Trade patterns of China and India

Elena Vidal

China and India are playing an increasingly significant role in global trade. In 2016, their joint share of the global trade in goods reached around 14%, while their share of services came to 7.5%. They have very different trade profiles, however, also reflecting very different internationalisation strategies. Since opening up in the 1980s, China has taken on a global trade hub role, thanks to its growing integration into global production chains for manufactured goods. More recently, China has undergone a shift in trade specialisation towards a pattern characterised by the export of products with higher domestic value added (i.e. it has moved up the global value chain). India's integration into global value chains has been much more limited and, since the early stages of its economic liberalisation, services have accounted for a substantial share of its exports. Although India's export profile has remained fairly stable in recent decades, a growing weight of manufacturing exports with a greater import content has recently become discernible. Against this background, the estimation of goods export demand equations shows how, in the long run, external demand is the factor that wields most influence on developments in both countries' exports, albeit more powerfully so in China, while price-competitiveness has a greater influence on Indian exports.

TRADE PATTERNS OF CHINA AND INDIA

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Introduction

In recent decades, growth in China and India has far exceeded that in other emerging economies and, of course, that in the advanced countries. The two Asian economies have come to account for 25% of global GDP, measured in terms of purchasing power parity (PPP), while they have attained growing influence on global trade. Indeed, the joint weight of these two Asian countries in international goods trade stood at 14% in 2016, 6 pp more than in 2005, while in services the figure was 7.5%, 2.5 pp up on 11 years earlier. Moreover, the two countries are major recipients of foreign capital and significant consumers of energy and other natural resources. Thus, in 2016 China received $170 billion in foreign direct investment (FDI), while €44 billion flowed into India – totalling almost a quarter of the FDI flowing into emerging countries.

In China's case, international expansion, reflected in its growing integration into global value chains,[1] has been accompanied by a major sectoral transformation. According to OECD-TiVA figures, in 2014 29.4% of the value of China's total gross exports related to foreign value added (FVA). China has taken on the role of a global trade hub, carrying out the assembly, packaging and export of final products, resulting in its exports having a high import content (which reflects strong backward linkages with value chains). India's experience has been very different, as it is not been as closely integrated in global production chains. Moreover, India's share of services exports is particularly high, with services exports accounting for almost 40% of the total. This far exceeds the level reached by other emerging market economies. However, for several years now, given the need to create jobs, India has sought to increase its share of global trade by focusing its manufacturing industry on exports.[2] For its part, China is seeking to incorporate more domestic value added in its gross exports. This led the government to launch the "Made in China 2025" campaign with the goal of becoming a technology benchmark by 2025, while also seeking to reduce its dependence on imports of high-tech components.

This article sets out to examine how the export profiles of China and India have developed, and to evaluate the extent to which differences in trade patterns are reflected in differences in the relationship between goods exports and their drivers. The remainder of this article is structured as follows: the second section gives a brief historical overview of the liberalisation processes in China and India, as these processes undoubtedly shaped the way the two countries emerged as significant players in global trade. The third section takes a closer look at their export profiles and how they have developed, using a range of indicators, including revealed competitive advantage, and it analyses the sector distribution of their export companies, based on both gross and value-added data.[3] The results of the

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1 The concept of global value chains (GVCs) is explained in more detail in Box 1.

2 The "Make in India" campaign, launched by prime-minister Modi in September 2014, set out to turn India into a manufacturing hub. Modi is aiming for sustainable economic growth underpinned by increasing foreign investment. The government is therefore working to raise the limit on permitted investments in certain sectors (such as defence and insurance), in order to facilitate foreign technology imports and alleviate certain bottlenecks in production processes.

3 In order to avoid the double counting of trade that GVCs can cause when exports and imports are calculated based simply on total export and import values, the economic value-added of the goods or services produced at each link in the chain has been used instead. Trade data in value added rather than gross terms have therefore been used.

1 DEGREE OF OPENNESS (a)

%
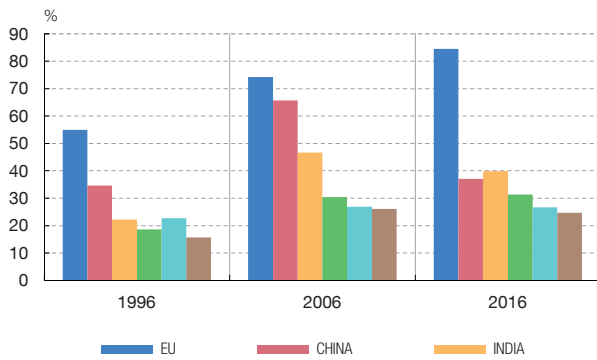
2 EXPORTS OF GOODS AND SERVICES/WORLD TOTAL

%

■ EU   ■ CHINA   ■ INDIA   ■ JAPAN   ■ USA   ■ BRAZIL
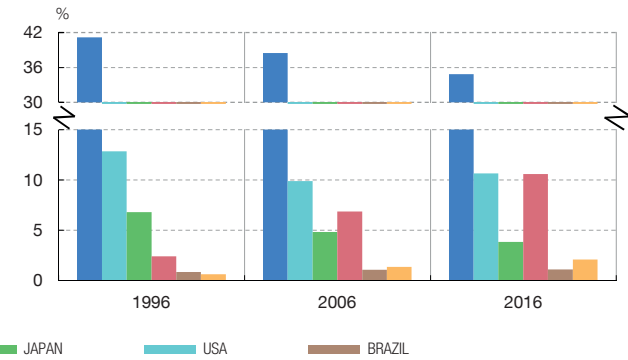
SOURCE: World Development Indicators (World Bank).

a Exports + imports of goods and services / GDP.

estimation of the goods export equations for the two countries are given in the fourth section, and the main findings are summarised in section five.

