



CHINA'S CHANGING TRADE STRUCTURE AND ITS IMPLICATIONS

Key points:

- *Tepid growth in advanced economies has weighed on global trade flows following the global financial crisis. To shore up export earnings, Chinese manufacturers have diversified export markets away from developed to emerging market economies. At the same time, they have moved up the value chain by fabricating high-end products, using more domestic supplies instead of importing parts and components from abroad. Reflecting this, China's trade structure has shifted from processing to ordinary trade, which now accounts for more than half the country's total trade.*
- *The growing importance of China's ordinary trade has significant implications for its trading partners in Asia. Unlike processing trade where the final consumers are mostly from advanced economies, almost half the ordinary exports from China are shipped to emerging markets. These emerging Asian countries, which are purchasing more capital goods from China but exporting less intermediate goods to the Chinese market, have seen their trade deficits with China growing over the years. Some regional countries also engaged in capital goods exports may face more competition from China's growing ordinary exports trade.*
- *As China upgrades its value chain and substitutes imports with domestic supplies, the country is likely to export more capital goods to regional economies, but import less intermediate goods than before, thus driving up the trade deficit of emerging Asian economies. Nevertheless, the effect of these structural changes in China on regional economies will depend not only on their existing trade structure but also their flexibility to adapt to the changes.*

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The views and analysis expressed in this paper are those of the authors, and do not necessarily represent the views of the Hong Kong Monetary Authority.

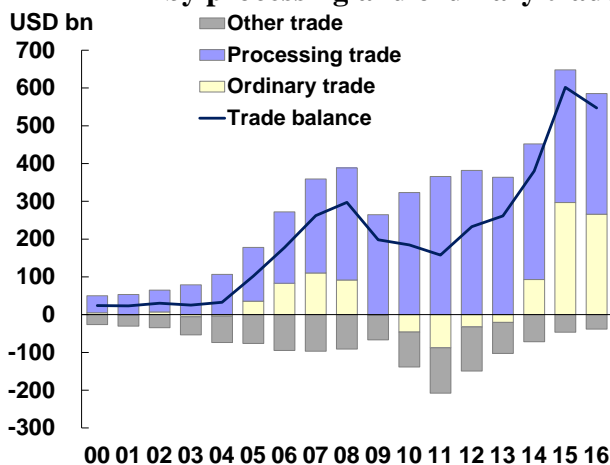
* The authors would like to thank Lillian Cheung and Frank Leung for their useful comments.

I. CHINA'S TRADE STRUCTURE SHIFTS FROM PROCESSING TO ORDINARY TRADE

Following the trade slowdown in 2015 and 2016, China's trade flows saw solid recovery entering 2017, with the value of exports and imports growing by 5% and 18% respectively in the first half of 2017 compared with the same period last year. Despite the volatile trade environment globally, China's trade surplus has continued to experience significant growth in recent years, reaching US\$510 billion in 2016 (4.4% of GDP) after hitting a record high of US\$590 billion in 2015.

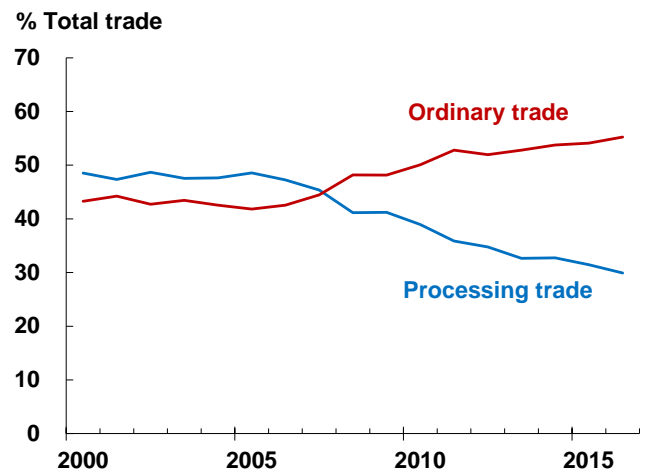
A breakdown by type of trade shows that most of the increase in the trade surplus has been driven by ordinary trade, while the surplus from processing trade has been narrowing (Chart 1). In basic terms, the processing trade in China is defined as the importation of parts and components (P&Cs) for assembly where the finished goods are shipped to overseas markets. The raw materials imported for this purpose are exempt from import duty to attract foreign firms to outsource their production in China. Ordinary trade encompasses imports for domestic use, either for final consumption or for use in production, where the imported raw materials or goods are subject to customs duty.

Chart 1. Breakdown of China's trade surplus by processing and ordinary trade



Sources: CEIC and staff estimates.

Chart 2. Ordinary versus processing trade



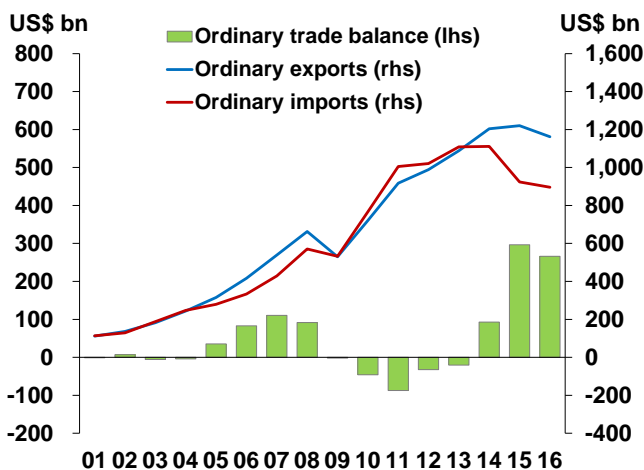
Sources: CEIC and staff estimates.

