TiM

Table 13: Employment Supported by Exports: Services

	Total Employment (millions)					Indirect Employment (% of total employment)				
	1995	2005	2012	2015	2018	1995	2005	2012	2015	2018
Computer programming, consultancy and information services	1.78	2.46	3.42	3.91	4.11	66.4	48.5	52.7	64.0	67.0
Wholesale and retail trade; repair of motor vehicles	1.22	2.75	3.94	3.51	4.02	10.9	11.4	11.7	12.9	12.9
Accommodation and food service activities	1.48	2.50	2.82	3.38	3.71	80.2	79.0	78.3	77.7	75.9
Professional, scientific and technical activities	1.86	2.45	2.83	3.41	3.59	22.7	16.1	14.8	19.1	20.4
Land transport and transport via pipelines	0.64	1.32	1.77	1.61	1.74	32.4	26.4	29.6	33.6	29.0
Administrative and support services	1.30	2.60	2.84	1.32	1.36	31.0	17.2	15.6	21.5	22.5
Publishing, audiovisual and broadcasting activities	0.21	0.52	0.80	0.70	0.71	59.0	65.0	71.8	74.2	75.4
Financial and insurance activities	0.17	0.41	0.47	0.47	0.52	51.2	50.8	46.9	51.4	53.9
Air transport	0.16	0.39	0.45	0.41	0.46	87.5	86.5	87.3	88.0	87.4
Warehousing and support activities for transportation	0.10	0.41	0.49	0.37	0.45	50.5	46.8	46.3	48.6	43.4
Arts, entertainment and recreation	0.11	0.31	0.36	0.35	0.41	12.4	13.3	10.9	11.8	11.2
Other service activities	0.07	0.19	0.21	0.22	0.26	7.1	8.7	6.9	7.3	6.8
Telecommunications	0.04	0.11	0.15	0.13	0.14	76.1	73.6	75.3	78.2	81.3
Education	0.04	0.07	0.08	0.09	0.11	16.1	10.9	9.2	9.5	9.4
Water transport	0.04	0.09	0.15	0.12	0.11	59.8	36.7	56.6	57.3	44.1
Human health and social work activities	0.02	0.05	0.05	0.06	0.07	25.9	15.5	18.4	18.6	18.1
Real estate activities	0.02	0.05	0.04	0.05	0.05	81.8	83.7	84.4	88.0	88.8
Electricity, gas, steam and air conditioning supply	0.00	0.00	0.01	0.02	0.01	80.0	83.7	75.6	75.9	66.7
Postal and courier activities	0.00	0.00	0.01	0.01	0.01	6.3	6.5	13.6	14.5	11.9
Water supply; sewerage, waste management and remediation activities	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0
Construction	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0
Public administration and defence; compulsory social security	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0
Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0

Source: TiM

Table 14: Employment Supported by Exports: Agriculture, Mining and Allied Activities

	Total Employment (millions)							Indirect Employment (% of total employment)						
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Agriculture	5.27	6.51	5.68	5.23	3.65	3.66	3.83	0.8	0.9	1.2	1.1	1.2	1.2	1.1
Other Mining	0.17	0.19	0.22	0.20	0.19	0.18	0.18	11.2	14.3	16.7	16.8	16.5	17.8	17.7
Livestock	0.09	0.19	0.09	0.09	0.11	0.11	0.11	64.8	66.4	69.3	68.9	71.0	72.2	73.7
Forestry and Logging	0.21	0.21	0.15	0.12	0.08	0.08	0.09	52.5	54.6	51.7	50.0	50.9	49.2	46.6
Fishing & Aquaculture	0.04	0.06	0.10	0.08	0.07	0.06	0.06	29.7	25.6	28.3	28.5	28.0	28.6	29.9
Non-ferrous metal ores	0.03	0.03	0.03	0.02	0.03	0.03	0.03	71.1	73.0	78.9	72.3	72.7	76.7	74.7
Iron Ore	0.19	0.09	0.09	0.03	0.02	0.02	0.02	76.2	77.0	83.4	81.0	79.2	76.1	78.5
Coal & Lignite	0.04	0.03	0.02	0.01	0.01	0.01	0.01	63.9	69.8	58.2	55.8	56.2	53.7	54.0
Crude Petroleum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Natural Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	86.6	0.0	94.5	95.0	0.0	0.0	0.0

Source: SUT based estimates

Table 15: Employment Supported by Exports: Manufacturing

	Total Employment (millions)							Indirect Employment (% of total employment)						
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Miscellaneous Manufacturing	12.36	9.46	9.72	7.76	7.62	6.96	7.1	15.5	12.4	22.9	17.3	4.5	4.8	4.8
Wearing apparel, except custom tailoring	7.46	6.7	6.31	5.8	5.27	5.09	5.37	40.6	39.5	40.4	30.4	28.3	28.9	28.3
Textiles and cotton ginning	8.65	7.33	6.68	5.75	5.19	5.1	5.26	79.6	75.1	77	74.6	73	74.4	75.1
Grain mill products, animal feeds etc	4.1	4.95	6.08	6.08	4.88	4.84	5.06	95.2	94.8	94.9	95.5	95.3	96.1	96.3
Production, processing and preservation of meat, fish, fruit, vegetables, oils and fats	4.06	4.09	4.51	4.46	4.41	4.34	4.51	96.1	95	95	94	93.8	95.2	95.6
Other food products	3.49	4.38	3.24	2.17	2.02	2	2.07	90.4	89.7	89.3	89.1	87.4	88.1	88.7
Chemicals except pharmaceutical	2.42	1.3	1.72	1.43	1.96	1.98	2.02	59	62.7	60.8	59.8	79.2	77.6	78.3
Coke and refined petroleum	0.6	0.86	1.09	0.85	1.47	1.43	1.44	97.3	96.6	97.2	96.5	98.2	97.2	97.3
Machinery and equipment n.e.c.	1.22	0.99	1.19	1.28	1.3	1.27	1.27	61.2	58.7	57.2	56.3	54.1	55.7	56.3
Leather and related products	1.4	1.57	1.59	1	1.11	1.13	1.16	73.9	73	74.9	52.2	66.8	64.6	64.3
Transport equipment	0.67	1.04	1.04	1.3	1.16	1.14	1.15	79.5	82.9	79.4	84.6	84.6	85.8	86.3
Electrical equipment	0.67	0.78	0.83	0.77	0.8	0.86	0.87	53.6	53.5	50.1	44.1	43.4	40.9	40.9
Iron and Steel and Casting of iron and steel	0.88	1.12	0.96	0.87	0.83	0.85	0.85	77.4	81.5	74.7	66.8	69.1	68.6	69
Rubber & plastic products	1.74	1.58	1.39	0.91	0.83	0.81	0.83	83.8	78.5	72.1	71.5	68.5	70	70.5
Pharmaceutical; medicinal chemicals and botanical products	0.8	1.15	1.28	1.3	0.83	0.82	0.82	68.5	68.1	73.4	75.3	60.5	60.9	62.5
Tobacco products	0.75	0.77	0.79	0.87	0.74	0.76	0.78	30.2	27.6	28.7	29.2	30.1	29.6	30.2
Beverages	0.83	0.58	0.91	0.7	0.67	0.67	0.7	93	89.3	90	88.6	87.1	86.7	86.6
Other non-metallic mineral products	0.34	0.4	0.49	0.46	0.51	0.47	0.47	34.5	32.8	32	33	31.2	32.9	33.4

	Total Employment (millions)							Indirect Employment (% of total employment)						
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
Basic precious and non-ferrous metals and Casting of non-ferrous metals	0.23	0.25	0.29	0.31	0.36	0.37	0.37	86.5	87.4	85.5	84.8	91.5	87.6	87.9
Fabricated metal products, except machinery and equipment	0.27	0.3	0.39	0.39	0.33	0.33	0.32	34.2	33.6	32.9	28.9	32.7	33.6	34.3
Electronic components, electronics, magnetic and optical media, computer and peripheral equipment, optical and electronics products n.e.c.	0.23	0.27	0.29	0.31	0.31	0.2	0.2	60.7	57.9	62.4	53.6	44.2	68.2	70.1
Furniture	0.16	0.16	0.18	0.23	0.19	0.18	0.18	33.7	36.6	33.7	35.1	26.8	27.9	29.6
Wood products, cork, and straw (except furniture)	0.09	0.11	0.15	0.12	0.13	0.12	0.13	6.9	7.3	6.8	7.9	8.3	8.8	8.5
Paper products	0.09	0.12	0.11	0.18	0.13	0.13	0.13	69.3	69.6	66.6	71.2	59.4	60.2	60.5
Communication equipment	0.4	0.39	0.28	0.1	0.07	0.07	0.07	79.3	68.9	65.4	46.9	70.8	74.7	74.1
Dairy products	0.03	0.07	0.19	0.06	0.04	0.04	0.04	96.7	95.6	93.7	92.2	91.9	91.6	91.6
Printing and reproduction of recorded media	0.05	0.06	0.06	0.04	0.04	0.04	0.04	41	41.7	35.5	45.5	36.3	36.6	36.3

Source: SUT based estimates

Table 16: Employment Supported by Exports: Services

	Total Employment (millions)							Indirect Employment (% of total employment)						
	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18
IT and information services	3.16	3.53	4.49	4.12	4.36	4.35	4.51	44.5	46.8	55.2	49.6	49.4	50.5	49.5
Other Business services	4.18	4.83	4.15	3.46	2.19	2.25	2.25	27.6	29.5	32.0	39.5	33.2	32.7	33.1
Education & Research	0.19	0.20	1.27	1.41	1.29	1.27	1.21	6.3	7.1	8.0	7.0	8.0	8.1	8.7
Water Transport	0.57	0.68	0.80	0.86	0.87	0.96	1.03	59.2	56.1	48.1	48.7	44.4	39.1	37.1
Financial Services	0.35	0.40	0.36	0.42	0.46	0.49	0.51	53.2	54.1	49.4	45.6	47.7	44.6	43.1
Air Transport	0.27	0.34	0.36	0.32	0.33	0.31	0.31	91.0	92.7	93.7	93.5	93.8	94.3	95.1
Insurance Services	0.21	0.22	0.21	0.25	0.22	0.26	0.23	26.9	31.7	35.2	39.1	39.4	33.5	37.9
Construction	0.14	0.16	0.15	0.17	0.19	0.19	0.19	36.6	36.4	36.9	35.8	35.9	34.3	34.1
Other services	0.17	0.19	0.25	0.18	0.18	0.18	0.17	6.1	6.5	5.9	9.0	7.6	7.9	8.5
Communication	0.13	0.15	0.14	0.13	0.13	0.14	0.14	56.9	60.3	57.7	57.2	56.8	55.4	53.7
Electricity	0.00	0.00	0.00	0.01	0.03	0.03	0.03	80.4	0.0	0.0	75.3	81.2	79.2	78.8
Gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water supply	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Railway Transport	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Land Transport	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Supportive & Auxiliary transport activities	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Storage & warehousing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hotels & Restaurant	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ownership of dwellings	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Medical and Health	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Legal Services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Real estate activities	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Renting of machinery and equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Community, Social & personal services	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Public administration. & defense	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: SUT based estimates

Table 17: Export Supported Employment by Gender, 2017-18, (millions), SUT based Estimates

	Males			Females			Males plus Females		
	Total	Direct	Indirect	Total	Direct	Indirect	Total	Direct	Indirect
Agriculture	3.05	2.85	0.20	1.25	1.19	0.06	4.30	4.04	0.26
	(70.9)	(70.6)	(77.1)	(29.1)	(29.4)	(22.9)	(100)	(100)	(100)
Manufacturing	32.03	12.96	19.06	11.37	4.22	7.15	43.40	17.19	26.21
	(73.8)	(75.4)	(72.7)	(26.2)	(24.6)	(27.3)	(100)	(100)	(100)
Services	8.29	4.89	3.40	2.11	1.34	0.77	10.40	6.23	4.17
	(79.7)	(78.6)	(81.5)	(20.3)	(21.4)	(18.5)	(100)	(100)	(100)
Total	**43.37**	**20.71**	**22.66**	**14.73**	**6.75**	**7.98**	**58.10**	**27.46**	**30.64**
	(74.6)	**(75.4)**	**(74.0)**	**(25.4)**	**(24.6)**	**(26.0)**	**(100)**	**(100)**	**(100)**

Source: Authors' estimation based on India's official SUT; values in parentheses are percentage shares of the respective total (males plus females) for each sector group.