Trade liberalisation in China and India

The process of liberalisation begun in China in the 1980s and India in the 1990s gave both countries access to cheaper and more modern imported inputs, as well as to new technologies and new markets. Thus, at the tail end of the last century, and in the years leading up to the financial crisis, Chinese and Indian foreign trade grew at rates well above those of world trade as a whole. Although this trend changed with the financial crisis, China and India remain among the most open large economies (using the ratio of the sum of exports and imports to GDP as a proxy), behind only the European Union (see Chart 1.1). As a result of this dynamism, the two countries' share of world trade has grown substantially (see Chart 1.2).

By seeking to use exports to drive economic development, China managed to turn itself into a key nexus in GVCs (although its value-added is as yet limited) during the liberalisation phase. The economic reforms underpinning China's current economic performance began in 1979 under the communist-party leader Deng Xiaoping, and put an end to the country's total economic self-sufficiency. In particular, China decided to adopt a growth strategy based on opening up its economy and specialising in exporting labour-intensive manufactured goods, taking advantage of the country's low wages and abundant supply of labour from the countryside. China began by exporting low value-added products, such as shoes, toys and low-quality clothing, gradually succeeding in assembling higher value-added goods, such as electronic devices and machinery, although it remained dependent on imported high-tech inputs. Over time an increasing amount of domestic value added has been incorporated in the goods sold abroad (Pula and Santabárbara (2012) and Koshy et al. (2016)).

Consequently, the country's trade policy underwent decentralisation at the start of the period of reform, enabling local small and medium-sized enterprises to operate freely and enter into trade relations with other countries. Nevertheless, it was the creation of four Special Economic Zones (SEZs) in coastal cities as poles of attraction for FDI[4] that really boosted China's foreign trade. Export processing zones were added to these special areas, dividing Chinese trade into two branches: process trading operations and ordinary

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4 Xiamen, Shantou, Shenzhen and Zuhai.

operations. In effect, multinationals' decisions to invest in China were based not only on its low labour costs, but also its position as a key link in GVCs. China joined the World Trade Organization (WTO) in 2001, which considerably accelerated the processing trade[5] as it laid the foundations for the country's access to advanced country markets, as neighbouring countries (such as Taiwan, South Korea and Japan) decided to export their high-tech products (electronics, machinery, etc.) via China, locating some of the production process stages in the country. In this way, China came to base its growth on high levels of exports.

However, China's processing trade slowed during the global financial crisis, as falling demand in the advanced countries led to a drop in their exports, which was in turn reflected in a contraction in imports of components from Asia. This change revealed a serious weakness of the export-led growth model, namely its dependence on demand from the rest of the world. Consequently, in recent years the Chinese authorities have sought to mitigate this fragility by reducing the country's dependence on the processing trade. This trend is also being driven by China's rising wages, which are twice those of Vietnam. The Chinese authorities recognised the limits of the growth model, assuming a change in the model of economic development in the 2011-2015 Five-Year Plan, which expressed the need to rebalance the growth pattern by raising the share of consumption relative to investment and exports, and that of services relative to manufacturing. The quest for a model that was more sustainable in the long term implies a parallel shift in trade strategy towards products with a bigger share of domestic technology content.

India's liberalisation process has followed a different dynamic, however. Since the country's independence in 1947, the Indian economy has been governed by a centrally planned system, in which five-year plans are drawn up and implemented. A number of structural reforms were introduced in the mid-1980s (deregulation of key sectors, such as machinery, computing and pharmaceuticals) but trade deregulation was only reflected in an increase in imports, which were financed from external borrowing. This situation led to rising foreign debt, culminating in a debt crisis in 1991, triggered by unsustainable fiscal and current account deficits against the background of slow economic growth. The high external liquidity pressure the country was experiencing was mitigated by the IMF's financial support in the form of a credit line and access to the Compensatory and Contingency Financing Facility. The programme set up by the IMF in these circumstances required India to carry out a series of economic and financial reforms to give the market a stronger role. Specifically, this New Economic Policy entailed economic liberalisation, with tariff cuts, privatisations in some industries, elimination of import licences, the entry of new commercial banks in the financial sector, and deregulation of the information and communications technology sectors. This all contributed to India's recovering and even exceeding the dynamism of its trade in the colonial period, by specialising in labour-intensive textile production and rebuilding its trade relations with South-East Asia.

Since 2000, however, India has taken a new approach to its positioning in the international market, establishing itself as a benchmark exporter of computer programming services at highly competitive prices, supported by greater openness to FDI in the telecommunications engineering sector and strong growth in the numbers of software engineering graduates. The key to its success was the high capacity for adaptation of its training centres to the

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5   The processing trade refers to the process of importing all the necessary inputs (raw materials, parts, components, accessories, packaging, etc.) for a specific product and re-exporting the completed product after assembly by domestic firms. See Box 1 for more details.

country's incipient trade integration, which allowed India to become the leading emerging country exporter of sophisticated services. Nevertheless, the economy is still highly dependent on the agricultural sector, to the detriment of industry, indicating a lack of industrial development compared to the situation in China. The challenge investors in India face include overcoming the bureaucratic hurdles to starting a business, bottlenecks in transport infrastructure and constraints imposed on foreign firms. President Modi's reform policies aim precisely to alleviate these barriers to foreign investment.

Two trade profiles

This section analyses how the structure of the two countries' exports has developed in response to the internationalisation strategies outlined in the preceding section. WTO data on exports of goods and services are available for the period 1990-2016 for this analysis. These data enable changes in exports by sector to be tracked since before China's membership of the WTO and comparative advantage indicators to be constructed in both gross and value added terms.

According to the WTO's goods trade data, Chinese exports primarily comprise goods (91% of the total, as shown in Chart 2), of which 94% are manufactured products. This ratio has been rising since the start of the century. Since then, machinery and transport equipment exports have grown substantially, in detriment to clothing and textiles (see Chart 3). Although India also exports manufactured goods (see Chart 4), its basket is more diverse. Manufactured goods represented 73% of total goods sales abroad in 2016. Of the remainder, 14% are petroleum products and minerals (cut and uncut diamonds) and 13% are from the agricultural sector.

The performance of services exports is more mixed, however. In China there has been a significant reduction in the share of services since the start of the century, representing as little as 9% of exports in 2016. By contrast, in India the share of services has risen continuously, reaching 37% of total exports in 2016. IT services account for 34% of total services exports.