In the past, processing trade accounted for about half of China's total trade, concentrating mainly on labour intensive industries such as textiles, apparel and electronics because of low labour costs and the price of land on the Mainland. Following the global financial crisis, subdued demand in advanced

economies has weighed on global trade, particularly for outsourcing purposes. This can be seen from the moderation in the share of processing trade conducted in China to less than 30% of the country’s total trade (Chart 2). Meanwhile, the resilient performance of ordinary trade has seen its share propelled to more than half of total trade, marking a profound change in China’s trade structure.¹

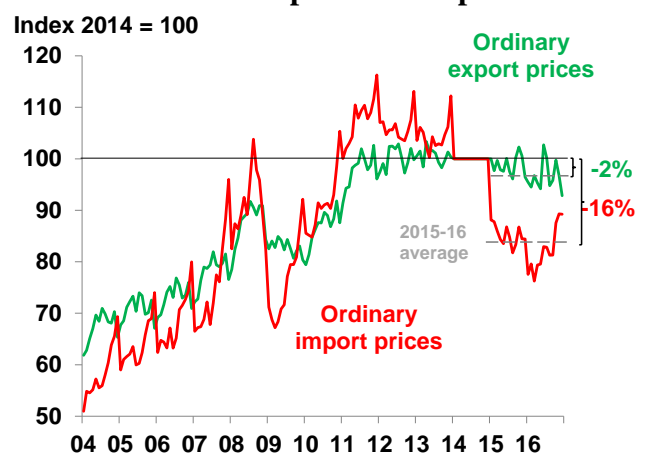
Despite the slowdown in global trade activities, China’s ordinary exports have managed to hold up well compared with ordinary imports, contributing to the turnaround in the ordinary trade balance from deficit to surplus (Chart 3). The divergent trend between ordinary exports and imports could be driven by both cyclical and structural factors. One key cyclical factor was the favourable terms-of-trade shock driven by the fall in global commodity prices in 2014 and 2015. For example, the IMF commodity price index covering items such as fuel, raw materials and food shrank by almost half, from 185 in June 2014 to 97 in December 2015, before stabilising in 2016. The lower commodity prices have dragged down import prices and benefited the trade surplus of commodity importing countries such as China. While the effects of these price factors can differ across countries, we estimated that China’s ordinary import prices, on average, fell by 16% in 2015-16 relative to 2014. This was much larger than the 2% decline in ordinary export prices, as more than 40% of ordinary imports to China are primary goods, such as fuels and basic materials (Chart 4). The detailed method of our estimation is discussed in the Annex.

Chart 3. Ordinary exports versus imports, and the trade balance



Sources: CEIC and staff estimates.

Chart 4. Estimated price index for ordinary imports and exports

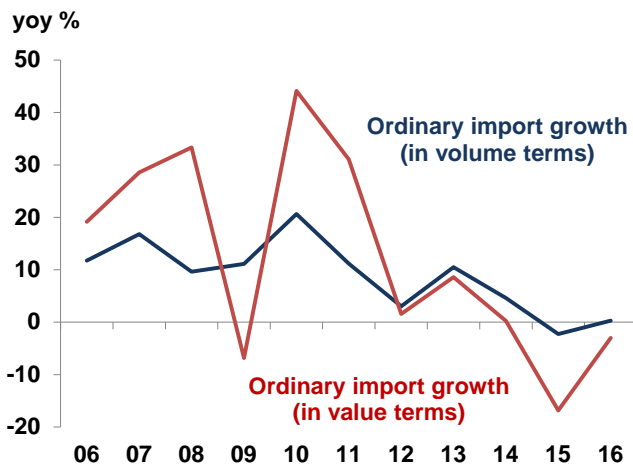


Sources: CEIC, China Customs and staff estimates.

¹ The remaining part mainly consists of customs warehousing trade, logistic goods by customs special control area, border trade, and trade related to contractual projects, with a combined share of about 15% in total trade.

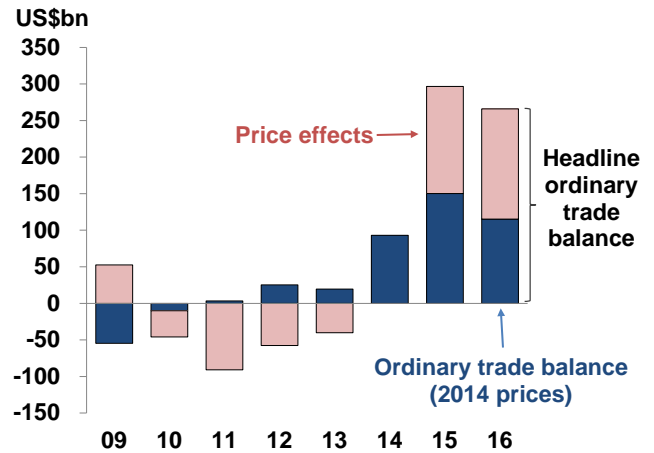
The construction of ordinary trade prices for China allows us disentangle the price effects on ordinary trade balance. Indeed, the decline in ordinary imports in volume terms is much less than that in value terms, implying a smaller trade surplus in volume terms than in value terms (Chart 5). Nevertheless, after controlling for price effects, the trade surplus in volume terms still experienced a gradual rise in the aftermath of the global financial crisis. This indicates that other non-price factors could have also contributed to boosting the ordinary trade surplus (Chart 6).

Chart 5. Ordinary imports in value and volume terms



Sources: CEIC, China Customs and staff estimates.

Chart 6. Price effects in ordinary trade balance

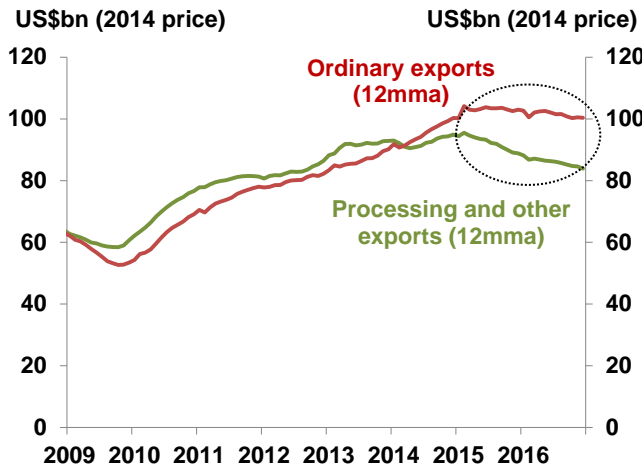


Sources: CEIC, China Customs and staff estimates.