Table 18: Export Supported Employment by Gender across Sectors, 2017-18, SUT based Estimates

Sub-sectors	Total employment (Millions)		Indirect employment as share of total employment (%)	
	Males	Females	Males	Females
Agriculture, mining and allied activities				
Agriculture	2.67	1.16	1.3	0.9
Livestock	0.07	0.04	83.9	57.5
Other Mining	0.15	0.02	17.3	20.1
Forestry and Logging	0.08	0.01	46.4	47.6
Fishing & Aquaculture	0.05	0.01	23.9	70.4
Nonferrous metal ores	0.02	0.01	70.4	94.7
Coal & Lignite	0.01	0	51.2	77.1
Crude Petroleum	0	0	0	0
Natural Gas	0	0	0	0
Iron Ore	0.01	0	78.3	79.4
Manufacturing				
Wearing apparel, except custom tailoring	3.37	1.99	32.3	21.3
Textiles and cotton ginning	3.67	1.59	76	72.9
Grain mill products, animal feeds etc	3.56	1.51	95.5	98
Production, processing and preservation of meat, fish, fruit, vegetables, oils and fats	3.19	1.32	94.6	98
Other Manufacturing	5.81	1.29	4.5	6.2
Other food products	1.45	0.62	87.5	91.5
Chemicals except pharmaceutical	1.44	0.57	73.4	90.3
Tobacco products	0.21	0.56	77.6	12.3
Leather and related products	0.83	0.34	58	79.8
Coke and refined petroleum	1.21	0.23	97	98.7
Beverages	0.5	0.2	84.2	92.6
Rubber & plastic products	0.65	0.19	67.5	80.6
Transport equipment	0.98	0.17	84.9	94
Pharmaceutical; medicinal chemicals and botanical products	0.66	0.15	58.2	80.9

Sub-sectors	Total employment (Millions)		Indirect employment as share of total employment (%)	
	Males	Females	Males	Females
Machinery and equipment n.e.c.	1.14	0.12	52.8	88.6
Electrical equipment	0.77	0.1	39.3	52.6
Iron and Steel and casting of iron and steel	0.75	0.09	66.2	91.8
Other non-metallic mineral products	0.4	0.07	33.5	32.8
Basic precious and non-ferrous metals and casting of non-ferrous metals	0.32	0.05	86.7	95.4
Electronic component, consumer electronics, magnetic and optical media, computer and peripheral equipment, optical and electronics products n.e.c.	0.17	0.03	69.8	71.5
Fabricated metal products, except machinery and equipment	0.3	0.02	31.6	68.1
Wood products, cork, and straw (except furniture)	0.12	0.02	8	12
Paper products	0.11	0.02	60.1	62
Furniture	0.17	0.01	25.5	97.3
Communication equipment	0.06	0.01	75.6	66.1
Printing and reproduction of recorded media	0.04	0.01	34.5	48
Dairy products	0.02	0.01	88.8	96.6
Services				
IT and information services	3.67	0.84	50.3	46.2
Education & Research	0.68	0.53	12.9	3.3
Other Business services	1.91	0.33	31.8	40.7
Water Transport	0.88	0.15	34.8	51.1
Financial Services	0.41	0.11	42.4	45.8
Air Transport	0.24	0.07	94.2	98.3
Insurance Services	0.19	0.04	34.3	55.6
Construction	0.17	0.02	31.9	49
Communication	0.12	0.02	52.3	61
Other services	0.14	0.02	8.3	10.2
Electricity	0.02	0	75.6	94.6
Gas	0	0	0	0
Water supply	0	0	0	0
Railway Transport	0	0	0	0
Land Transport	0	0	0	0
Supportive & Auxiliary transport activities	0	0	0	0
Storage & warehousing	0	0	0	0
Trade	0	0	0	0
Hotels & Restaurant	0	0	0	0
Ownership of dwellings	0	0	0	0
Medical and Health	0	0	0	0
Legal Services	0	0	0	0
Real estate activities	0	0	0	0
Renting of machinery and equipment	0	0	0	0
Community, Social & personal services	0	0	0	0
Public administration. & defence	0	0	0	0

Table 19: Export Supported Employment by Educational Attainment of Workers, 2017-18, (millions), SUT based Estimates

|	No formal schooling*	Up to Primary school	Middle school	Secondary and higher secondary	Diploma and above**	Total
Agriculture	1.53	0.91	0.94	0.75	0.20	4.33
	(4.3%)	(5.3%)	(6.1%)	(7.4%)	(16.8%)	(6.0%)
Manufacturing	10.16	8.96	10.62	9.43	4.04	43.20
	(80.8%)	(58.9%)	(53.5%)	(52.5%)	(49.5%)	(60.5%)
Services	0.92	0.80	1.46	2.26	5.13	10.58
	(67.4%)	(71.8%)	(54.7%)	(45.2%)	(24.0%)	(40.2%)
Total	**12.62**	**10.67**	**13.02**	**12.44**	**9.37**	**58.11**
	(70.5%)	**(55.3%)**	**(50.2%)**	**(48.5%)**	**(34.8%)**	**(52.7%)**

Note: Figures in parentheses are the share of indirect employment in total export related employment for each category; *this group includes workers who are "not literate" and "literate without formal schooling"; ** this groups includes workers who have passed "diploma/certificate course", "graduate" and "post graduate and above".

Table 20: Export Supported Employment by Educational Attainment, 2017-18, SUT based Estimates

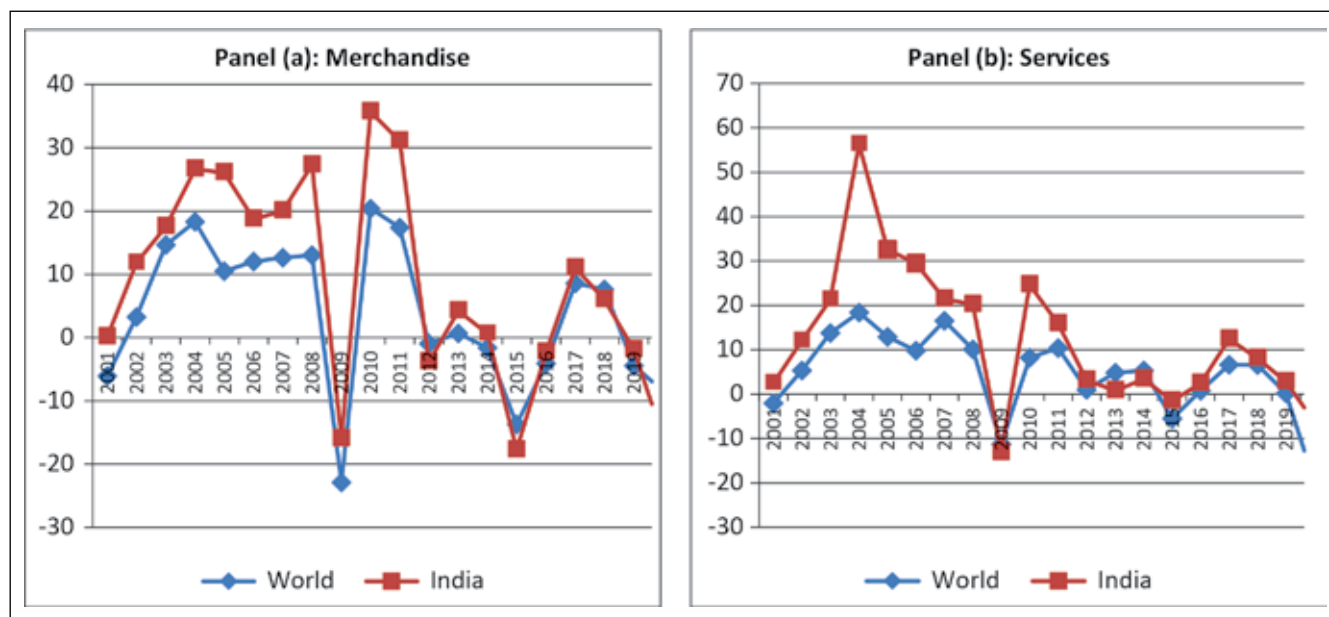|	No formal schooling	Up to Primary	Middle school	Secondary and higher secondary	Diploma and above
Agriculture					
Agriculture	1.38	0.82	0.83	0.65	0.15
Other Mining	0.06	0.03	0.04	0.04	0.02
Livestock	0.04	0.02	0.02	0.02	0.00
Forestry and Logging	0.02	0.02	0.02	0.02	0.01
Fishing & Aquaculture	0.02	0.02	0.01	0.01	0.00
Nonferrous metal ores	0.01	0.01	0.01	0.01	0.00
Iron Ore	0.00	0.00	0.00	0.00	0.00
Coal & Lignite	0.00	0.00	0.00	0.00	0.00
Crude Petroleum	0.00	0.00	0.00	0.00	0.00
Natural Gas	0.00	0.00	0.00	0.00	0.00
Manufacturing					
Miscellaneous Manufacturing	0.67	1.67	2.34	1.72	0.71
Wearing apparel, except custom tailoring	0.78	1.19	1.56	1.47	0.37
Textiles and cotton ginning	1.58	1.20	1.16	1.00	0.32
Grain mill products	1.80	1.07	1.09	0.89	0.22
Production, processing and preservation of meat, fish, fruit, vegetables, oils and fats	1.56	0.96	0.99	0.79	0.21
Other food products	0.71	0.44	0.46	0.36	0.10
Chemicals except pharmaceuticals	0.60	0.37	0.41	0.40	0.24
Coke and refined petroleum	0.28	0.24	0.32	0.36	0.24
Machinery and equipment	0.17	0.18	0.30	0.38	0.24
Leather and related products	0.32	0.25	0.29	0.22	0.09
Transport equipment	0.19	0.18	0.25	0.29	0.23
Electrical equipment	0.10	0.11	0.16	0.29	0.20
Iron and Steel and Casting of iron and steel	0.12	0.13	0.22	0.22	0.16
Rubber & plastic products	0.19	0.15	0.18	0.19	0.12
Pharmaceuticals	0.16	0.10	0.14	0.17	0.24
Tobacco products	0.29	0.22	0.14	0.10	0.02
Beverages	0.23	0.14	0.15	0.14	0.05
Other non-metallic minerals	0.15	0.08	0.10	0.09	0.05
Basic precious and non-ferrous metals and casting of non-ferrous metals	0.08	0.07	0.09	0.08	0.06
Fabricated metal products, except machinery and equipment	0.04	0.06	0.08	0.09	0.05
Electronic component, consumer electronics, magnetic and optical media, computer and peripheral equipment, optical and electronics products	0.03	0.02	0.03	0.06	0.06
Furniture	0.02	0.05	0.06	0.04	0.01