The composition of both countries' imports is more similar. Both economies mainly import goods (between 75% and 80% of total goods and services imports), particularly manufactured goods and raw materials. Intermediate goods account for 65% to 70% of goods imports.

The Balassa (1965) index can be used to analyse how the two countries' commercial specialisation has evolved in more detail. This index identifies the sectors in which an economy has a competitive advantage relative to the rest of the world. A sector's Balassa index is defined as:

$$RCA = (X_{si} / X_{sw}) / (X_i / X_w),$$

where X_{si} is country i's exports in sector s; X_{sw} represents world exports in this sector; X_i is total exports of country i, and X_w stands for total world exports. The value of this index measures the importance of a given sector for a country's exports relative to the sector's importance for world exports. To facilitate the interpretation and analysis of the Balassa index values, they are usually normalised to a maximum of 1 and minimum of -1, where a negative value represents a competitive disadvantage and a positive value represents a competitive advantage.[6]

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6   NRCA = (RCA - 1) / (RCA + 1); Normalised Revealed Comparative Advantage.

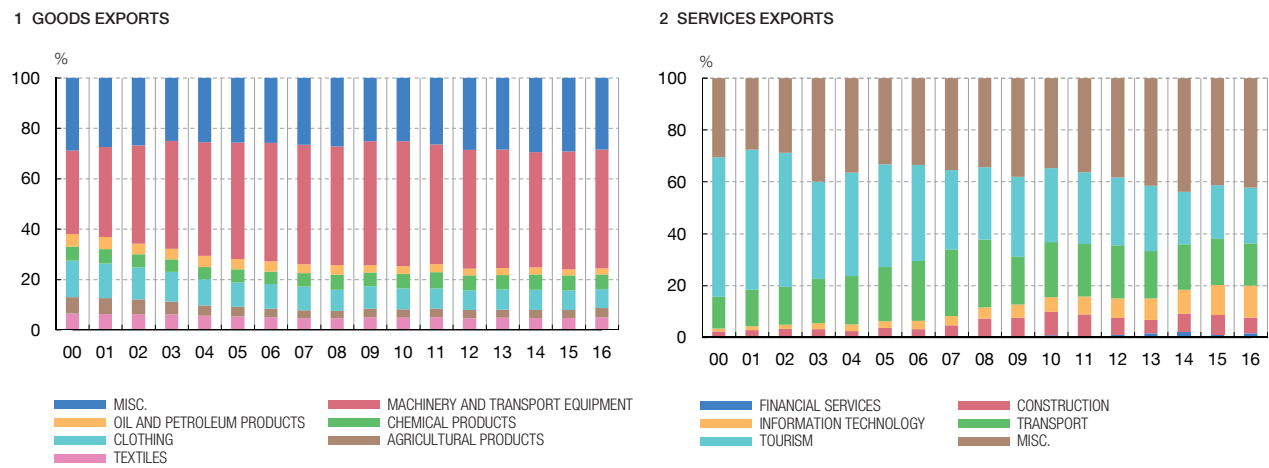## BREAKDOWN OF EXPORTS IN 2016

CHART 2

% of total
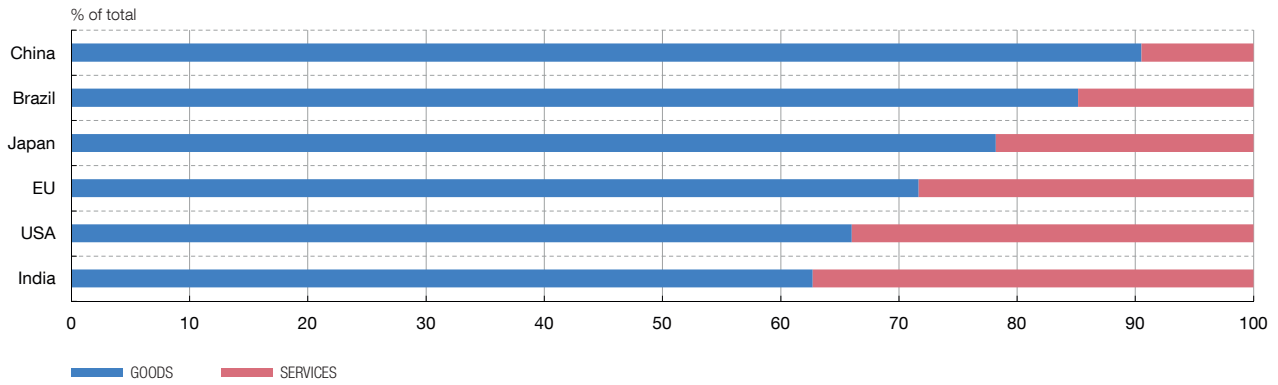
GOODS   SERVICES

SOURCES: World Trade Organization and World Development Indicators (World Bank).