II. REASONS BEHIND THE RESILIENT PERFORMANCE OF ORDINARY EXPORTS

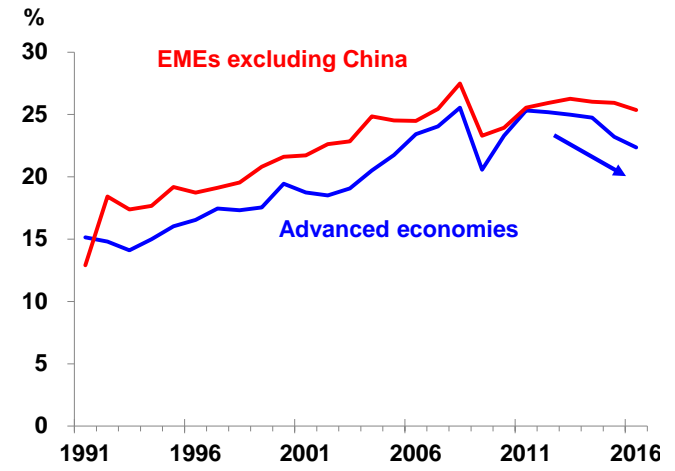
The resilient performance of ordinary exports has been another important factor contributing to the growing surplus in ordinary trade. In terms of volume, ordinary exports have been outperforming processing exports with the former holding up, while the latter trending down (Chart 7). The divergent movement can be explained by changes in the import propensity between advanced and emerging market economies (EMEs). Following the global financial crisis, subdued income growth in advanced economies has resulted in declining import intensity, while in EMEs the demand for imports is still holding up thanks to their relatively decent economic growth (Chart 8). Given that about half of China's processing exports were being shipped to advanced economies, their subdued demand has weighed on processing trade conducted in China.

Chart 7. Ordinary exports outperform processing exports in volume terms



Sources: CEIC, China Customs and staff estimates.

Chart 8. Imports-to-GDP: advanced economies and EMEs



Sources: Bloomberg and staff estimates.

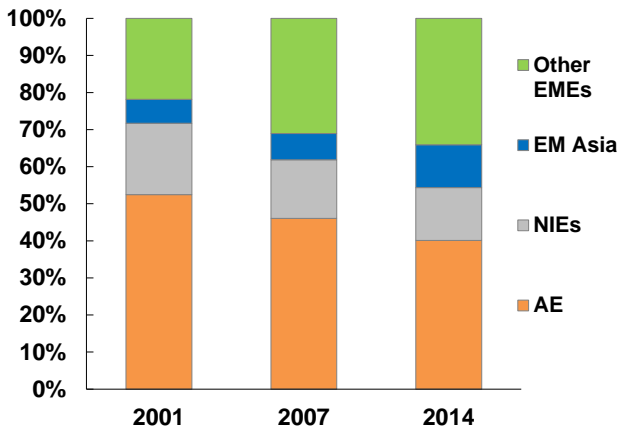
Facing the new global trade landscape, two structural factors help to explain the relatively resilient performance of China’s ordinary exports. They are (i) the diversification strategy of exports to emerging markets by Mainland manufacturers, and (ii) upgrading their products along the production chain.

(i) Market diversification

Indeed, the destinations of China’s ordinary exports are more diversified in comparison with processing exports whose final consumers mainly come from advanced economies. This can be seen from the combined share of emerging markets (EM) Asia and other EMEs that picked up 46% of China’s ordinary exports in 2014, up from 28% in 2001 (Chart 9).² In contrast, the combined share of advanced economies (AEs) and the newly industrialised economies (NIEs) shrank to 54% from 72%.³ The diversification of export markets away from AEs to EMEs has helped shore up China’s ordinary exports as lacklustre income growth in the AEs has weighed on their demand for Chinese products. In terms of geographical regions, ordinary exports from China experienced their fastest growth with regional trading partners in Southeast Asia after the global financial crisis. This notably outpaced its ordinary exports to AEs (Chart 10).

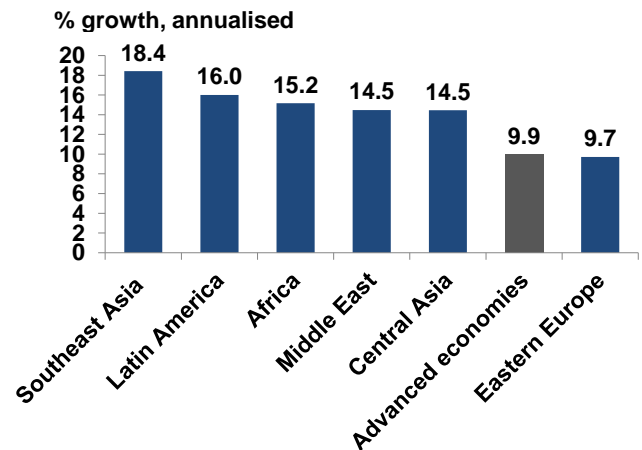
² EM Asia included Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Thailand and Vietnam.
³ NIEs included Hong Kong, South Korea, Singapore and Taiwan.

Chart 9. Ordinary exports by destination



Sources: China Customs and staff estimates.