	No formal schooling	Up to Primary	Middle school	Secondary and higher secondary	Diploma and above
Paper and paper products	0.03	0.02	0.03	0.03	0.02
Wood products, cork, and straw (except furniture)	0.04	0.03	0.03	0.03	0.01
Communication equipment	0.01	0.01	0.02	0.02	0.02
Printing and reproduction of recorded media except publishing	0.00	0.00	0.01	0.01	0.01
Dairy products	0.01	0.01	0.01	0.01	0.00
Services					
IT and information services	0.29	0.27	0.43	0.77	2.75
Other Business services	0.19	0.21	0.40	0.63	0.81
Education & Research	0.04	0.05	0.08	0.25	0.79
Water Transport	0.19	0.08	0.29	0.23	0.23
Financial Services	0.05	0.04	0.06	0.11	0.25
Air Transport	0.05	0.05	0.06	0.07	0.08
Insurance Services	0.01	0.01	0.02	0.05	0.14
Construction	0.05	0.04	0.05	0.04	0.01
Other services	0.02	0.03	0.04	0.05	0.03
Communication	0.01	0.02	0.02	0.05	0.04
Electricity	0.01	0.00	0.01	0.01	0.01
Gas	0.00	0.00	0.00	0.00	0.00
Water supply	0.00	0.00	0.00	0.00	0.00
Railway Transport	0.00	0.00	0.00	0.00	0.00
Land Transport	0.00	0.00	0.00	0.00	0.00
Supportive & Auxiliary transport activities	0.00	0.00	0.00	0.00	0.00
Storage & warehousing	0.00	0.00	0.00	0.00	0.00
Trade	0.00	0.00	0.00	0.00	0.00
Hotels & Restaurant	0.00	0.00	0.00	0.00	0.00
Ownership of dwellings	0.00	0.00	0.00	0.00	0.00
Medical and Health	0.00	0.00	0.00	0.00	0.00
Legal Services	0.00	0.00	0.00	0.00	0.00
Real estate activities	0.00	0.00	0.00	0.00	0.00
Renting of machinery and equipment	0.00	0.00	0.00	0.00	0.00
Community, Social & personal services	0.00	0.00	0.00	0.00	0.00
Public administration. & defence	0.00	0.00	0.00	0.00	0.00

Figure 1: India's Share (%) in World Exports, Merchandise and Services, 2000-2020
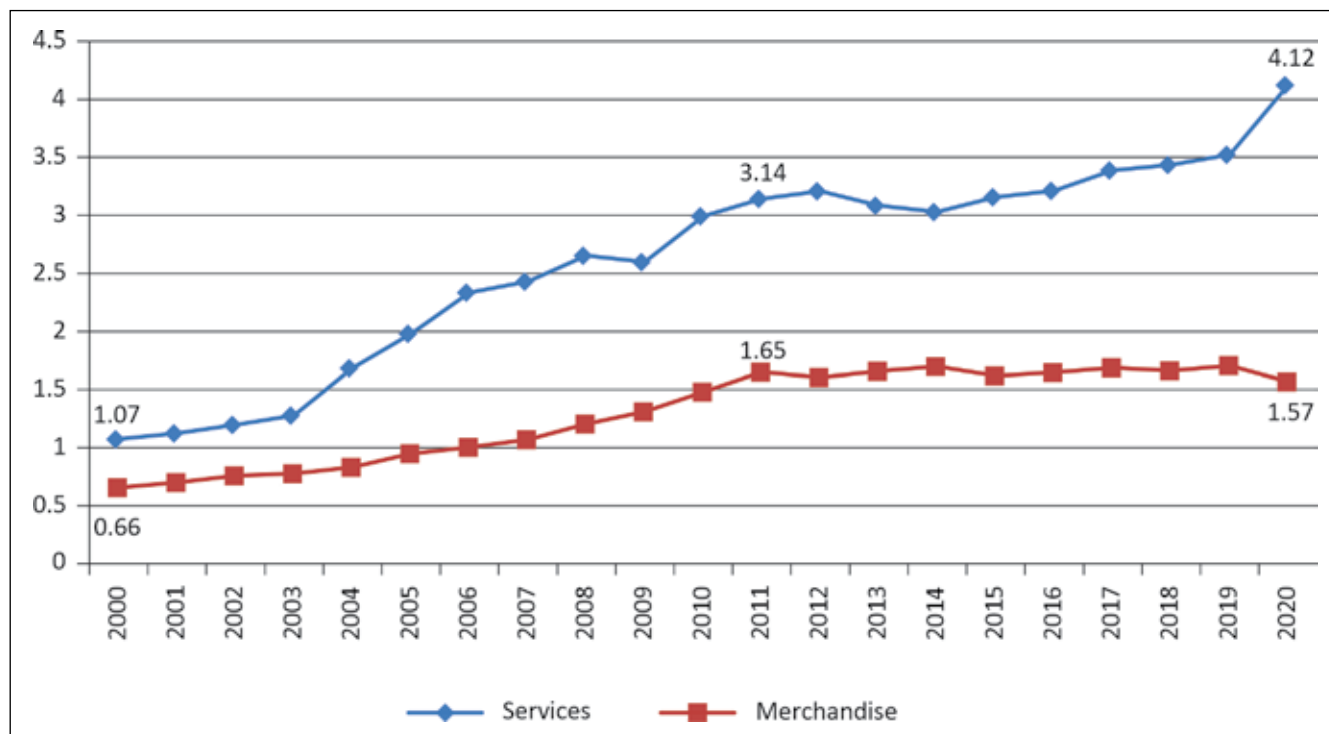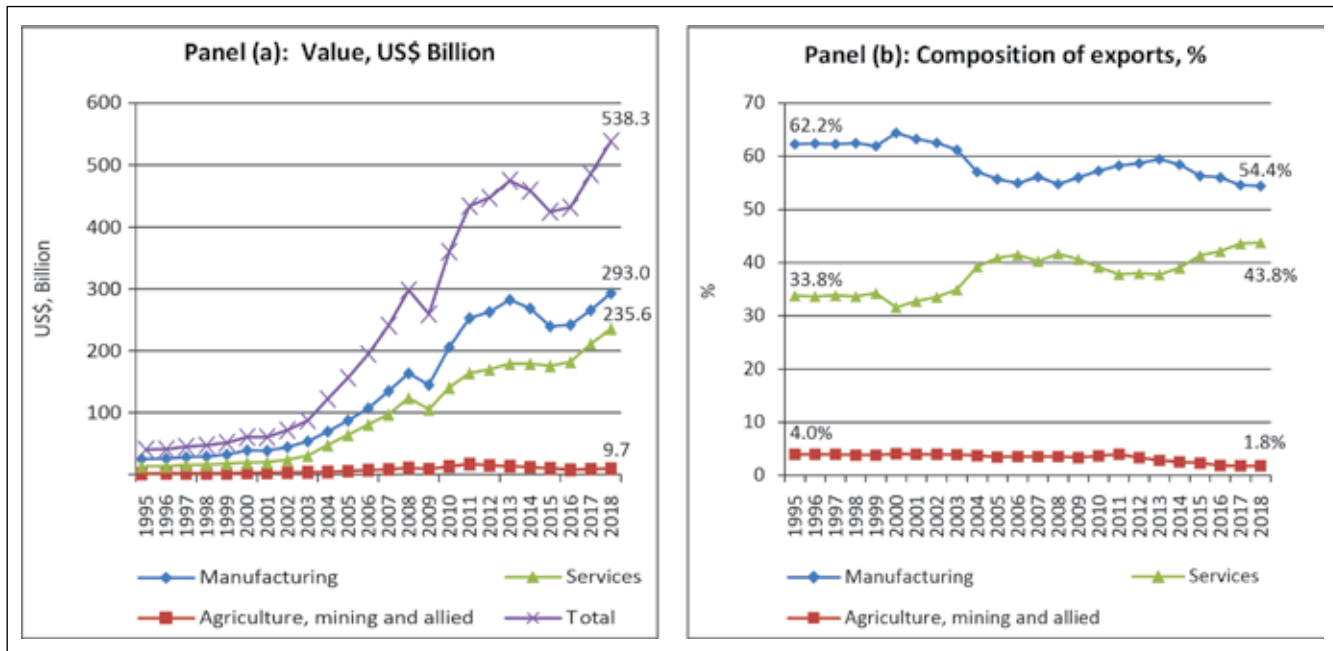

Source: Plotted by authors using data from the WTO

Figure 2: Annual Growth Rates of Exports, India and World

Source: Plotted by authors using data from the WTO

Inter-Linkages BetweenExports and Employment in India: An Update

**Figure 3: Composition of Exports by Sector Groups, Values (US$ billion) and Shares (%)**

Source: Plotted by authors using OECD's Trade in Value Added (TiVA) database based on ICIO tables.

