12. China's Manufacturing Performance and Industrial Competitiveness Upgrading

International comparison and policy reflection

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Introduction

China's sustained economic growth in the 37 years from 1978 is a story of manufacturing industry success. China has enjoyed rapid structural transformation and a process of deep development (Gereffi 2009; Lin and Wang 2012; Zhang 2006). As a factory to the world, China is also the world's number one producer of manufactured goods and manufactured exports. Recently, China has also been seeking to upgrade its production frontier towards more capital and technology-intensive industries.

China is evidently a manufacturing giant, but is it really an industrial power? And if it is an industrial power, what drives its industrial competitiveness? While there have been some studies on Chinese industry and manufacturing exports in general, the literature focusing on these questions has so far been limited.[2] One evident gap in the literature is inadequate measurement of manufacturing performance (MP) and the identification of MP determinants. Working in this direction, this chapter aims to advance the existing literature as follows. First, it studies eight indicators of three MP dimensions (capacity, intensity and quality) in both domestic and world markets, as suggested by UNIDO (2013), we provide more comprehensive measures of MP in China. Second, in addition to manufacturing drivers at the micro level of firms and industries, it examines macro-drivers of China's industrial development against international benchmarks, including development strategies and industrial policy. Third, we assess the role played by foreign trade and foreign direct investment (FDI) in China's MP and IC by focusing on their impact on industrial

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2 The studies on Chinese industry and manufacturing development include Brandt and Thun (2010); Gereffi (2009); Lin and Wang (2012); Nahm and Seinfeld (2014); Zhang (2006); Zhao and Zhang (2007, 2010).

capacity, intensity and quality, especially technology upgrading. Fourth, we use more recent data (up to 2013) to complement the cross-country ranking in 1992–2010 by UNIDO (2013).

Section two provides the analytical framework on which China's industrial competitiveness is assessed and against which its performance is compared internationally. Section three examines the drivers of China's industrial success by first distinguishing initial conditions and causes and then by identifying their main drivers. Two drivers, industrial policy and export FDI, are then discussed in sections four and five, and conclusions are drawn in the final section.

An analytical framework for study of China's industrial competitiveness

Industrialisation—structural transformation from traditional agriculture to modern manufactures and services—has been considered a key to economic growth and development since the Industrial Revolution in the eighteenth century. Industrial development is desirable not only as a source of higher productivity growth and per capita income, but also to achieve greater diversity in economic structure. The latter helps to reduce a country's vulnerability to poverty and external shocks.

To better illustrate China's industrial performance, Figure 12.1 and Table 12.1 lay out some basic related indicators. As the data in the table illustrate, in the 35 years from 1978 to 2013 China's gross domestic product (GDP) grew 26 times over. The industrial sector, however, grew the fastest and also made the largest contribution to growth (growing 42 times over), as shown in Figure 12.1. By 2014, China had become the second-largest economy in the world at current exchange rates, but number one in purchasing power parity (PPP) terms. As the most populous country, however, China's GDP per capita lags far behind the United States and other high-income economies, including South Korea, Taiwan, Singapore and Hong Kong.