Chart 10. China's ordinary export growth by geographical region in 2008 - 2014

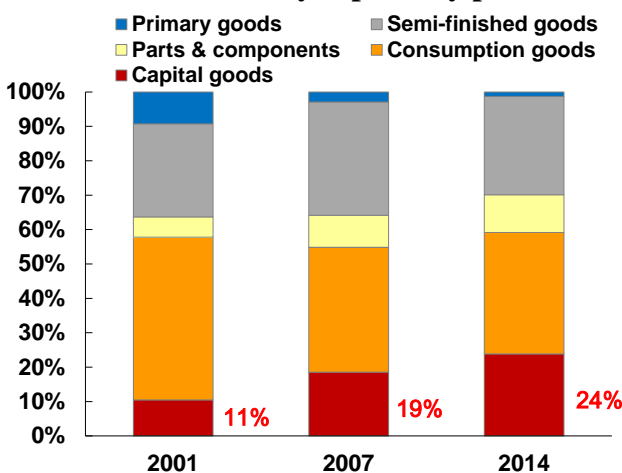


Sources: China Customs and staff estimates.

(ii) Product upgrade

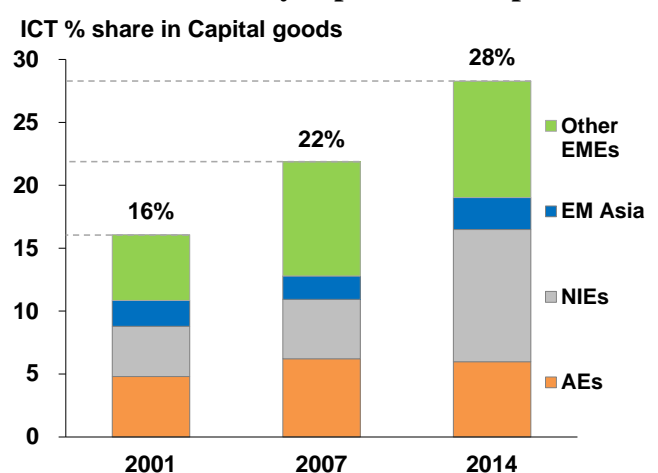
Another structural factor supporting the resilient performance of China's ordinary trade is the ability of Mainland manufacturers to fabricate more high-end products. A breakdown of China's ordinary exports by product suggests the robust performance of ordinary exports has been largely driven by capital goods, with its share in ordinary exports rising rapidly from 11% in 2001 to 24% in 2014 (Chart 11). Within the capital goods category, ICT products were found to be the key driver of growth.⁴ The share of ICT products in capital goods surged significantly from 16% in 2001 to 28% in 2014, with most of the increment being shipped outside the advanced economies (Chart 12).

Chart 11. Ordinary exports by product



Sources: China Customs and staff estimates.

Chart 12. Ordinary exports of ICT products



Sources: China Customs and staff estimates.

⁴ ICT products refer to items related to information, communications and technology.

Table 1 provides a more detailed insight into the top 10 ordinary exports of capital goods by China. This is noteworthy because it highlights the fact that items with a higher technological content, such as smart phones, personal computers and electrical transformers, are beginning to dominate the export table. This reflects how Mainland manufacturers are upgrading themselves and are capable of fabricating higher-end capital goods, with the support of improved domestic production technology.

Table 1. Top 10 items in China's ordinary exports of capital goods

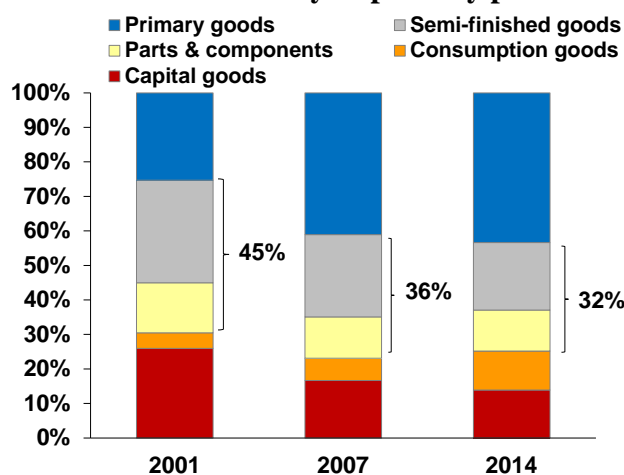
2001		2007		2014	
Product	Share (%)	Product	Share (%)	Product	Share (%)
Furniture	8.6	Smart mobile phone and telecom devices	15.7	Smart mobile phone and telecom devices	18.7
Portable electric tools	5.7	Furniture	8.1	Furniture	8.8
Seats	4.6	Seats	6.0	Seats	6.3
Microphones	4.2	Air conditioners	3.4	Electrical transformers	3.6
Heaters	4.1	Heaters	2.8	Heaters	3.3
Air or vacuum pumps	3.4	Air or vacuum pumps	2.8	Computers	2.8
Air conditioners	3.2	Electrical transformers	2.5	Air or vacuum pumps	2.7
Smart mobile phone and telecom devices	3.1	Motor vehicles for the transport of goods	2.4	Air conditioners	2.6
Hand tools	2.9	Tools for working in the hand	2.2	Microphones	2.6
Pumps for liquids	2.5	Microphones	2.2	Electric motors	2.0
Top 10 total	42.1	Top 10 total	48.1	Top 10 total	53.4

Sources: China Customs and staff estimates.

III. ENCOMPASSING A LARGER PORTION OF THE VALUE CHAIN

Advances in production technology enable Mainland manufacturers to produce more sophisticated goods and reduce their reliance on importing intermediate goods from abroad during the production process. An analysis of ordinary imports suggests that China has been importing less P&Cs and semi-finished goods over the past decade, with their combined share in ordinary imports shrinking from 45% in 2001 to 32% in 2014. Meanwhile, more primary goods are imported as the inputs for domestic production (Chart 13).

Chart 13. Ordinary imports by product



Sources: China Customs and staff estimates.

The reduced reliance on imports of intermediate goods suggests that Mainland manufacturers can capture a larger share of the value chain throughout the production process. This can be seen from the declining import intensity in ordinary trade. Table 2 selects three major types of capital goods in ordinary exports, namely machinery, electrical machinery and ICT products with their corresponding imports of P&Cs. During the period from 2001-2014, the increase in the export value of these capital goods was much faster than the import value of their corresponding P&Cs. As a result, the import intensity of these capital goods, which is the ratio of imported P&Cs to their corresponding exports of finished goods, has declined by varying degrees in recent years. The method of mapping imported P&Cs is explained in the Annex.