Figure 4: Composition of Exports by Sector Groups, Comparison of SUT and ICIO Databases
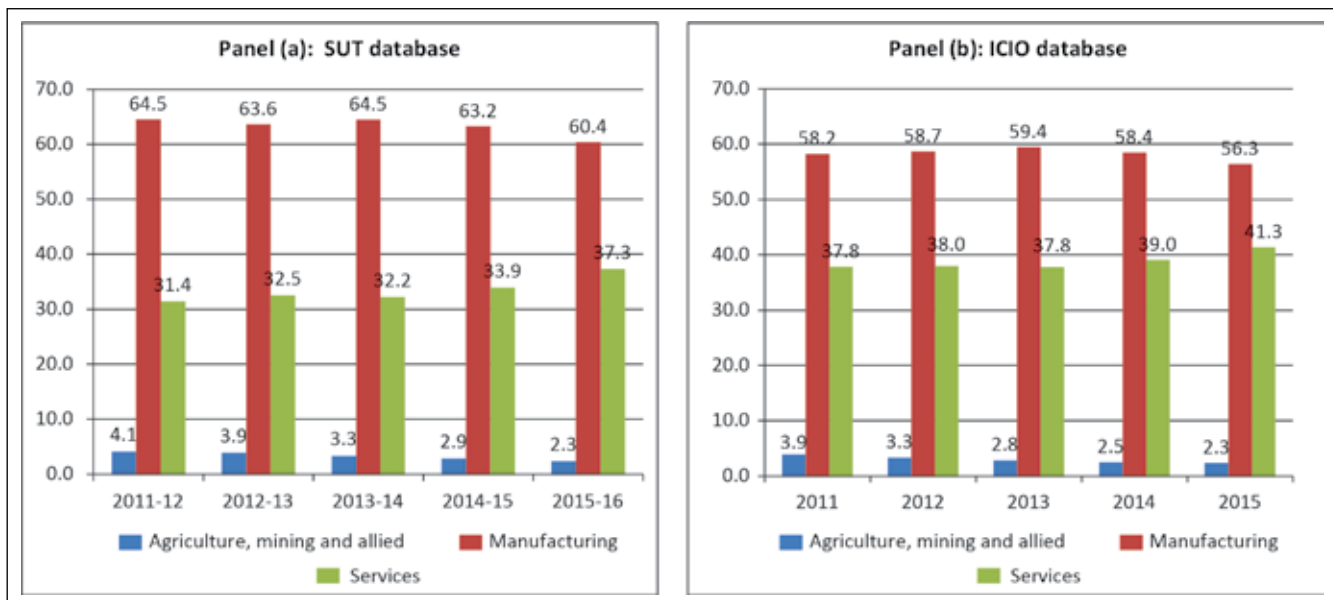
Source: Plotted by authors using CSO's SUT database and OECD's TiVA database based on ICIO

Figure 5: Number of Employment (millions) Tied to India's Aggregate Exports (Merchandise plus Services)
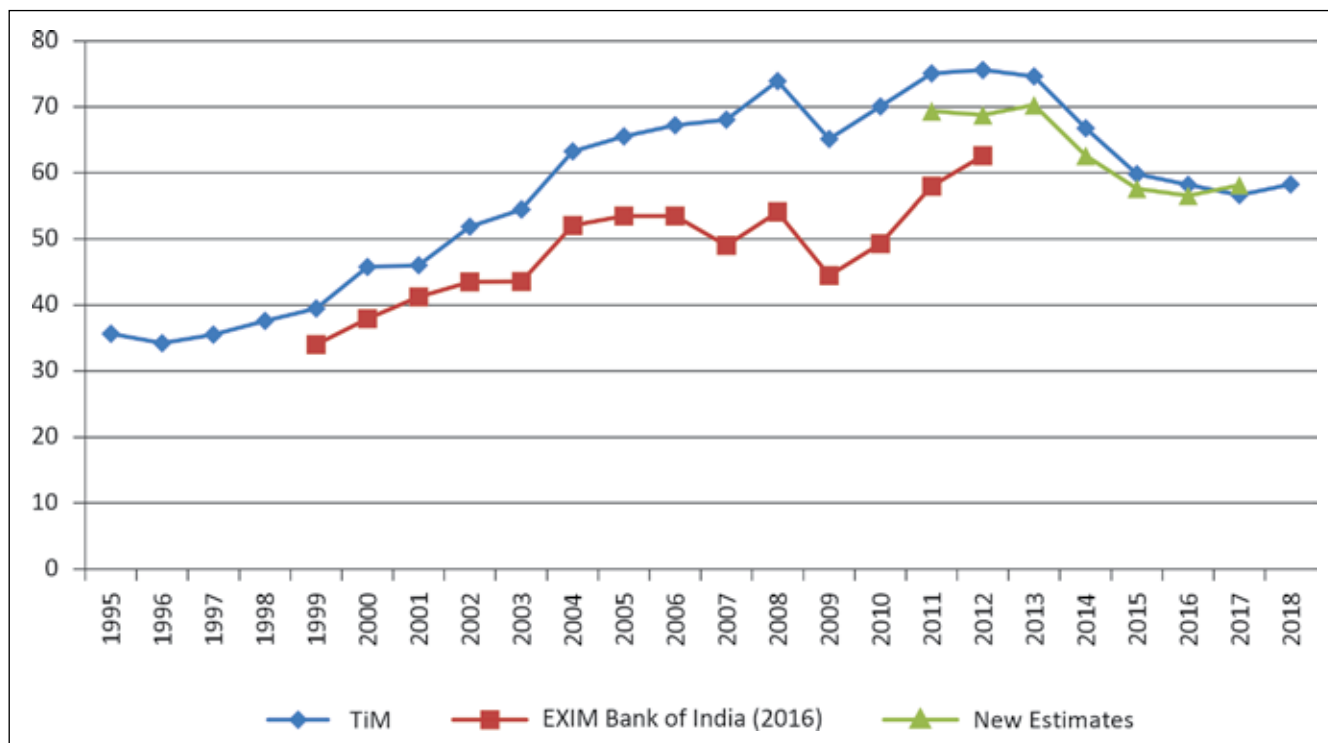
Note: TiM estimates are as per the calendar year (January-December). Exim Bank of India (2016) and the new SUT based estimates are for the Indian financial year (April- March); thus, for example, the Exim Bank of India estimate for the year 1999 in this Figure stands for the estimate for the financial year 1999-2000.

Figure 6: Share of Export Related Employment in Total Domestic Employment
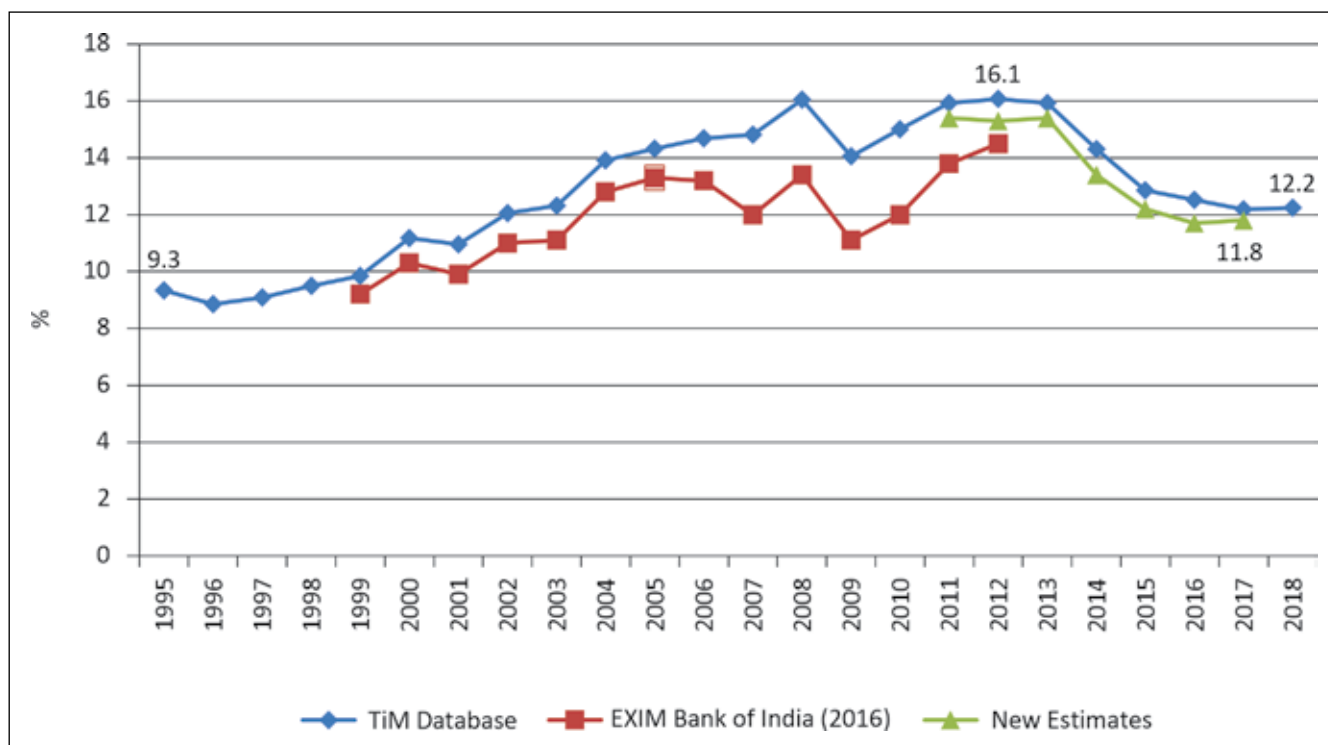
Figure 7: India's Trade Openness, Exports and Imports as a percentage of GDP
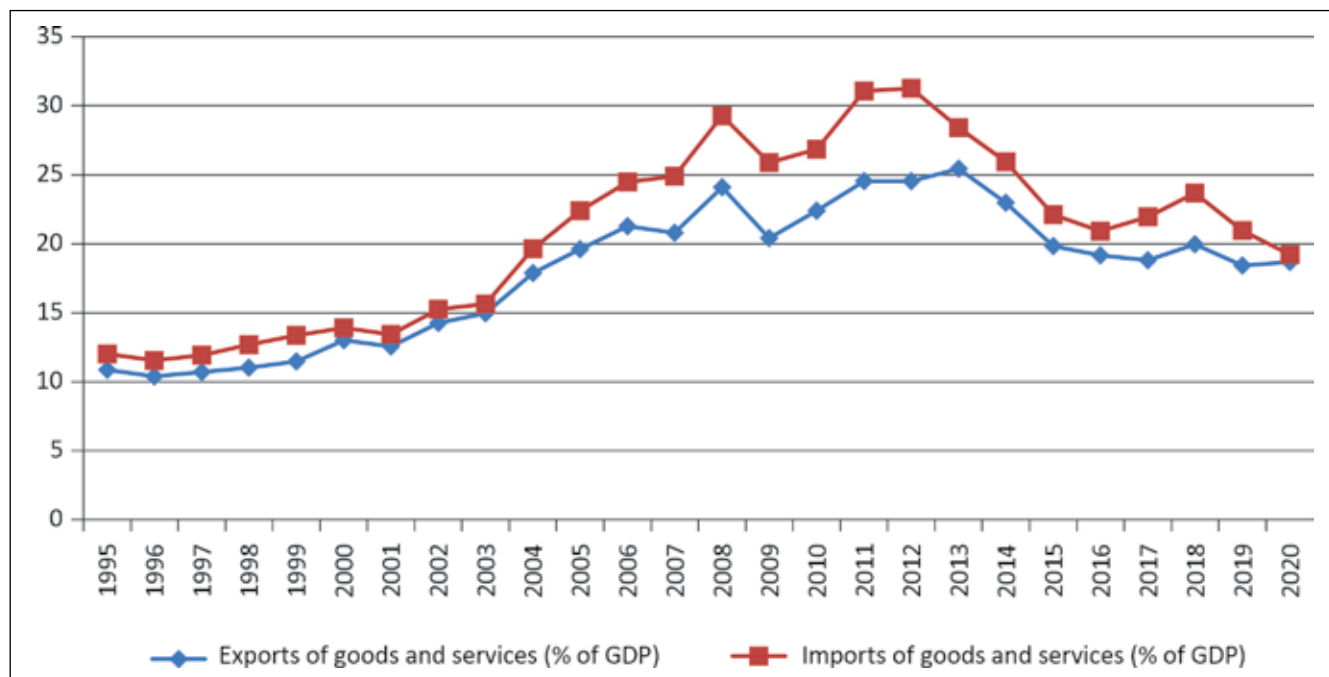
Source: World Development Indicators, World Bank