CHINA'S EXPORTS OF GOODS AND SERVICES BY SECTOR

CHART 3

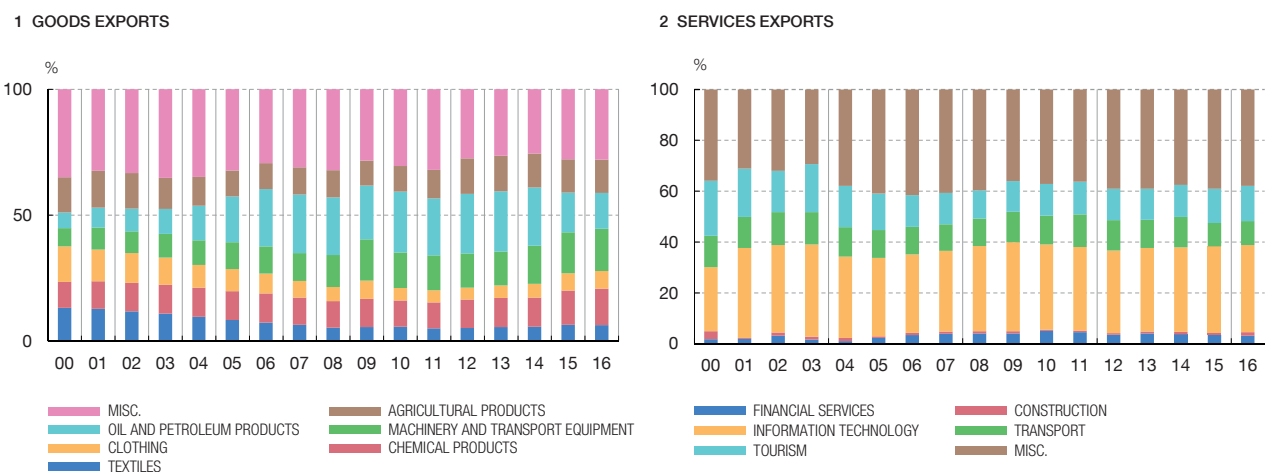### 1 GOODS EXPORTS

MISC.
OIL AND PETROLEUM PRODUCTS
CLOTHING
TEXTILES
MACHINERY AND TRANSPORT EQUIPMENT
CHEMICAL PRODUCTS
AGRICULTURAL PRODUCTS

2 SERVICES EXPORTS

FINANCIAL SERVICES
INFORMATION TECHNOLOGY
TOURISM
CONSTRUCTION
TRANSPORT
MISC.

SOURCE: World Trade Organization.

INDIA'S EXPORTS OF GOODS AND SERVICES BY SECTOR

CHART 4

1 GOODS EXPORTS

MISC.
OIL AND PETROLEUM PRODUCTS
CLOTHING
TEXTILES
AGRICULTURAL PRODUCTS
MACHINERY AND TRANSPORT EQUIPMENT
CHEMICAL PRODUCTS

2 SERVICES EXPORTS

FINANCIAL SERVICES
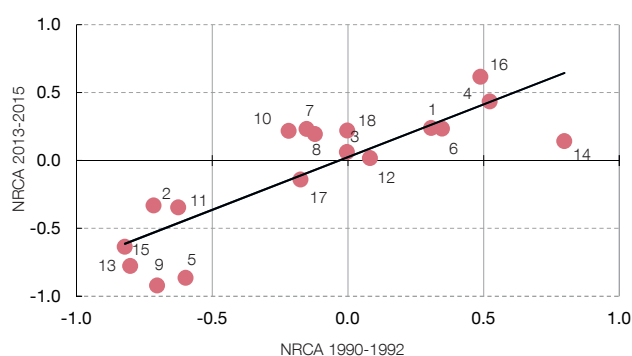INFORMATION TECHNOLOGY
TOURISM
CONSTRUCTION
TRANSPORT
MISC.

SOURCES: World Trade Organization.

1 RELATIONSHIP BETWEEN CHINA'S TRADE SPECIALISATION IN 1990-1992 AND IN 2013-2015
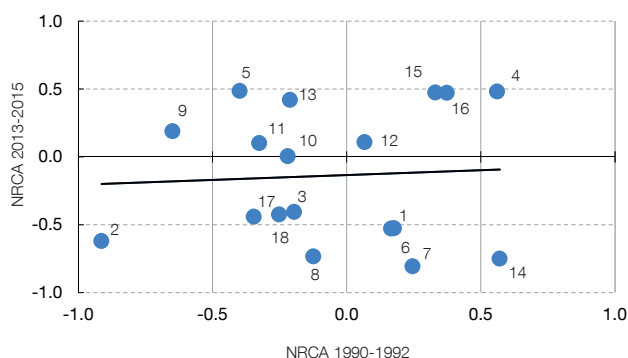
2 RELATIONSHIP BETWEEN INDIA'S TRADE SPECIALISATION IN 1990-1992 AND IN 2013-2015

SOURCE: Banco de España, using WTO data.
NOTE: 1. Agricultural products; 2 Motor vehicles; 3. Chemical products; 4. Clothing; 5. Electronic data processing and office equipment; 6. Foods; 7. Oil; 8. Mining and petroleum products; 9. Electronic components and integrated circuits; 10. Iron and steel; 11. Machinery and transport equipment; 12. Manufactured goods; 13. Telecommunications and office equipment; 14. Pharmaceuticals; 15. Telecommunications; 16. Textiles; 17. Transport equipment; 18. Services.

a Normalised Balassa indices.

Chart 5 compares the average Balassa indices in each country over the periods 1990-1992 and 2013-2015,[7] highlighting the differences between the two countries' trading strategies. First, it can be seen that China's trading profile has changed more than India's since the 1990s.[8] Indeed, in India the sectors that were competitive in the 1990s were still competitive in 2013-2015. Both countries' specialisation in the agricultural sector has declined over the past two decades, although India still maintains a competitive advantage, while China lost this position with the strong rural exodus since 1980, while economic development was taking place in the provinces of the south-east coast, such as Guangdong and the north of Hainan (the "Pearl River Delta").

China has a clear competitive advantage in the case of manufacturing industry. Both countries continue to have a broad competitive advantage in textiles, although India's specialisation is currently stronger. By contrast, in China some capital-intensive manufacturing sectors (such as machinery and transport equipment, telecommunications and electronics) that were not competitive in the nineties now have a clear competitive advantage. Meanwhile, in 2013-2015 China was still at a disadvantage in terms of services, despite its intention to rebalance its economy towards a production model in which services are increasingly important. India, on the other hand, is highly specialised in services (particularly IT services), and has gained in specialisation since the 1990s. Moreover, it also shows a strong competitive advantage in oil and minerals, and in chemical products (particularly pharmaceuticals) – sectors in which China is at a disadvantage.

Using data from the OECD-TiVA database (1995-2011)[9] on goods and services exports expressed in value-added terms it is possible to examine the trade strategies of China and India more closely. China's role in GVCs and world trade in manufactured goods has

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7 Using the same database as mentioned above for the calculation.

8 China underwent a change in the trade pattern of its imports and exports over the period 1978-1995, explaining the current pattern of trade and China's belonging to GVCs, having gone from importing manufactured goods and exporting raw materials to importing and exporting manufactured goods.