Table 2. Ordinary exports of capital goods and corresponding imports of P&Cs

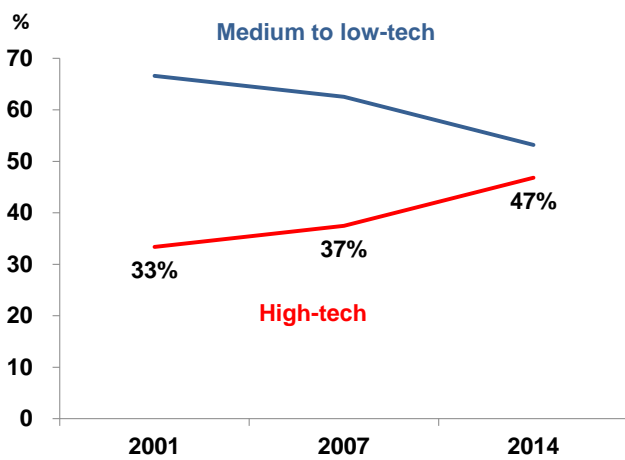
(US\$ bn)	Imports of P&Cs			Exports of final products			Import intensity: Imported P&Cs / Exported final goods (1) / (2)		
	(1)			(2)					
	2001	2007	2014	2001	2007	2014	2001	2007	2014
Machinery	1.8	9.0	17.1	5.1	38.2	98.3	0.37	0.24	0.17
Electrical machinery	2.0	6.6	12.7	2.3	13.3	38.9	0.87	0.50	0.33
ICT & electronics	8.4	20.0	60.5	1.9	21.7	81.0	4.50	0.92	0.75
Of which:									
Computer, tablet and notebook¹	1.4	1.5	3.0	0.1	1.1	8.1	18.10	1.42	0.36
Television and LCD monitors²	2.1	1.2	1.6	0.3	0.7	3.3	7.87	1.67	0.51

1. Estimates using imports of P&Cs of machines with headings 8469 to 8472 (HS code 8473) to exports of automatic data processing machines (HS code 8471).
2. Estimates using imports of P&Cs of apparatus with headings 8525 to 8528 (HS code 8529) and thermionic, cold cathode or photocathode valves and tubes (HS code 8540) to exports of television, monitors and projectors (HS code 8528).

Sources: China Customs and staff estimates.

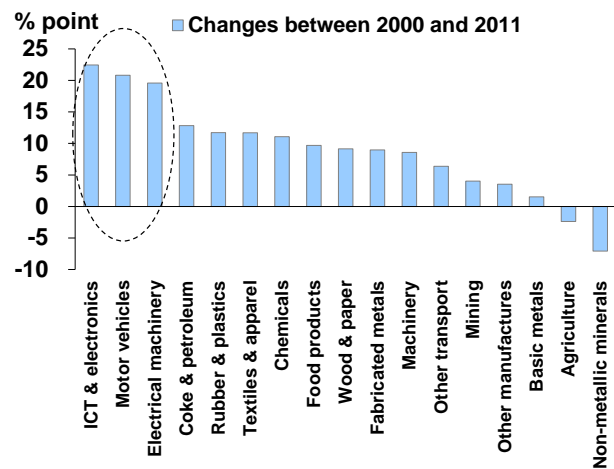
Even if P&Cs have to be imported in the production process, they are more likely to be high-tech components. In fact, the share of medium to low-tech content parts and components has declined notably since 2001, while high-tech P&Cs such as CPUs (central processing units) and integrated circuits are growing in proportion (Chart 14).⁵ A further statistical breakdown of ordinary imports of P&Cs by item also confirms such a change in composition. For example, the share of electronic integrated circuits and micro-assemblies increased from one-quarter in 2001 to more than one-third in 2014 (Table 3). In contrast, the proportion of parts and accessories used in calculating and office machines with lower technological content dropped from 8.8% to 2.4% over the same period. With more and more P&Cs being produced and supplied domestically, there has been a marked increase in the contribution from the domestic value-added to the export value of capital goods, such as ICT and electronics, motor vehicles and electrical machinery over the past decade (Chart 15).

Chart 14. Ordinary imports of P&Cs by technological content



Sources: China Customs and staff estimates.

Chart 15. Changes in contribution from domestic value-added to export sectors



Sources: OECD and staff estimates.

⁵ The technological content is defined using the product approach classification of high-tech products by the EU. More details can be found in Annex 5 of “Eurostat indicators on High-tech industry and Knowledge – intensive services” on the Eurostat website.

Table 3. Top 10 items of China's ordinary imports of P&Cs

2001		2007		2014	
Product	Share (%)	Product	Share (%)	Product	Share (%)
Electronic integrated circuits and micro-assemblies	24.9 →	Electronic integrated circuits and micro-assemblies	26.7 →	Electronic integrated circuits and micro-assemblies	36.2
Parts and accessories of motor vehicles	14.6	Parts and accessories of motor vehicles	19.2	Parts and accessories of motor vehicles	20.3
Parts and accessories of calculating machines and office machines	8.8	Taps, cocks and valves	5.2	Semiconductor devices	6.0
Parts and accessories of radio-broadcasting, television, radar, monitor, etc.	8.4	Semiconductor devices	4.7	Taps, cocks and valves	4.8
Thermionic, cold cathode or photocathode valves and tubes	4.1	Transmission shafts and crank	4.0	Transmission shafts and cranks	3.3
Parts and accessories of aircraft	3.6	Numerical control apparatus	3.7	Numerical control apparatus	2.8
Numerical control apparatus	3.6	Parts and accessories of internal combustion piston engines	3.3	Parts and accessories of internal combustion piston engines	2.6
Parts and accessories of internal combustion piston engines	3.2	Parts and accessories of calculating machines and office machines	3.0 →	Parts and accessories of calculating machines and office machines	2.4
Parts of lifting, handling and loading machines, etc.	3.1	Parts and accessories of agricultural machines	2.8	Ball or roller bearings	1.7
Semiconductor devices	2.9	Parts of lifting, handling and loading machines, etc.	2.8	Parts and accessories of agricultural machines	1.6
Top 10 total	77.3	Top 10 total	75.3	Top 10 total	81.8

Sources: China Customs and staff estimates.