Figure 8: Share of Indirect Employment in Total Export Related Employment (%)
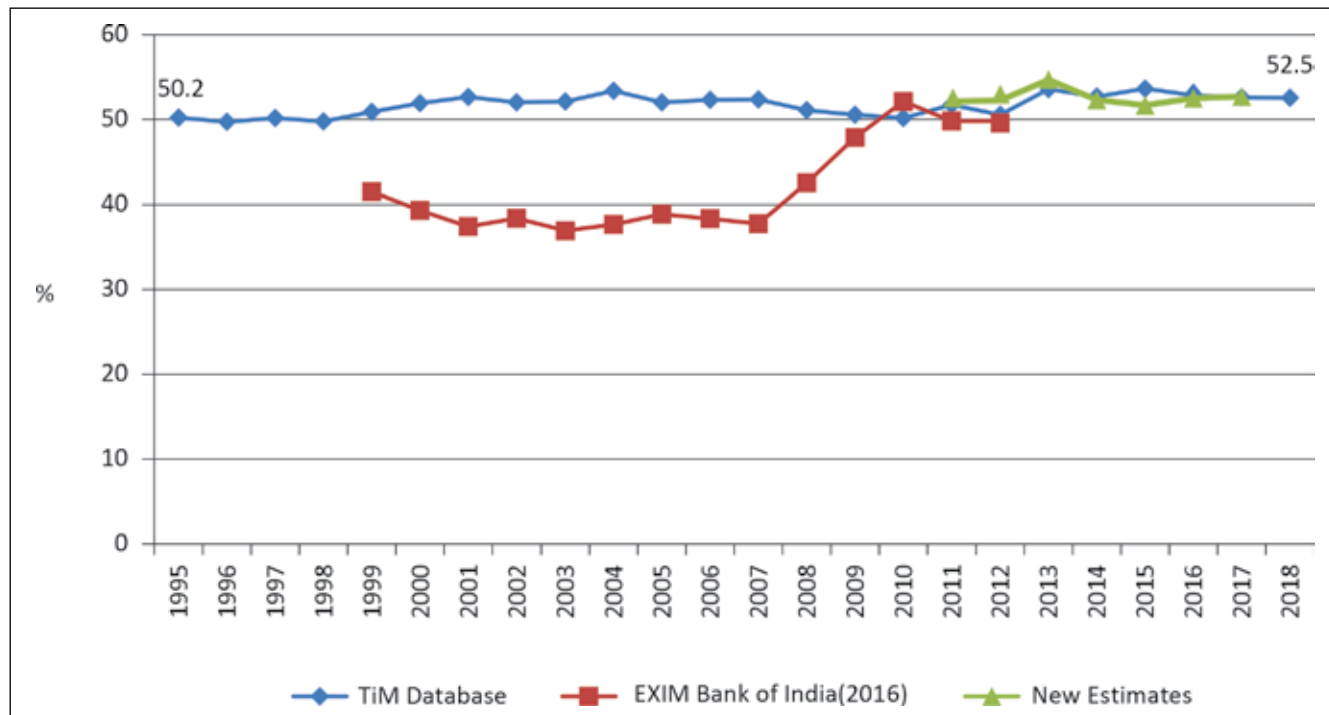
Figure 9: Number of Jobs per US$ million Worth of Exports
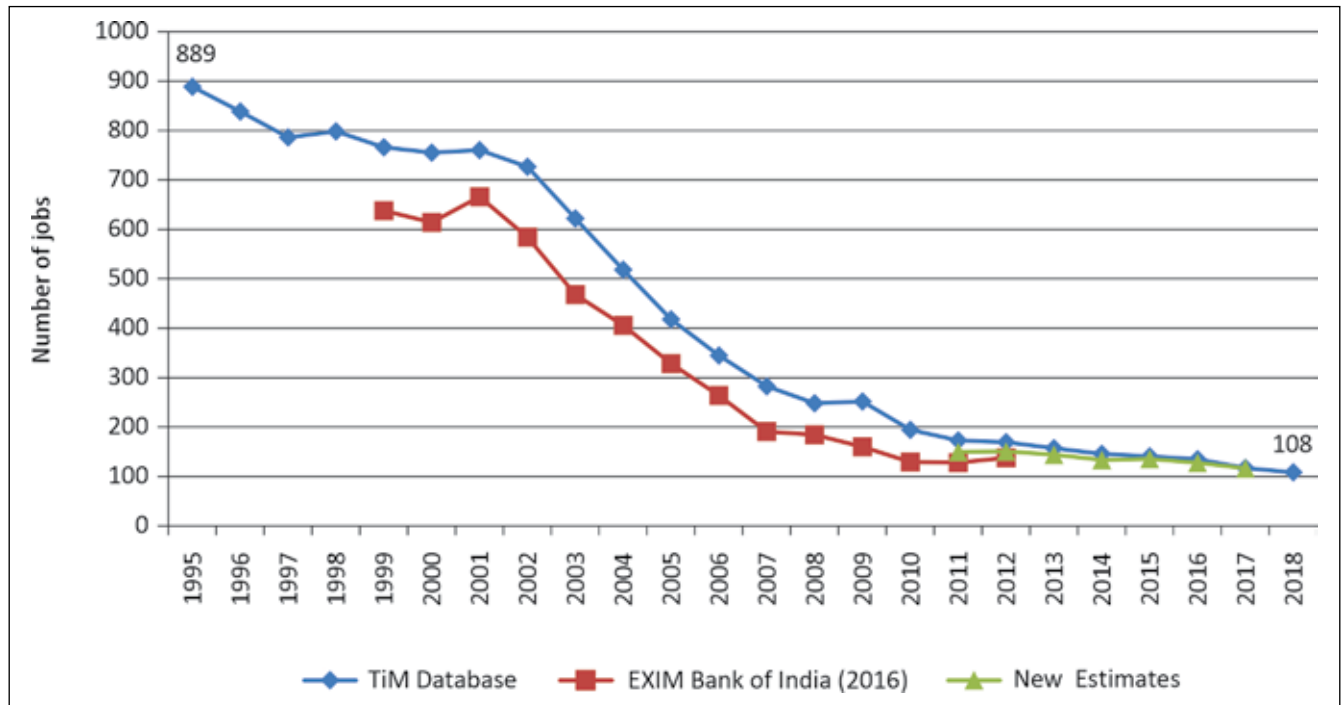
Figure 10: Composition of Export Related Employment by Sector Groups, %
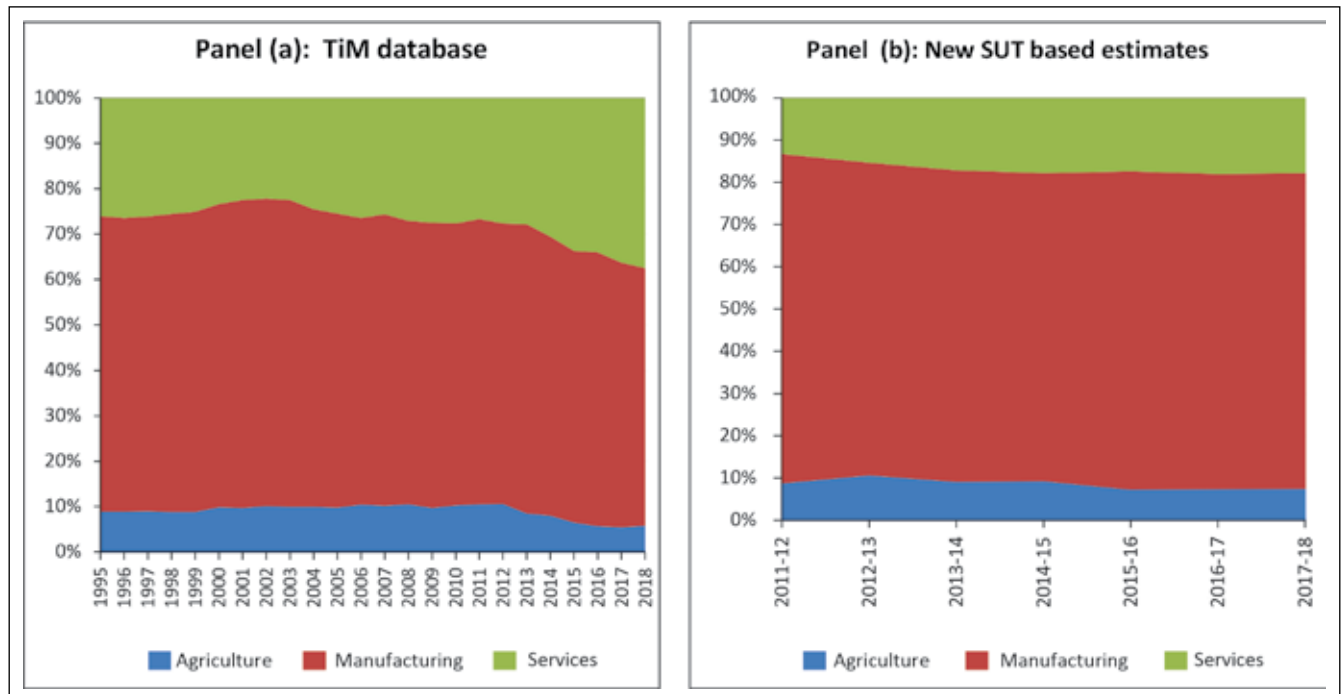
Figure 11: Share of Indirect Employment in Total Jobs Tied to Exports by Sector Groups (%)
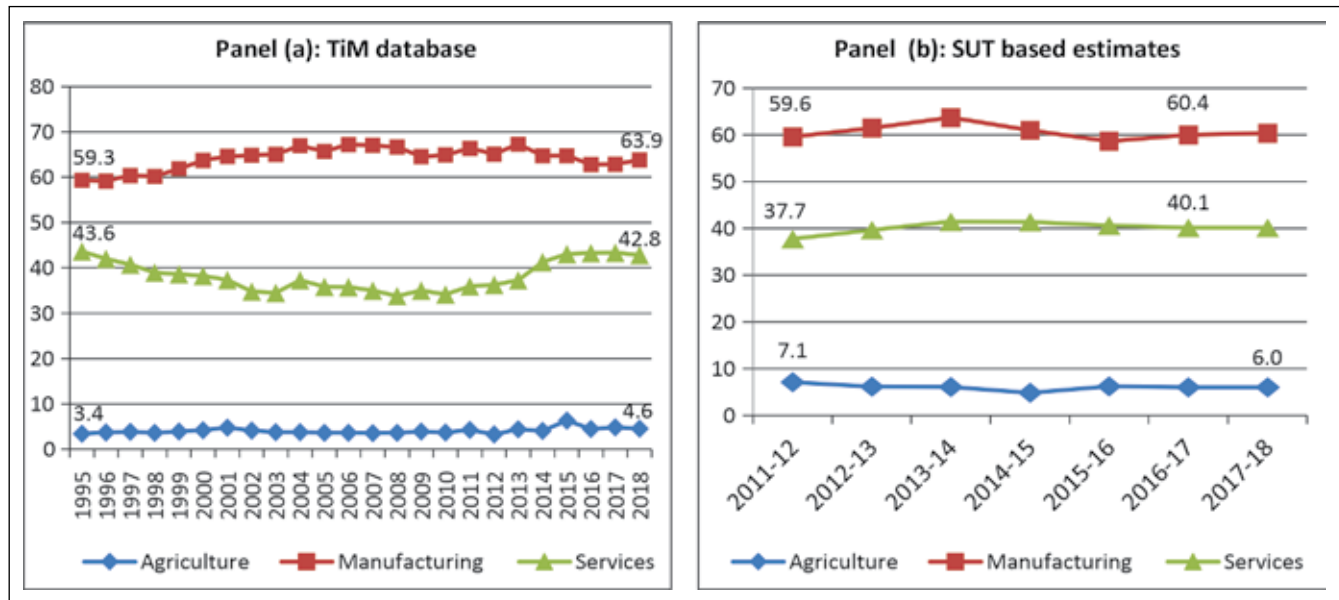
Figure 12: Female Employment Intensity in Exports and Total Production, SUT based Estimates
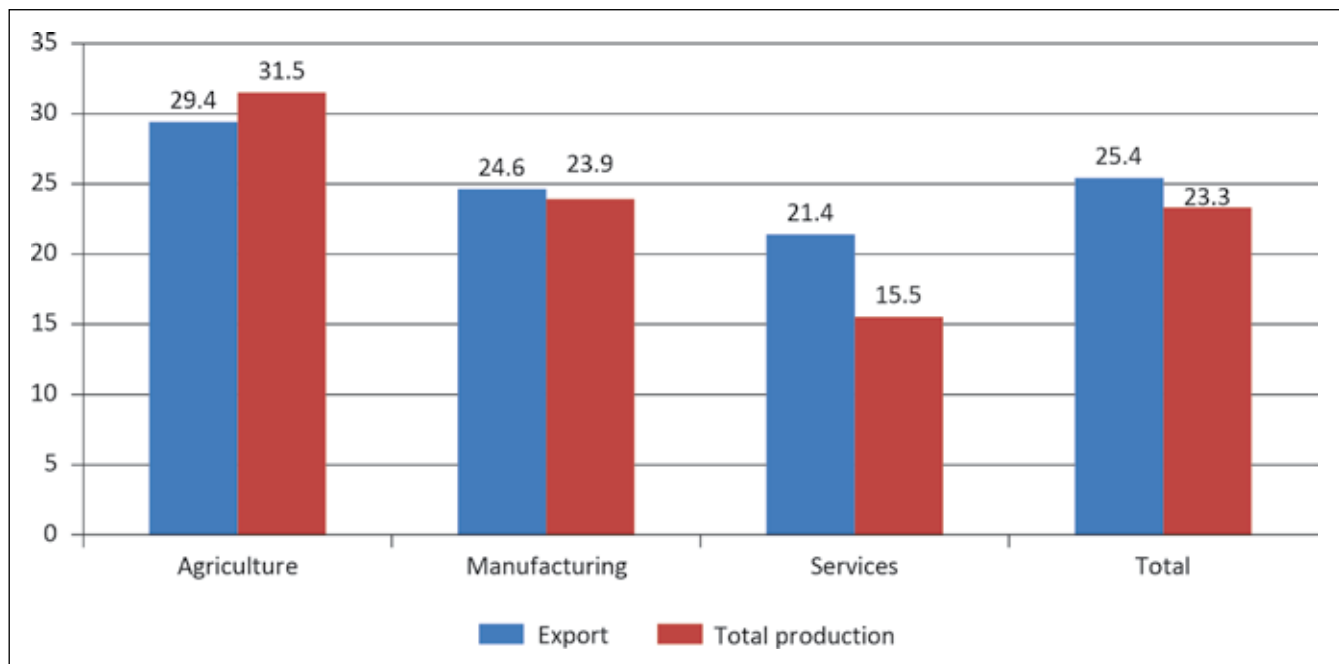
Figure 13: Percentage Distribution of Export Related Employment by Educational Attainment across Sector Groups (%), SUT based Estimates
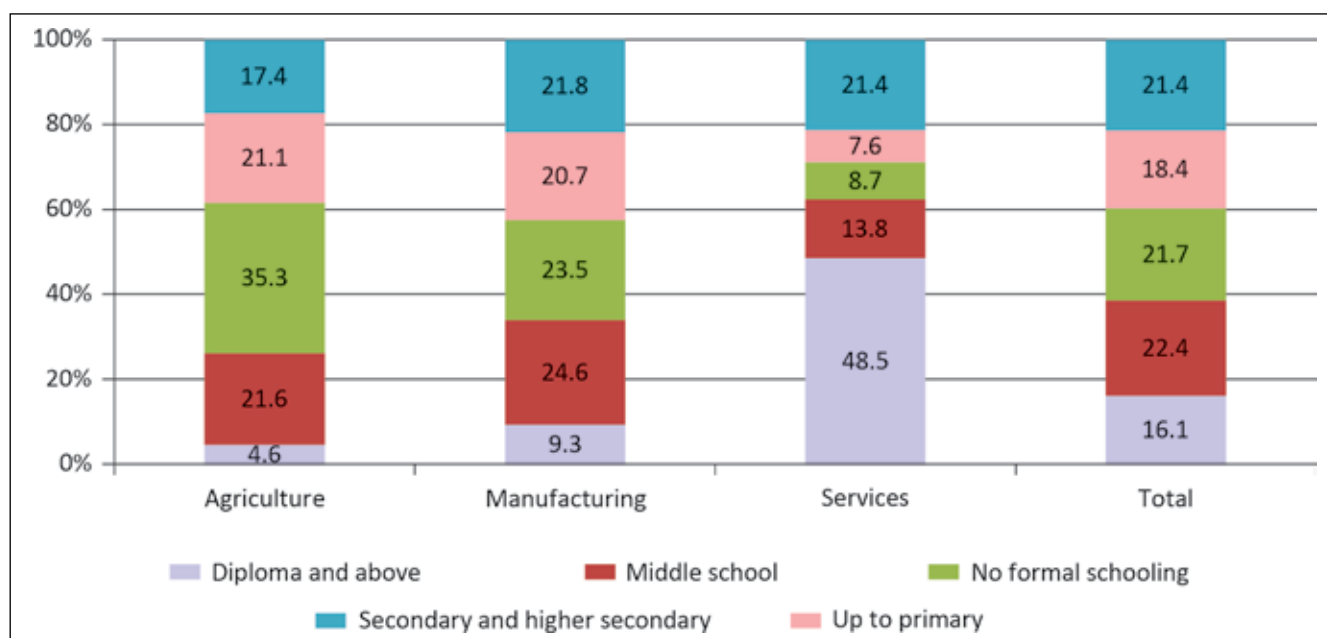
Figure 14: Percentage Distribution of Direct Export Related Employment by Educational Attainment across Sector Groups (%)
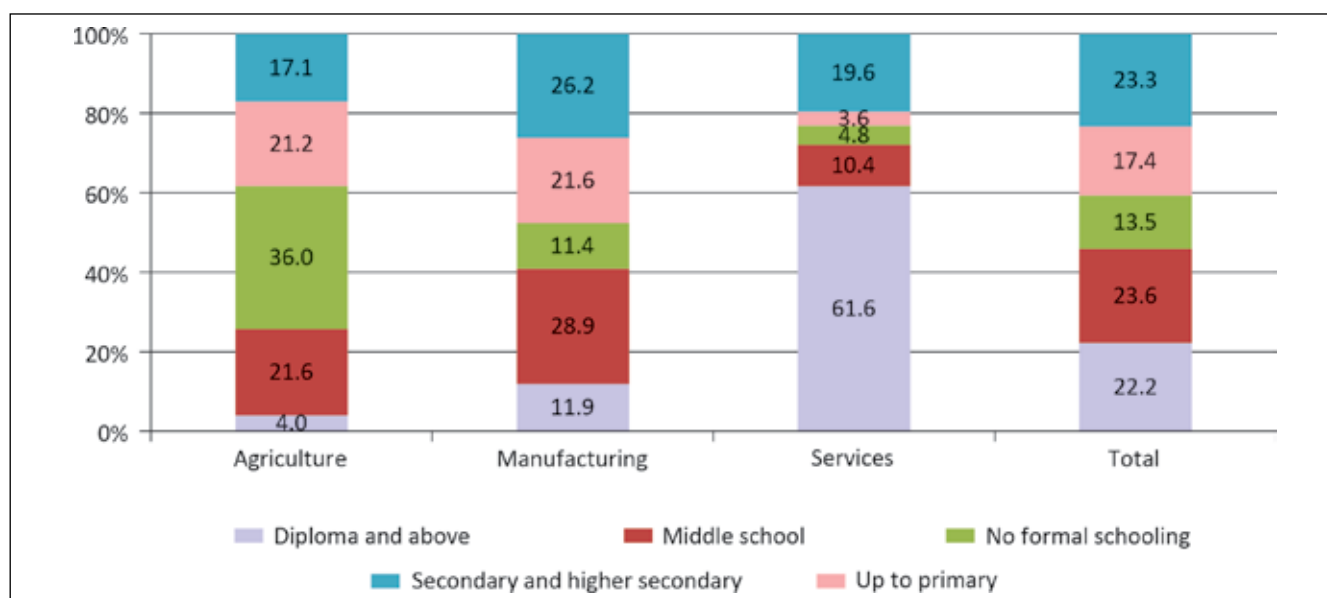
Figure 15: Educational Attainment and Employment: Exports and Total Production, SUT based Estimates