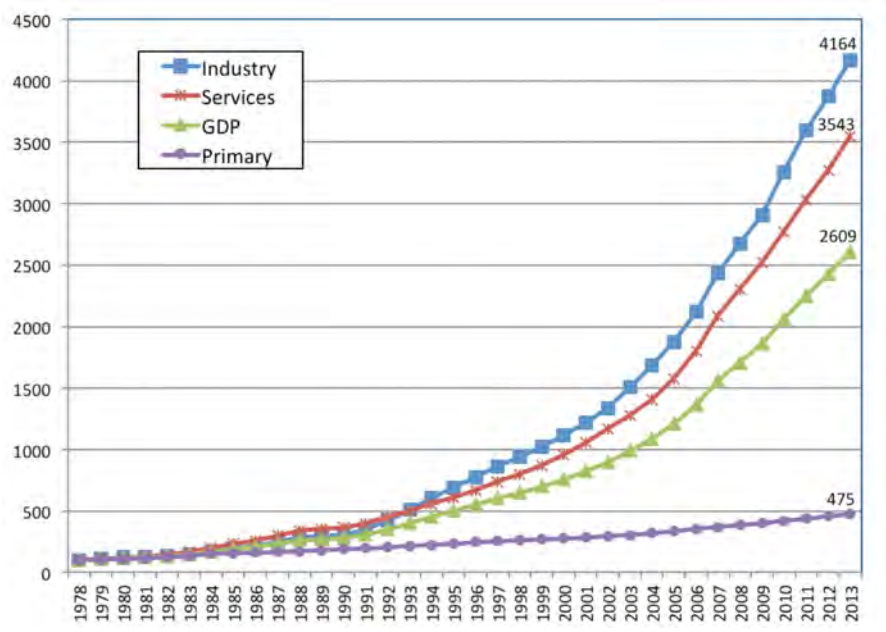

Figure 12.1 Growth of China's GDP and its component sectors, 1978–2013 (1978=100)

Sources: National Bureau of Statistics various years[a].

Table 12.1 China's position in the top-10 economies, 2014

Economy	GDP (US$b)	GDP (PPP $b)	Population (million)	GDP per capita (US$)	GDP per capita (PPP $)
United States	17,416(1)	17,416(2)	316(3)	53,670(1)	53,960(1)
China	10,361(2)	17,617(1)	1,357(1)	7,635(9)	12,982(9)
Japan	4,770(3)	4,750(4)	127(6)	46,140(2)	37,630(3)
Germany	3,820(4)	3,722(5)	80(7)	46,100(3)	44,540(2)
France	2,902(5)	2,580(8)	66(8)	42,250(4)	37,580(4)
United Kingdom	2,848(6)	2,549(9)	64(9)	39,110(5)	35,760(5)
Brazil	2,244(7)	3,264(7)	200(4)	11,690(8)	14,750(8)
Russia	2,057(8)	3,565(6)	144(5)	13,860(7)	23,200(7)
Italy	2,129(9)	2,128(10)	60(10)	34,400(6)	34,100(6)
India	2,048(10)	7,376(3)	1,252(2)	15,70(10)	5,350(10)

Notes: Ranking for each indicator in the table is given in parentheses after the figure. According to the World Bank's International Comparison Program, China passed the United States to become the world's number one economy in purchasing power parity (PPP) GDP in 2014.
Sources: World Bank (2015); and CIA (2015).

Based on a method developed by UNIDO (2013), a country's industrial competitiveness (IC) can be assessed via eight indicators that are grouped along three dimensions, as shown in Table 12.2. The first dimension relates to a country's capacity to produce and export manufactures. Unlike measures used before, we include total output as well as output per capita to capture the manufacturing scale in the context of China's population. Output per capita can understate the capacity of populous countries like China, India and the United States relative to small ones. Including total output might not only correct such understating, but also reflect economies of scale derived from the large amount of output. The second dimension covers a country's industrial intensity in terms of manufacturing value added share in GDP and manufactured export share in total exports. The third IC dimension captures a country's industrial quality in terms of technological deepening and upgrading in domestic manufacturing output and exports. In contrast with other available indices, the IC index provides a unique cross-country industrial performance benchmark and rank based on quantitative indicators of industrial performance. These rankings are provided for 135 countries for the years 1992–2010 (UNIDO 2013).[3]

Table 12.2 Industrial competitiveness: Three dimensions and eight indicators

Industrial capacity	Manufacturing value added per capita (MPC) Manufactured exports per capita (MXPC) Manufacturing value added share in world (MWS) Manufactured exports share in world (MXWS)
Industrial intensity	Manufacturing value added share in GDP (M/GDP) Manufactured exports share in total exports (MX/X)
Industrial quality	Medium and high-tech manufacturing value added share in total (MQ) Medium and high-tech manufactured export share in total (MXQ)

Source: Author's reorganisation based on UNIDO (2013).