IV. IMPLICATIONS OF THE SHIFT IN CHINA'S TRADE STRUCTURE

(i) *The Implications for Mainland China*

The growing importance of ordinary trade has significant implications for China. First, given the moderation in processing trade, the resilient performance in ordinary exports helps offset part of the impact of subdued demand in advanced economies on China's overall export performance. Secondly, unlike processing exports, the contribution from domestic value-added to ordinary exports is generally larger than processing exports given that a large part of the fabrication process is done using domestic supplies, rather than importing parts and components from abroad.⁶ With a greater contribution from domestic value-added, the shift from processing trade to ordinary trade helps underpin China's export earnings.

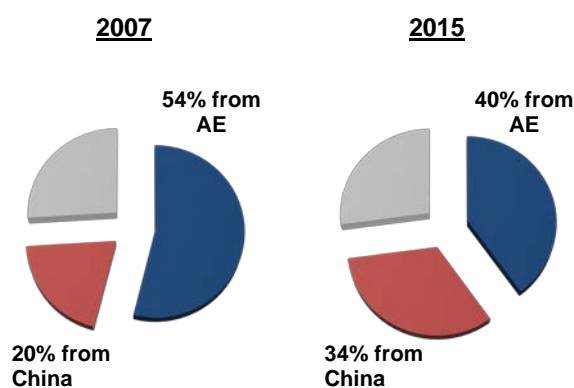
⁶ Manova and Yu (2016); based on matched customs and balance sheet data, found that spanning more production stages via ordinary trade increases the value-added and profitability of exporters.

Looking ahead, the increase in imports in value terms along with a rebound in global commodity prices could reduce the favourable terms of trade effects and suppress the robust trade surplus of China over the near term. That said, the structural shift in China’s trade structure should be able to help support its trade balance in the longer term when Chinese manufacturers continue to move up the value chain and diversify their export markets.

(ii) Implications for regional trading partners

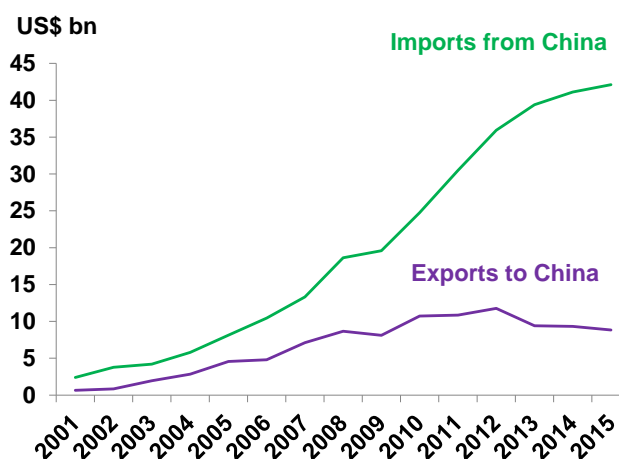
Unlike processing trade, whose final consumers are mostly from advanced economies, almost half the ordinary exports from China are shipped to emerging markets. Chinese products, which are often more competitive in pricing compared with products from AE counterparts, have gained an increasing market share in these emerging markets. For example, China’s share of the imports of capital goods in Asia’s emerging markets has gradually climbed from 20% in 2007 to 34% in 2015, while the share of imports from developed economies, such as Japan and the EU, has declined (Chart 16).⁷

Chart 16. EM Asia’s imports of capital goods from China



Sources: UN Comtrade and staff estimates.

Chart 17. EM Asia’s capital goods trade with China

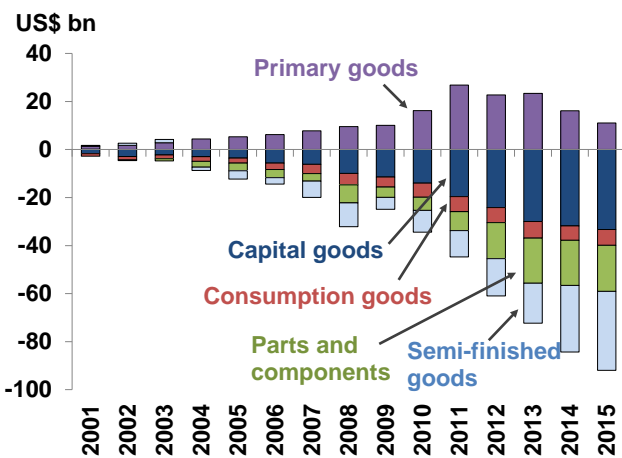


Sources: UN Comtrade and staff estimates.

⁷ Developed countries are defined according to IMF advanced economies definition excluding trading hubs.

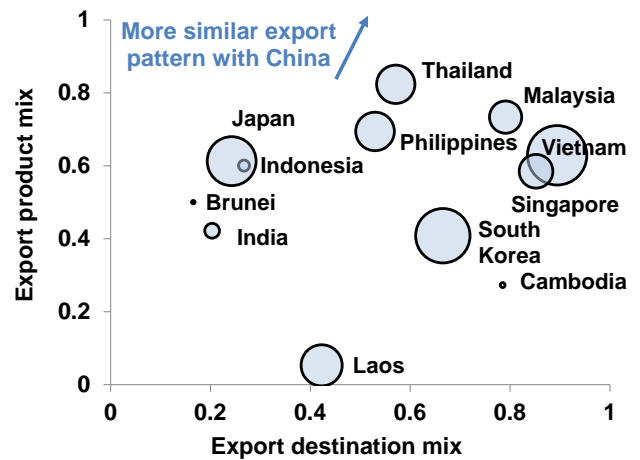
With emerging Asian countries purchasing more capital goods from China, their trade deficits with the Mainland have widened since the turn of the century. In particular, imports of Chinese capital goods have surged notably from US\$2.4 billion in 2001 to US\$42 billion in 2015, while exports of capital goods to China expanded at a much slower pace from US\$0.7 billion to US\$8.8 billion (Chart 17). As a result, the trade deficit in capital goods has become the main deficit source for EM Asia-China trade, accounting for more than 40% of the total deficit in 2015 (Chart 18).