Panel (a): Agriculture — bar chart showing Export and Production percentages by educational attainment:
- No formal schooling: Export 36.0, Production 36.5
- Up to primary: Export 21.2, Production 21.3
- Middle school: Export 21.6, Production 21.4
- Secondary and higher secondary: Export 17.1, Production 16.9
- Diploma and above: Export 4.0, Production 3.9

Panel (b): Manufacturing
- No formal schooling: Export 11.4, Production 15.6
- Up to primary: Export 21.6, Production 20.4
- Middle school: Export 28.9, Production 25.1
- Secondary and higher secondary: Export 26.2, Production 25.7
- Diploma and above: Export 11.9, Production 13.3

Panel (c): Services
- No formal schooling: Export 4.8, Production 14.2
- Up to primary: Export 3.6, Production 16.3
- Middle school: Export 10.4, Production 21.6
- Secondary and higher secondary: Export 19.6, Production 24.8
- Diploma and above: Export 61.6, Production 23.0

Panel (d): Total
- No formal schooling: Export 13.5, Production 24.1
- Up to primary: Export 17.4, Production 19.0
- Middle school: Export 23.6, Production 21.9
- Secondary and higher secondary: Export 23.3, Production 21.4
- Diploma and above: Export 22.2, Production 13.6

METHODOLOGY FOR CONSTRUCTING DOMESTIC USE TABLES (DUT) AND DATA SOURCES

In what follows, a brief description of the method adopted for building the time series of annual domestic use tables (DUT) and various data sources used for this purpose is provided. The discussion here pertains to the estimation of export related employment based on SUTs. An alternative set of estimates, reported in this study, are based on OECD's TiM database; see Horvát, Webb and Yamano (2020) for a detailed discussion of data and methodology involved in the compilation of TiM estimates.