9 See Box 1 for an explanation of how international trade is measured in terms of value added. The OECD-TiVA database has data available for the period up to 2011. DVA data on gross exports are available for the period up to 2014.
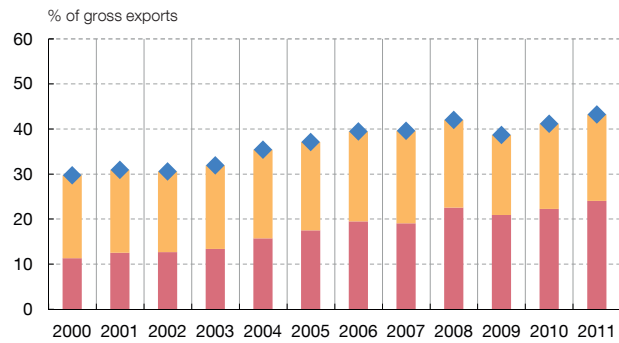
CHART 6

1 CHINA

% of gross exports
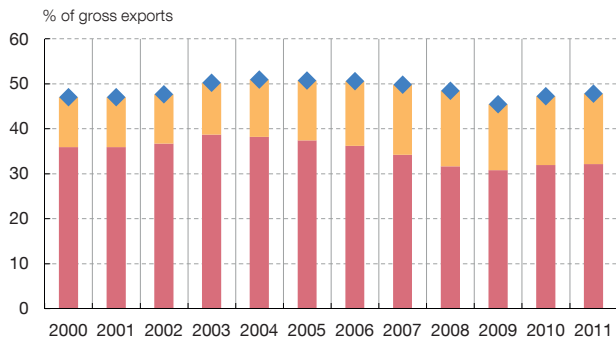
2 INDIA

% of gross exports

BACKWARD LINKAGES   FORWARD LINKAGES   ◆ TOTAL PARTICIPATION

SOURCE: OECD - TiVA (2016).

a Backward linkages: foreign value-added (FVA) embedded in gross exports. Forward linkages: domestic value-added (DVA) re-exported to third-parties.
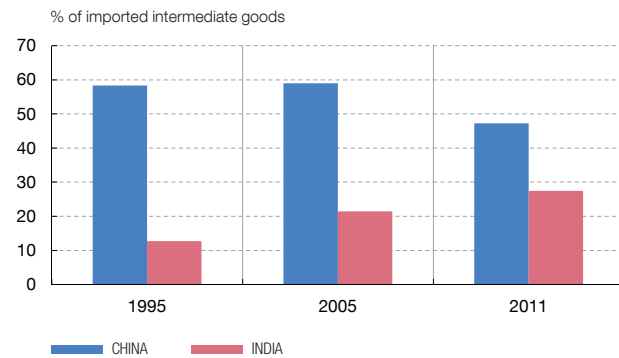
BACKWARD LINKAGES OF CHINA AND INDIA IN GLOBAL VALUE CHAINS (a)

CHART 7

1 FOREIGN VALUE-ADDED EMBEDDED IN GROSS TOTAL EXPORTS (b)

% of value of exports

CHINA   INDIA

2 RE-EXPORTS OF IMPORTED INTERMEDIATE GOODS AND SERVICES
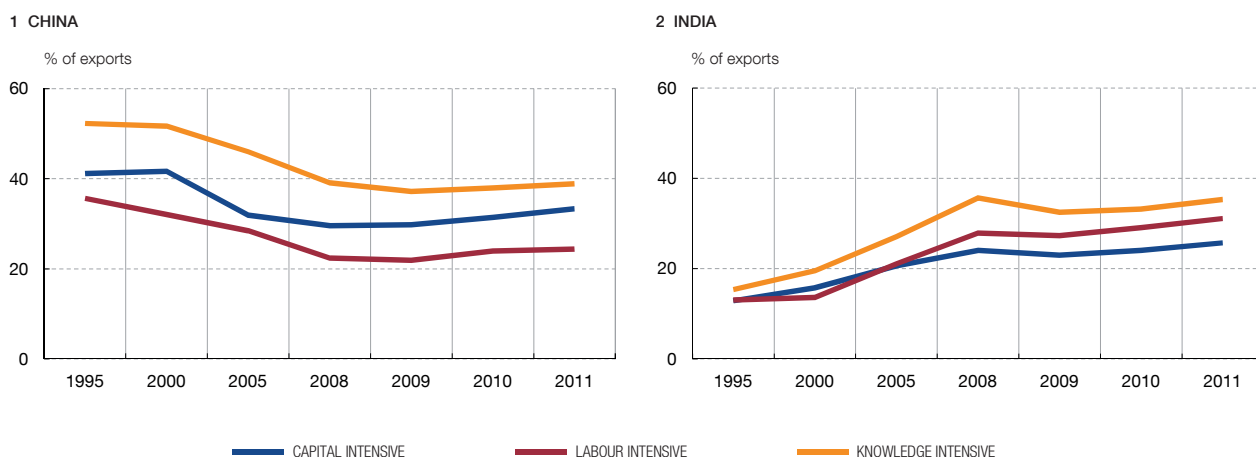
% of imported intermediate goods

CHINA   INDIA

SOURCE: OECD - TiVA (2016).

a See box.
b Estimates for 2012 to 2014.

already been mentioned. In taking on this role, China has developed its processing trade intensively, giving rise to what some authors have termed the "denationalisation of comparative advantage". On this model, a significant part of the value added in the final goods exported by China is of foreign origin. Chart 6 shows the high import content (backward linkages with GVCs) of Chinese exports. By contrast, in India, exports from other countries can be seen to be making a bigger contribution to value added (forward participation). Nevertheless, China has been changing its comparative advantages since its trade liberalisation (in the 1990s) and its integration in the GVCs (in the early 2000s), such that the two economies' patterns of foreign trade can be seen to have grown closer together.