Chart 18. EM Asia’s trade balance with China by type of goods



Sources: UN Comtrade and staff estimates.

Chart 19. Correlation of capital goods export destination and product type with China (2015)



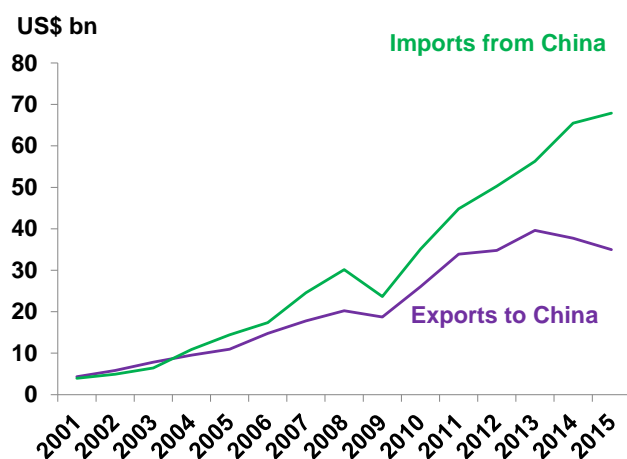
Sources: UN Comtrade and staff estimates.

Note: The size of bubbles indicates share of capital goods in a country’s total exports

In addition, China’s growing ordinary exports of capital goods could mean more intense competition for some regional countries, which also engage in this export trade. Trading partners, who are competing with China in the same markets or with the same product type, are likely to be affected more than other trade partners. To identify the potential impact on individual countries, Chart 19 attempts to compare the similarity of China’s current trade structure in capital goods with its regional partners. To do this, we paired up China with its regional trading partners, one by one, and calculated the correlation between their export destination mix in the horizontal axis and their export product mix in the vertical axis. The value closer to one indicates that the country is more likely to compete with Chinese manufacturers in the same export market, and hence could be competing more directly with these manufacturers. For example, Thailand, Malaysia and Vietnam are among those countries in the region crossing over most with China’s export market, while capital goods also represent a significant share in their total exports.

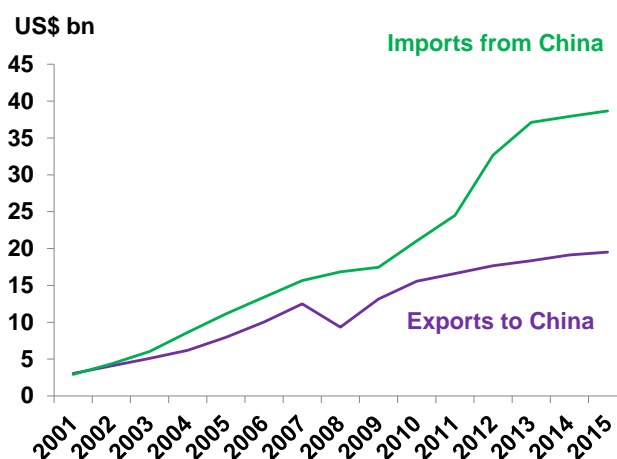
Apart from capital goods, Asia’s emerging markets’ trade balance with China regarding P&Cs and semi-finished goods has also deteriorated significantly in recent years. As China moves towards ordinary trade and substitutes imported inputs with domestic production, it is likely to demand less intermediate goods from its trading partners. Reflecting this, exports of P&Cs from EM Asia to China have been growing more slowly compared with imports, while exports of semi-finished goods have actually registered a notable decline since 2013 (Chart 20 & 21). On the other hand, the contribution of consumption goods to EM Asia’s trade deficit with China has been relatively stable. While EM Asia has been importing more consumption goods (mainly apparel and clothing accessories) from China in the past decade, this has been matched by faster consumption goods exports to China, largely underpinned by the transition of China towards a consumption-driven economy.

Chart 20. EM Asia’s semi-finished goods trade with China



Sources: UN Comtrade and staff estimates.

Chart 21. EM Asia’s P&Cs trade with China



Sources: UN Comtrade and staff estimates.

V. CONCLUDING REMARKS

China’s changing trade structure from processing to ordinary trade reflects advances in production technology by Mainland manufacturers, and the need to diversify export markets in the face of subdued demand in advanced economies after the global financial crisis. The growing importance of ordinary trade also means a greater contribution from domestic value-added to China’s export sector. Improved earnings will encourage manufacturers to invest in new technology, which creates positive externalities in the industrial sector. Therefore, the shift in China’s trade structure will have a profound impact on manufacturing industry.

Given that China is the largest trading nation in the world, the shift in the trade structure will have significant implications for its trading partners in Asia. EMEs, particularly in emerging Asia, which are importing more capital goods from China, have seen their trade deficits with China widening over the years. To some regional countries which also engage in capital goods exports, the growing ordinary exports of capital goods from China could also spell more intense competition for their exports. At the same time, the reduced reliance on external supplies by China has dealt a severe blow to the exports of intermediate goods in the region, which is another important factor contributing to the widening of EM Asia's trade deficit with China.

Going forward, as China upgrades its value chain and substitutes imported inputs with domestic supplies, it is likely to export more capital goods to regional economies, but import less intermediate goods than in the past. This will drive up the trade deficit of regional economies. However, the transition of the Chinese economy from investment-led to consumption-driven growth is likely to boost China's import demand for consumption goods in the region. As a result, the effect of these structural changes in China on regional economies will likely depend not only on their existing trade structure, but also their flexibility to adapt to these changes.