(i) Method for Building the DUT Time Series from SUTs

In order to construct the DUT time series, all official SUTs available for each year from 2011-12 and 2015-16[23] are considered. As official SUTs do not distinguish between imported and domestic inputs, a standard 'proportionality' assumption, discussed below, has been relied on, to separate the two types of inputs. Since SUTs are not available beyond the year 2015-16, the estimates for 2016-17 and 2017-18 are based on the assumption that the domestic coefficient matrix (A^d) of 2015-16 is applicable for the subsequent years. This assumption is unlikely to cause any bias as technical coefficients do not change significantly in the short term.

Looking across a given row in the Use Table (or absorption matrix) of SUT, it is observed how the output of each product i (y_i) is used for intermediate use by various industries j (that is, sector i's forward linkages). On the other hand, each column records a given sector j's purchase of inputs from other sectors i (that is, sector j's backward linkages) for producing the output of sector j (y_j). Sector j's purchase of inputs represents total flows – that is, without distinguishing domestically sourced inputs from imported inputs.

Let z_{ij} denote the intermediate use of sector i's output by sector j, let F_i denote the final use of sector i's output and m_i denote total import of i for intermediate and final use. Note that F_i includes exports from sector i (x_i). Assuming that there are n sectors in an economy, the gross value of output from each sector i (y_i) can be obtained by subtracting the value of imports from the sum of all row entries (i.e., the sum of all z_{ij} and F_i in a given row). This can be expressed for year t as follows:

$$y_{it} = z_{i1t} + z_{i2t} + ... + z_{ijt} + ...+z_{int} + F_{it} - m_{it} \tag{a.1}$$

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[23] SUTs (unlike IO tables) are not a square matrix. Indian SUTs have 140 rows and 66 columns. Some of the sectors were aggregated to obtain a square matrix with 63 sectors.

Similarly, from the supply perspective, output of each product j (y_{jt}) can be obtained by summing the column entries – that is, the sum of the value of all input purchases and value added in sector j

$$y_{it} = z_{1jt} + z_{2jt} + ... + z_{jjt} + ...+z_{njt} + t_{jt} + v_{jt} \tag{a.2}$$

where t_{jt} stands for net indirect taxes and v_{jt} stands for value added.

The ratio of total intermediate use to total availability (imports plus industry output) for a given sector i and year t (r_{it}) is defined as:

$$r_{it} = IIUSE_{it}/(y_{it} + m_{it}) \tag{a.3}$$

where $IIUSE_{it}$ stands for total intermediate use of sector i's output for year t – that is, the sum of all z_{ij}'s in equation a.1 for a given sector i and year t. This ratio is obtained for all 63 sectors in the SUTs. Using these ratios, total domestic intermediate use ($DIIUSE_{it}$), is obtained as follows:

$$DIIUSE_{it} = r_{it} \times y_{it} \tag{a.4}$$

Next, the value of $DIIUSE_{it}$ is distributed across cells within a given row on the basis of the share of each sector j in the total intermediate use of sector i's output – that is, by using the following identity for each sector i[24].

$$1 = \frac{z_{i1t}}{IIUSE_{it}} + \frac{z_{i2t}}{IIUSE_{it}} + ... + \frac{z_{iit}}{IIUSE_{it}} + ... \frac{z_{int}}{IIUSE_{it}} \tag{a.5}$$

Using 63×63 absorption matrices, the ratios are computed in (a.5) for all years for which official SUT are available. Multiplying these ratios for each row by the respective $DIIUSE_{it}$ values, the annual time series of DUT (with dimension 63×63) is obtained. The column entries in DUT are used to estimate the domestic technical coefficient matrix, (A^d), the elements of which (denoted as a_{ijt}) measure the amount of domestic input from sector i required to produce one unit of output in sector j, using the following identity.

$$A^d = \begin{bmatrix} a_{11t} & a_{12t} & ... & a_{1nt} \\ a_{21t} & a_{22t} & ... & a_{2nt} \\ ... & ... & ... & ... \\ a_{n1t} & a_{n2t} & ... & a_{nnt} \end{bmatrix} = \begin{bmatrix} \frac{d_{11t}}{y_{1t}} & \frac{d_{12t}}{y_{2t}} & ... & \frac{d_{1nt}}{y_{nt}} \\ \frac{d_{21t}}{y_{1t}} & \frac{d_{22t}}{y_{2t}} & ... & \frac{d_{2nt}}{y_{nt}} \\ ... & ... & ... & ... \\ \frac{d_{n1t}}{y_{1t}} & \frac{d_{n2t}}{y_{2t}} & ... & \frac{d_{nnt}}{y_{nt}} \end{bmatrix} \tag{a.6.}$$

---

[24] Note that $DIIUSE_{it}$ does not include imported intermediates. Total imported intermediate use $MIIUSE_{it}$ can be obtained in an analogous manner: $MIIUSE_{it} = r_{it} \times m_{it}$. By summing the two, total use: $IIUSE_{it} = DIIUSE_{it} + MIIUSE_{it}$ is obtained.

As the number of rows are higher (140) than the number of columns (66), with the help of a concordance table, some of the sectors were aggregated to obtain a square matrix with equal number of rows and columns[25]. Following this procedure, a time series of DUT can be generated with dimension 63×63 covering the whole economy.

(ii) Data Sources

Consistent time series data on gross value of output (y_{it}), exports (X), and employment for 63 sectors is needed. For the years 2011-12 to 2015-16, gross value of output data is obtained directly from the SUT. For the years 2016-17 and 2017-18, output values are obtained from National Account Statistics (NAS). NAS reports values for over 60 broad industry groups[26]. Using a concordance table, the NAS values for each of these industry groups have been apportioned (based on percentage shares from the SUT, 2015-16) across the corresponding 63 industry codes[27].

For the years 2011-12 to 2015-16, the export data provided in SUT has been used. For the years 2016-17 and 2017-18, aggregated merchandise and services trade published by the Reserve Bank of India (RBI) is obtained. For each year, the total value of exports across the 63 sectors is apportioned, based on the export composition of SUT sectors (for the year 2015-16) and the export composition of ICIO sectors (for the year 2016 and 2017)[28].

To obtain sector level employment data, unit level data from the Employment and Unemployment Surveys (EUS) by NSSO for the year 2011-12 and Periodic Labor Force Survey (PLFS) data for the year 2017-18 is used. The estimates of share in employment at the 5-digit level of NIC for these two years are obtained. For the intervening years, the 5-digit level shares in employment are interpolated. The aggregate employment figures for each year, obtained from International Labor Organization (ILO) are then apportioned according to these shares. The 5-digit level estimates were then aggregated to obtain a time series for the 63 sectors, using concordance between NIC 5-digit and the 63 sectors. Once it is obtained, a consistent time series of employment figures at NIC 5-digit level, using concordance table between NIC 5-digit and our 63 sectors, the employment numbers for 63 sectors, for the time period 2011-12 to 2017-18[29] are aggregated.

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[25] Published SUTs contain 140 rows and 66 columns, which have been converted to 63×63 matrices. This conversion is done as follows. First, using a concordance table between 66 SUT column sectors and the 140-sector classification, the zij values appearing in each of the 66 cells of a given SUT row is aggregated into the corresponding 63 sectors. This is done because the concordance between 63 industries and 140 sectors is most accurate after aggregating certain sectors. Second, using a concordance table between 140 SUT rows and 63 columns, the rows have been aggregated into 63 sectors.

[26] Of these, 31 industry groups belong to manufacturing sector, and 27 industry groups belonging to the service sector. NAS also provides data for the broad categories that fall under the primary sector, these include, crops, livestock, forestry & logging, fishing & aquaculture and mining & quarrying.

[27] For a few sectors, the NAS reports only gross value added (GVA) but not y. In such cases, we derived estimates of y by applying output to value added ratios, available in SUT for the year 2015-16. Values of sector level output, in our final dataset, are in nominal terms and correspond to 2004-05 base year. We validate and match our estimates of y with the data reported in official SUTs for the corresponding years.

[28] The SUT sectors were matched with the ICIO sectors using a concordance table. The ICIO sector-wise export shares for the calendar year 2016 (2017) is used to apportion the aggregate export values for the financial year 2016-17 (2017-18).

[29] We use the employment data based on 'Usual Principal and Subsidiary Status (UPSS), which is the commonly used measure for tracking employment trends in India.