In effect, the forward participation in GVCs has gained weight in China since the 1990s, while India has steadily increased its backward participation. Chart 7.1 shows that since 1995 there has been a clear decline in the percentage of FVA contained in Chinese exports and an increase in the share in India's exports, such that in 2014 29.4% of China's total

1 CHINA

% of exports

2 INDIA

% of exports

▬▬ CAPITAL INTENSIVE   ▬▬ LABOUR INTENSIVE   ▬▬ KNOWLEDGE INTENSIVE

SOURCE: OECD-TIVA (2016).

a Equivalent to import intensity of goods exports.
b See classification of goods in Koshy, Geoff, Gee, Sung, Schmittmann and Yu (2016).

exports were of foreign origin, while 21% of India's were. This convergence is also reflected in the development of the processing trade. According to China's official customs sources, Chinese processing exports declined dramatically, dropping to 7% of total ordinary trade in September 2016, from 25% in 2005, and 38% in 2001. No equivalent data are available for India, but using re-exports of imported intermediate goods as a proxy, for which data are available from OECD-TiVA (see Chart 7.2), this type of export pattern appears to be on the rise: 27% of imported intermediate goods were re-exported in 2011, compared with 21% in 1995.

With the slowdown in the processing trade, the FVA content of China's exports declined, while, given that India's exports are more dependent on imports of intermediate goods, the FVA they contain increased. In short, China is moving up GVCs by producing and exporting its own components and higher DVA final goods. Nevertheless, China's share of total value added is smaller in the case of more sophisticated products (Pula and Santabárbara (2012)). By way of illustration, bearing in mind the classification of the products exported by China as a function of the intensity of their use of factors of production (i.e. whether they are labour-, capital- or knowledge-intensive), Chart 8 shows a drop in the FVA incorporated in goods exports between 1995 and 2011 in the case of the most labour-, capital- and knowledge-intensive goods. However, it can be seen that, despite the downward trend, foreign participation in knowledge-intensive products' total value-added remains high. Exports by labour-intensive sectors incorporate the least FVA. The situation in India is radically different, with a trend towards an increase in the foreign content of exports being apparent. However, foreign participation in total value-added of capital-intensive export goods is low.

Drivers of goods exports

In order to assess the extent to which the two countries' export profiles have influenced the relationship between exports and their driving factors, short- and long-term goods exports[10] demand functions have been estimated for the two Asian economies, using a

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10 Ideally, estimating goods and services export equations would have been of more interest, however, this was not possible due to the lack of data on service export drivers, primarily relative prices of services.

sample of quarterly data from 1994 to 2016.[11] The main drivers of exports envisaged in this exercise, the methodological features and detailed results of which are set out in Box 2, are external demand (proxied by imports from trading partners), price-competitiveness (measured by export prices relative to those of competitors) and imports.

In China's case, the results of the exercise show that external demand is the main driver of its exports over the long run, with an elasticity greater than one. This reflects the increasing share of Chinese exports in global trade and China's orientation towards exporting more sophisticated products. The elasticity with respect to the price-competitiveness indicator is negative, with an absolute value less than that of exports. These elasticities are similar – albeit lower in absolute value – than those obtained by Aziz and Li (2007), and Cerra and Dayal-Gulati (1999). Moreover, imports have a strong positive impact, reflecting the importance of imports destined for re-export, which also reduces the effect of price competitiveness (ECB (2014)).

The results obtained for the short-term dynamics show that changes in external demand have a coincident effect on total exports, with an elasticity of 0.82%. Changes in price-competitiveness have a coincident influence on exports, with a much higher elasticity than over the long run (-1.31%), implying that in the short term exports only compete on price. The lagging change in imports has a positive impact, but the impact is less than over the long run. The tests performed including dummy variables to include the effect of the Asian crisis (1997) and the global financial crisis (2008-2012) did not yield satisfactory results.

India's long-term income elasticity is lower than China's (1.02% compared with 1.25%), this fact being consistent with China's process of trade liberalisation, which began in the 1980s, and its recent change in trade specialisation model towards more sophisticated sectors with higher income elasticities, such as telecommunications and machinery. In the short term, changes in external demand have a coincident effect on India's total imports, with an elasticity of 0.73%. India's long-term price-competitiveness elasticity is much higher than China's, suggesting its products are probably less sophisticated than its neighbour's. Lastly, imports have a similar impact in each case, as in both countries manufacturing industry (and the oil industry in India's case) have a backward linkages in the GVCs, meaning the import content is significant.

Conclusions

The analysis of the trade patterns of China and India presented here confirms that the two countries have very different export profiles. China has undergone a change in trade specialisation since it first embarked on trade liberalisation, moving from a model centring on exports of agricultural produce and low-quality manufactured goods, towards a model centring on the production of machinery and electronics (albeit with limited technological content), and more recently, towards a pattern characterised by exports of goods with higher DVA (it has moved along the value chain). Although its integration at the bottom of the GVCs was a decisive factor in increasing its trade in the early stages of its economic liberalisation, China is now trying to move further up the global production chain. By contrast, India's export profile has changed little over the past few decades. Nevertheless, exports of manufactured goods can be observed to have been gaining share in recent years, as India moves into the terrain that China is seeking to exit. From estimates of goods export demand equations we can conclude that over the long run foreign demand factors have the biggest influence on Chinese and Indian trade flows, although the effect

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11 The estimation covers the period from the first quarter of 1994 to the last quarter of 2016. Real price data for 2010 for China and 2011 for India.

is more powerful in China's case. This could be related to the gradual shift in China's exports towards higher value-added segments. By contrast, price-competitiveness has a bigger influence on India's exports. Imports seem to have a similar influence on both countries' goods exports, due to the two economies having significant backward linkages in GVCs.

The analysis carried out in this study has some implications for possible future scenarios. The recovery in the advanced economies may help sustain the growth of China's exports, as, at around 1.3%, their long-term income elasticity is relatively high. In this connection, the fiscal stimulus introduced in the United States could help boost demand and, consequently, Chinese exports. Nevertheless, a rise in protectionist measures against the influx of "cheap goods" could have a bigger impact on China's exports, as it still concentrates on low quality manufactured goods to some extent. Meanwhile, although the long-term export-import elasticity –which is close to one in both cases– implies a significant degree of integration in the GVCs, the threat of protectionism could disrupt global production chains and, ultimately, lead to a reduction in the import content of exports.