I. EXPLANATORY NOTE ON ESTIMATING PRICE EFFECTS ON ORDINARY TRADE

The growing contribution of ordinary trade to China's overall trade surplus is partly due to a favourable terms-of-trade shock, as the decline in import prices is more severe than export prices. To strip out the price effect on the surplus from ordinary trade, it is useful to estimate the ordinary trade balance in volume terms. To do this, we estimate the price index for ordinary imports and exports respectively as such data are not available from China Customs.

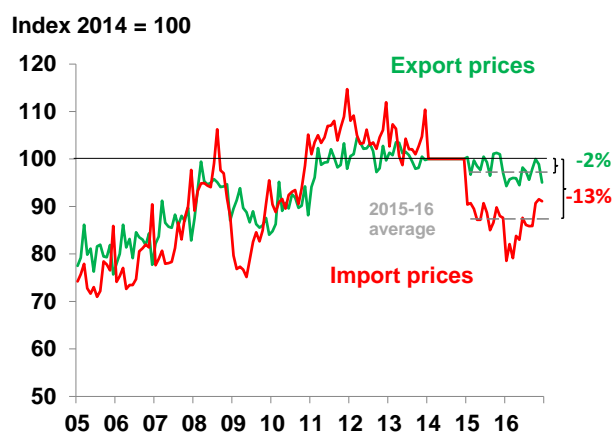
The unit value index (UVI) of ordinary imports and exports is the weighted average of the UVI of a single trade item i as defined in Harmonized System classification. Defining the share of the trade item i as w_{it} , which is the weight of 21 broadly classified ordinary trade items, we calculated the trade weights based on the data from 2001, 2007 and 2014, and derived the weights in other years through interpolation.

These weights are mapped with corresponding UVIs to estimate an overall UVI for ordinary imports and exports, which can be represented by the mathematical equations below:

$$\begin{aligned} \text{Ordinary Import UVI}_t &= \sum_i \text{Ordinary Import } w_{it} * \text{Import UVI}_{it} \\ \text{Ordinary Export UVI}_t &= \sum_i \text{Ordinary Export } w_{it} * \text{Export UVI}_{it} \end{aligned}$$

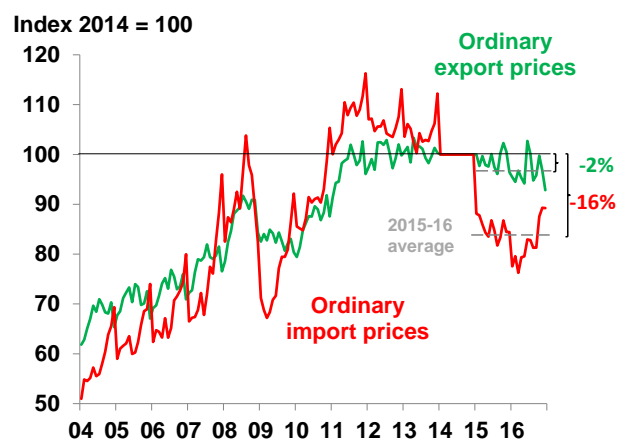
We assume the same UVI for identical trade items no matter whether it is for ordinary or processing trade. With this in mind, [Chart A1](#) shows the price index of overall imports and exports in China. The estimated price index for ordinary imports and exports is shown in [Chart A2](#). The price index is normalised to 100 in year 2014. The different movement between the price index for overall trade and ordinary trade mainly reflects the difference in the weights of these two trade baskets.

Chart A1. Price indices of China's overall imports and exports



Sources: CEIC and staff estimates.

Chart A2. Price indices of China's ordinary imports and exports



Sources: CEIC, China Customs and staff estimates.

II. MAPPING EXPORTS OF FINAL GOODS AND THEIR CORRESPONDING P&Cs

The table below illustrates the method of mapping exports of final goods with their corresponding P&Cs. Using “personal computer” as an example, we identify the P&Cs that are used in “calculating and office machines” with HS codes from 8469 to 8472. Given that the HS code of a personal computer is 8471, which falls into the range of 8469 to 8472, we know that P&Cs with the HS code of 8473 should be classified as the components for fabricating personal computers.

A similar method is applied to other final goods (e.g., television) where their corresponding P&Cs can be identified based on the HS code appearing in the description of a particular group of parts and components.

Imports of P&C	Exports of final products
Parts and accessories of calculating machines 8473 and office machines (machines of headings 8469 to 8472)	8471 Computer, tablet and notebook
Parts and accessories of radio-broadcasting, 8529 television, radar, monitor and etc (apparatus of headings 8525 to 8528)	8528 Television, monitors and projectors
8540 Thermionic, cold cathode or photocathode valves and tubes	

REFERENCES

- Cui, L., Syed, M. (2007), “The shifting structure of China’s trade and production”, IMF Working Paper, WP/07/214.
- Hong, G.H., Lee, J., Liao, W., Seneviratne, D. (2016), “China and Asia in Global Trade Slowdown”, IMF Working Paper, WP/16/105.
- Koopman, R., Wang, Z., Wei, S.J. (2008), “How much of Chinese exports is really made in China –Assessing foreign and domestic value-added in gross exports”, NBER Working Paper Series, 14109.
- Koopman, R., Wang, Z., Wei, S.J. (2012), “Estimating domestic content in exports when processing trade is pervasive”, *Journal of Development Economics* 99 (2012), 178-189.
- Manova, K., Yu, Z. (2012), “How firms export: processing vs. ordinary trade with financial frictions”, NBER Working Paper Series, 18561.
- Pula, G., Santabarbara, D. (2011), “Is China climbing up the quality ladder? Estimating cross country differences in product quality using eurostat’s COMEXT trade database”, European Central Bank, Working Paper Series no. 1310.
- United Nations. (2015), “Tracing the value-added in global value chains: product-level case studies in China”, UNCTAD.