EMPLOYMENT EMBODIED IN INDIAN EXPORTS TO TOP 25 PARTNER COUNTRIES

Table A1: Number of Domestic Employment (000s) Embodied in Indian Exports to Top 25 Partner Countries

1995		2015		2018	
Partner	**Number**	**Partner**	**Number**	**Partner**	**Number**
USA	9111.5	USA	13074	USA	13281.8
Japan	4093.5	UK	2567.9	UK	2381.8
Germany	2193.1	Germany	1740.7	Germany	1930.9
UK	2135.7	Saudi Arabia	1492.6	Singapore	1636.2
Korea	1250.3	Singapore	1484	Japan	1440.6
Italy	1052.6	France	1272.4	France	1385.6
Thailand	942.9	Japan	1155	Saudi Arabia	1199
Belgium	880.7	Korea	1033.6	Korea	1126.2
France	793.3	Australia	938.6	Italy	1088.1
Russia	586.7	Italy	903.5	Thailand	1079.2
Netherlands	573.1	Thailand	867.1	Viet Nam	1025.5
Singapore	569.9	Canada	862.4	Australia	921.5
Saudi Arabia	548.4	Brazil	837.4	Canada	863.4
Malaysia	478.3	Turkey	751.9	Malaysia	802
Spain	464.3	Malaysia	689.5	Turkey	791.2
Canada	461.2	Viet Nam	682.8	Spain	728.1
Australia	425.7	Netherlands	665.4	Brazil	725.7
Taiwan	383.5	Spain	649.8	Russia	698.4
Switzerland	327.4	Russia	645.7	Netherlands	682.4
Brazil	308.5	South Africa	564	Mexico	574.8
Israel	206	Switzerland	544.2	Belgium	553.2
South Africa	190.9	Mexico	527.6	Switzerland	485.3
Philippines	183.1	Belgium	515.1	South Africa	479.7
Sweden	181.1	Israel	438.1	Israel	476
Denmark	151.5	Taiwan	391.7	Taiwan	469.5

Source: TiM database; domestic employment embodied in Indian exports to China is not available in the database

Table A2: Number of Domestic Employment (000s) Embodied in Indian Exports of Agriculture to Top 25 Partner Countries

1995		2015		2018	
Partner	**Number**	**Partner**	**Number**	**Partner**	**Number**
USA	1178	USA	784.7	USA	800.2
Japan	316.1	Germany	116.2	Japan	153.8
Germany	172.1	Brazil	107	Germany	131.4
Brazil	153	UK	86.2	Viet Nam	125.4
Italy	126.9	Russia	73.1	Malaysia	96
UK	123.3	Viet Nam	72.7	Brazil	95.8
Netherlands	103.7	Malaysia	69.6	Italy	78.9
Korea	96.5	Italy	68.9	Thailand	73.2
Singapore	63.3	Saudi Arabia	64.9	Russia	63.8
France	55	Thailand	56.9	Saudi Arabia	60.8
Australia	51	Australia	54	UK	59.3
Kazakhstan	49.9	Japan	50.2	Canada	46.8
Taiwan	39.4	Canada	46	Netherlands	45.1
Canada	33.7	Korea	43.9	Korea	42.7
Saudi Arabia	32.2	Singapore	35.8	Australia	38.9
Malaysia	31.3	Taiwan	34.5	Taiwan	34.8
Belgium	31	Switzerland	31.7	Switzerland	29.8
Spain	21.5	Spain	29.9	Singapore	29.5
Slovak Rep	19.9	France	23.3	France	27.5
Poland	17.4	Philippines	22.4	Spain	24.2
Turkey	16.9	Netherlands	22.1	Philippines	21.6
Switzerland	16.8	Mexico	18.4	Mexico	20.3
Czech Rep	16.6	Finland	16	Austria	10.9
Romania	12.9	Poland	14.7	Poland	16.8
Thailand	12.4	Belgium	14	Morocco	13.3

Source: TiM database; domestic employment embodied in Indian exports to China is not available in the database

Table A3: Number of Domestic Employment (000s) Embodied in Indian Exports of Manufacturing to Top 25 Partner Countries

1995		2015		2018	
Partner	**Number**	**Partner**	**Number**	**Partner**	**Number**
USA	6407.6	USA	7827.5	USA	7638.3
Japan	2684.1	UK	1283.1	UK	1076
UK	1317.1	Germany	948.7	Germany	1027.2
Germany	1078.3	Saudi Arabia	895.4	France	817.7
Belgium	769.6	France	766.5	Japan	795.7
Korea	748.3	Japan	676.7	Italy	714.7
Italy	710.2	Italy	606.3	Viet Nam	705.5
Thailand	701.4	Turkey	584.6	Saudi Arabia	652.5
France	561.8	Canada	571.5	Thailand	611.5
Russia	392.3	Korea	560.7	Turkey	596.6
Saudi Arabia	354.4	Australia	535	Korea	571
Singapore	325.7	Thailand	500.6	Canada	550.3
Canada	291.8	Spain	471.2	Australia	522.1
Spain	278.3	Viet Nam	470.5	Spain	511.7
Australia	276.1	Mexico	426.7	Mexico	450
Malaysia	210.7	South Africa	412.4	Malaysia	428.6
Netherlands	205.9	Malaysia	377.8	Russia	409.7
Taiwan	184.8	Russia	361.3	Belgium	369
Switzerland	161	Belgium	337.3	South Africa	336.9
South Africa	142.3	Singapore	329	Singapore	312.6
Philippines	124.2	Israel	289.6	Israel	304.5
Israel	118.2	Poland	247.2	Netherlands	298.5
Sweden	113.1	Netherlands	245.3	Taiwan	241.5
Turkey	98.4	Switzerland	226.6	Poland	237.2
Denmark	91.8	Taiwan	207.2	Norway	220.5

Source: TiM database; domestic employment embodied in Indian exports to China is not available in the database
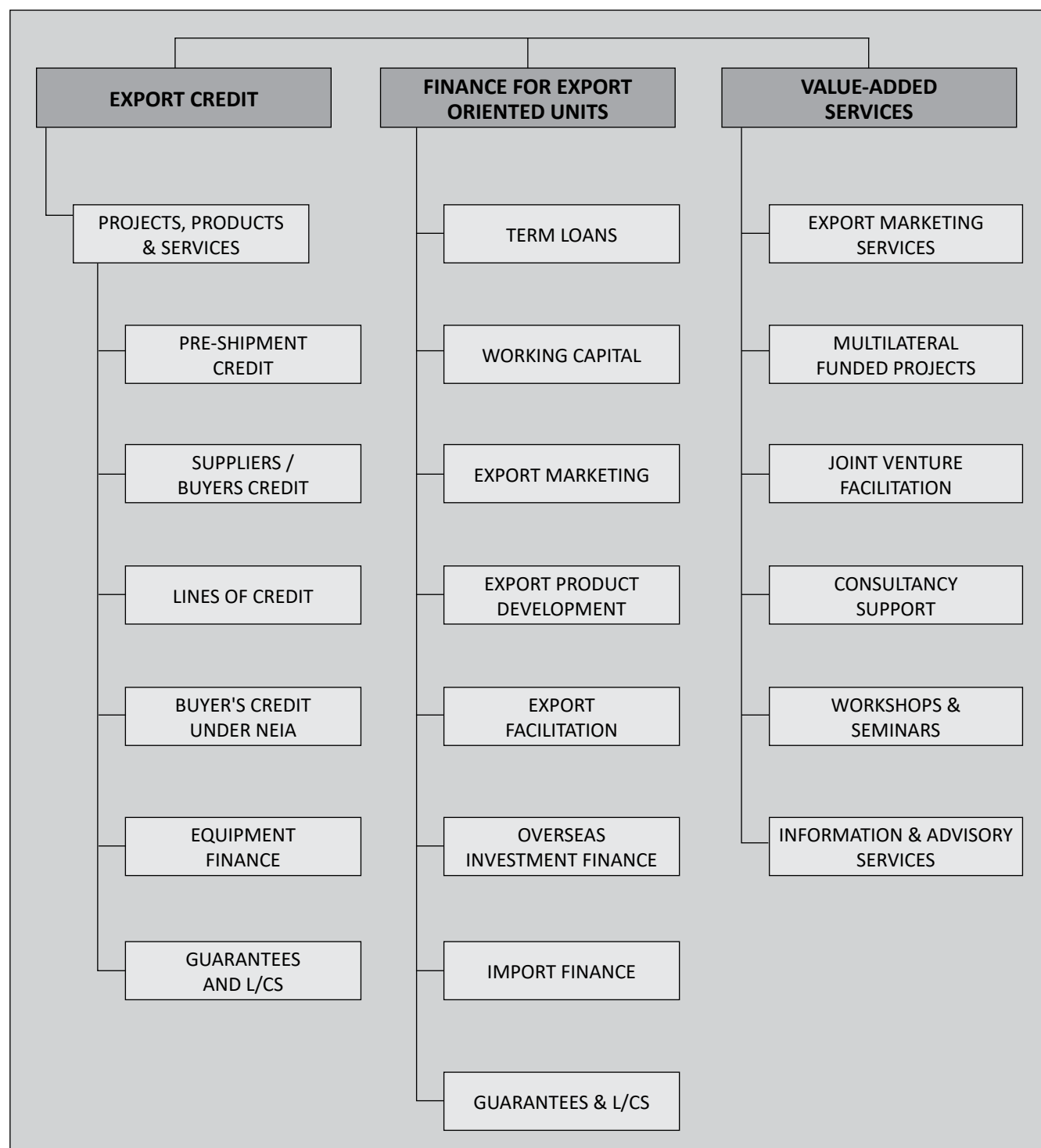
Table A4: Number of Domestic Employment (000s) Embodied in Indian Exports of Services to Top 25 Partner Countries

1995		2015		2018	
Partner	Number	Partner	Number	Partner	Number
USA	1525.8	USA	4461.8	USA	4843.3
Japan	1093.3	UK	1198.7	Singapore	1294.1
Germany	942.6	Singapore	1119.2	UK	1246.5
UK	695.4	Germany	675.7	Germany	772.3
Korea	405.5	Saudi Arabia	532.3	France	540.4
Netherlands	263.5	France	482.6	Korea	512.5
Malaysia	236.2	Korea	428.9	Japan	491.1
Thailand	229.1	Japan	428.1	Saudi Arabia	485.8
Italy	215.5	Netherlands	397.9	Thailand	394.7
Russia	185.9	Australia	349.6	Australia	360.5
Singapore	180.9	Thailand	309.6	Netherlands	338.7
France	176.5	Switzerland	285.9	Italy	294.5
Spain	164.4	Canada	244.9	Switzerland	277.8
Saudi Arabia	161.8	Malaysia	242	Malaysia	277.4
Taiwan	159.4	Italy	228.4	Canada	266.2
Switzerland	149.6	Sweden	217.7	Russia	224.8
Canada	135.8	Belgium	163.8	Sweden	214.9
Australia	98.6	Turkey	155.2	Viet Nam	194.5
Belgium	80.1	Taiwan	149.9	Taiwan	193.1
Israel	75.8	Spain	148.7	Spain	192.2
Norway	69.9	South Africa	142.7	Turkey	183.8
Sweden	65.7	Viet Nam	139.6	Belgium	175.4
Denmark	56	Philippines	138.2	Israel	162.3
Philippines	48.3	Israel	136.3	Philippines	161.3
South Africa	43.2	Finland	117.3	Ireland	147.8

Source: TiM database; domestic employment embodied in Indian exports to China is not available in the database

INDIA EXIM BANK'S MAJOR PROGRAMMES

Bank's Major Programmes

EXPORT CREDIT	FINANCE FOR EXPORT ORIENTED UNITS	VALUE-ADDED SERVICES
PROJECTS, PRODUCTS & SERVICES	TERM LOANS	EXPORT MARKETING SERVICES
PRE-SHIPMENT CREDIT	WORKING CAPITAL	MULTILATERAL FUNDED PROJECTS
SUPPLIERS / BUYERS CREDIT	EXPORT MARKETING	JOINT VENTURE FACILITATION
LINES OF CREDIT	EXPORT PRODUCT DEVELOPMENT	CONSULTANCY SUPPORT
BUYER'S CREDIT UNDER NEIA	EXPORT FACILITATION	WORKSHOPS & SEMINARS
EQUIPMENT FINANCE	OVERSEAS INVESTMENT FINANCE	INFORMATION & ADVISORY SERVICES
GUARANTEES AND L/CS	IMPORT FINANCE	
	GUARANTEES & L/CS	

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