29.6.2018.

REFERENCES

ANAND, R., K. KOCH HAR and S. MISHRA (2015). Make in India: Which Exports can drive the Next Wave of Growth? IMF Working Paper No. 15/119.

AZIZ, J., and X. LI (2007). China's changing trade elasticities, IMF Working Paper 07/266.

BALASSA, B. (1965). Trade Liberalisation and Revealed Comparative Advantage, The Manchester School of Economic and Social Studies, 33(2), pp. 99-123.

ECB (2014). Understanding global trade elasticities: what has changed? ECB Monthly Bulletin, July.

CERRA, V., and A. DAYAL-GULATI (1999). China's trade flows: changing price sensitivities and the reform process, IMF Working Paper No. 99/1.

DORRUCCI, E., G. PULA and D. SANTABÁRBARA (2013). China's economic growth and rebalancing, Occasional Papers Series, No. 142. European Central Bank.

GARCÍA, C., and E. GORDO (1998). *Funciones trimestrales de exportación e importación para la economía española,* Documentos de Trabajo, No. 9822, Banco de España.

GARCÍA, C., E. GORDO, J. MARTÍNEZ-MARTÍN and P. TELLO (2009). *Una actualización de las funciones de exportación e importación de la economía española,* Documentos Ocasionales, No. 0905, Banco de España.

HUANG, Y. (2017). Cracking the China Conundrum, Ed. Oxford University Press.

KOOPMAN, R., Z. WANG and S.-J. WEI (2014). Tracing value-added and double counting in gross exports, The American Economic Review, 104(2), pp. 459-494.

KOSHY, M., G. GEOFF, H. H. GEE, E. J. SUNG, J. SCHMITTMANN and J. YU (2016). China's changing trade and the implications for the CLMV economies, IMF, Asia and Pacific Department.

MAULEEN, I., and L. SASTRE (1994). *El saldo comercial en 1993: un análisis econométrico,* Información Comercial Española, 735, pp. 167-172.

MEHDI, R., and T. VOLODYMYR (2015). Price and Income Elasticity of Indian Exports. The Role of Supply Side Bottlenecks, IMF Working Paper No. 15/161.

PRADES, E., and C. GARCÍA (2015). *Actualización de la función de las exportaciones españolas de bienes,* Boletín Económico, April, Banco de España.

PRADES, E., and P. VILLANUEVA (2017). Spain in the global value chains, Economic Bulletin, 3/2017, Banco de España.

PULA, G., and D. SANTABÁRBARA (2012). Is China climbing up the quality ladder? Working Papers, No. 1209, Banco de España.

SAIKKONEN, P. (1991). Asymptotically Efficient Estimation of Cointegrating Regressions, Econometric Theory, 7, pp. 1-21.

SATEN, K. (2011). Estimating export demand equations in selected Asian countries, Journal of Chinese Economic and Foreign Trade Studies, vol. 4, No. 1, pp. 5-16.

STOCK, J. H., and M. W. WATSON (1993). Simple Estimator of Cointegrating Vectors in Higher Order Integrated Systems, Econometrica, vol. 61, No. 4, pp. 783-820.

Production, trade and international investment are increasingly organised in what are termed "global value chains" (GVCs), where the set of activities or production stages required for the production and sale of final goods and services, right from the initial production phases of basic components through to the delivery of after-sales service, is spread across different countries. Against the background of growing globalisation, companies have incentives to restructure their operations internationally by outsourcing and offshoring their activities. In this way, companies are seeking to optimise their processes by locating the various stages, from product design through to manufacturing of parts, assembly, and marketing, in different countries.

Consequently, exported goods and services incorporate ever more intermediate consumption from the rest of the world. However, flows of goods and services within these global production chains are not always reflected in conventional measures of international trade. The joint OECD – WTO Trade in Value-Added (TiVA) initiative addresses this issue by considering the value added by each country in the production of goods and services that are consumed worldwide. This database (TiVA)[1] can be used to calculate indicators of each country's participation and position in GVCs. In it, the volume of gross exports is broken down into the contribution of domestic value-added (DVA) and the contribution of foreign value-added (FVA). DVA represents the

contribution of domestic production factors to exports, whereas FVA refers to the contribution of foreign production factors. Drawing on the methodology proposed by Koopman, Wang and Wei (2014), the OECD calculates two indicators to measure each country's participation in GVCs (see Figure 1). First, the "backward linkages" indicator measures the import content embedded in a country's exports and is proxied by the ratio of FVA to the gross value of those exports. Second, the "forward linkages" indicator, measures the DVA of goods and services that, after being exported, are subsequently re-exported to a third country. The ratio of the sum of the backward and forward linkages to total gross exports is a proxy for the economy's overall participation in GVCs (see Chart 1).[2]

In China's case it is also possible to measure the strength of its backward linkages from its customs records on the "processing trade". This refers to the business activity of importing some or all of the raw materials and ancillary materials, parts, components, accessories and packaging materials for product assembly in China. After processing or assembly the finished goods are then re-exported to third parties. Therefore, the importance of the processing trade in China highlights the high level of import content in its exports, or in other words, its strong backward linkages in GVCs.

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1 Constructed using global input-output tables.

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2 See E. Prades and P. Villanueva, "Spain in the global value chains", Economic Bulletin, 3/2017, Banco de España.
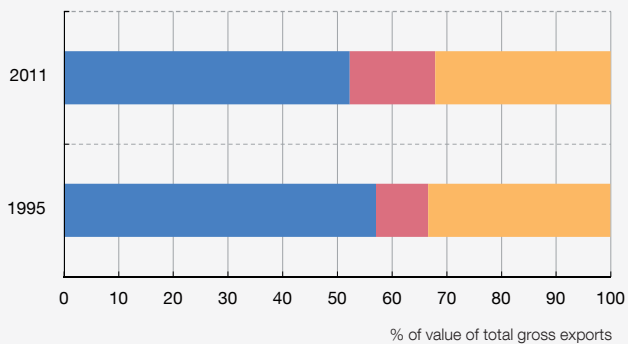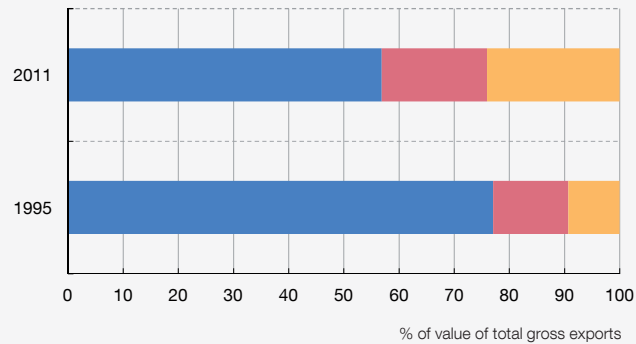

Figure 1
BREAKDOWN OF EXPORTS IN TERMS OF VALUE-ADDED
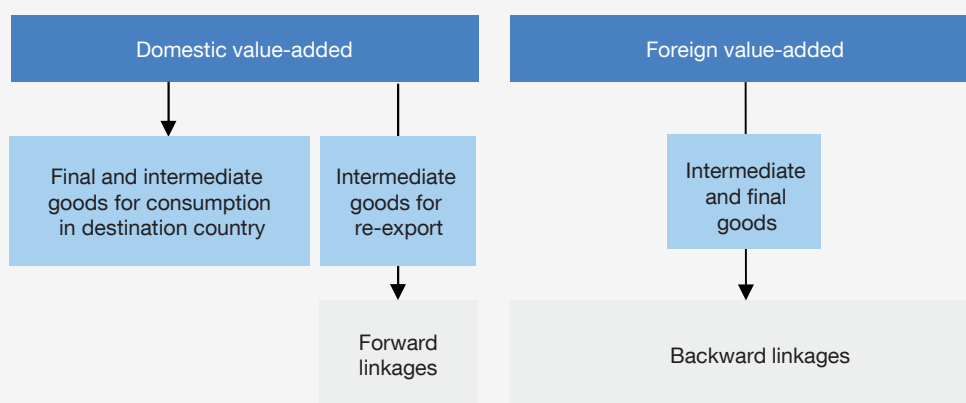
SOURCE: Banco de España.

Chart 1
BREAKDOWN OF GROSS EXPORTS IN VALUE ADDED TERMS, 1995 AND 2011

1 CHINA

2 INDIA

% of value of total gross exports

% of value of total gross exports

■ DVA DESTINED FOR FINAL CONSUMPTION   ■ DVA EXPORTED TO THIRD PARTIES   ■ FVA EMBEDDED IN EXPORTS

SOURCE: OECD - TiVA (2016).

In order to specify the export demand equations, the export demand functions of the Banco de España's quarterly model have been used as a reference (García and Gordo (1998), García et al. (2009) and Prades and García (2015)). In this model, based on demand theory, the traditional drivers of goods exports are foreign demand and price-competitiveness. Additionally, following Mauleón and Sastre (1994), imports are included as an explanatory variable in both the short and long-term[1] with a certain time lag to take the production process into account. The results of the goods estimate equations discussed in the main text[2] for China and India are presented below.

China's goods exports

The long term drivers considered in the export equation are: growth in the volume of imports of goods among the main recipients of Chinese exports (United States, Japan and Hong Kong), weighted with each destination country's share of total Chinese exports (EXT), and the ratio of the export prices of Chinese goods and global competitors' prices, adjusted by the exchange rate (P) to Chinese imports lagged by one year (M).

Estimation of long-term goods exports.

$$X = 0.68^{***} M + 1.25^{***} EXT - 0.33^{***} P$$

Estimation of short-term exports (D refers to the differences operator and MCE the error correction mechanism).

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1 Although ideally imports of intermediate goods should be included in the specification of the export function, the lack of data made it necessary to use total imports. This is not expected to distort the results obtained, as, in both countries, approximately 70% of imported goods are intermediate goods.

2 The level variables have been converted to logarithms for two reasons: to reduce the variability of the series and to interpret the coefficients as elasticities. Moreover, the non-stationarity of the annual series in logarithms has made it necessary to frame the equation in the context of the cointegration analysis. It has been confirmed, using the ADF and Engel-Granger test, that the variables have integration of order one and are cointegrated. This estimation is used by the dynamic MCO method proposed by Saikkonen (1991) and Stock and Watson (1993) with an advance and a lag.

$$DX = 0.03^{***} + 0.19^{***} DM + 0.82^{`**} DEXT - 1.31^{***} DP - 0.11^{**} MCE_{t-1}$$

$$-0.20^{***} S1 + 0.09^{***} S2 + 0.06^{***} S3$$

$$R^2 = 0.95; \text{ Durbin Watson: } 1.91$$

* Significant to 90%, **significant to 95 %, and ***significant to 99 %

The residuals of the long-term relationship have a highly significant coefficient, which confirms the cointegration of these variables.

India's goods exports

The long term drivers considered in India's export equation are: growth in the United States' volume of goods imports, the US being the country to which India exports most; the ratio of Indian products' export prices and the prices of global competitors, adjusted by the exchange rate (P); and Indian imports lagged by one year (M).

Estimation of long-term goods exports.

$$X = 0.75^{***} M + 1.02^{**} EXT - 0.52^{***} P$$

Estimation of short-term goods exports.

$$DX = -0.04^{***} + 0.19^{***} DM + 0.73^{***} DEXT - 0.95^{***} DP - 0.13^{***} MCE_{t-1}$$

$$+ 0.13^{***} S1 + 0.07^{***} S3$$

$$R^2 = 0.86; \text{ Durbin Watson} = 2.25$$

* Significant to 90 %, **significant to 95 % and ***significant to 99%

As in the case of China, the residuals of the long-term relationship are highly significant in the short term relationship, confirming that these variables are cointegrated.