Table 12.3 reports the top 15 of the world IC ranking in 1992–2010, which reveals a pronounced yet familiar pattern. The most industrially competitive nations in the world are those with high-income industrialised economies. The top-three positions are occupied by Japan, Germany and the United States, which have headed the rankings since 1992. China has ascended rapidly to its rank of seventh.

3 In contrast with other indices currently available, the IC index provides a unique cross-country industrial performance benchmark and ranking based on quantitative indicators of manufacturing development. Rankings are provided at global levels for 135 countries in 1992–2010 (UNIDO 2013).

Table 12.3 Rank of top-15 economies for industrial competitiveness, 1992–2010

Economy	2010	2009	2008	2007	2006	2005	2000	1995	1992	Change in 1992–2010
Japan	1	2	2	2	1	1	1	1	1	0
Germany	2	1	1	1	2	2	3	2	2	0
United States	3	3	3	3	3	3	2	3	3	0
Korea	4	4	4	4	4	4	12	13	15	+11
Taiwan-China	5	5	5	5	5	10	10	12	11	+6
Singapore	6	7	9	9	7	9	11	10	12	+6
China	7	10	14	15	16	18	23	26	30	+23
Switzerland	8	9	10	12	13	13	14	7	7	−1
Belgium	9	6	7	8	9	6	9	8	8	−1
France	10	8	6	6	6	5	5	6	5	−5
Italy	11	11	8	7	10	8	7	5	6	−5
Netherlands	12	13	12	13	14	14	15	11	9	−3
Sweden	13	15	11	10	11	12	13	14	13	0
United Kingdom	14	14	13	11	8	7	4	4	4	−10
Ireland	15	12	15	14	12	11	8	15	17	+2

Note: UNIDO's ranking, published in 2014, runs only to 2010.
Source: UNIDO (2014).

Selected details capturing China's industrial growth are presented in Table 12.4, including eight IC component indicators for the period 1990–2010. Within each of UNIDO's nominated eight indicators, China has evidently made significant progress. Looking to the indicators that have been augmented here to adjust for China's population size, manufacturing value added per capita (MPC) has increased eight times and manufactured exports per capita (MXPC) are up an extraordinary 19 times. In parallel, China's share of manufacturing value added in the world (MWS) rose by 13 percentage points, from 2.6 per cent in 1990 to 15.3 per cent in 2010, and its share in world manufactured exports (MXWS) rose by 12 percentage points, from 2.2 per cent to 14.1 per cent. In parallel, in 2010 China surpassed Germany to become the world's largest manufactured goods exporter, and in 2011 it replaced the United States as the largest producer of manufactured goods in the world.

Table 12.4 China's industrial competitiveness and eight indicators, 1990–2010

Indicators	1990	1995	2000	2005	2010	Change in 1990–2010
Industrial capacity						
MPC (US$)	100.3	199.4	303.1	480.4	820.0	+$719.7
MXPC (US$)	58.2	108.9	179.9	550.4	1,123.6	+$1,065.4
MWS (%)	2.6	5.0	6.7	9.4	15.3	+12.7
MXWS (%)	2.2	3.4	4.7	9.3	14.1	+11.9
Industrial intensity						
M/GDP (%)	25.9	30.5	32.1	33.0	34.2	+8.3
MX/X (%)	72.5	88.8 91	91.7	94.8	96.2	+23.7
Industrial quality						
MQ (%)	37.8	38.0	42.9	41.6	40.7	+2.9
MXQ (%)	26.7	35.4	45.5	57.7	59.8	+33.1
IC index value	0.08	0.13	0.16	0.24	0.33	+0.25

Source: Computed from UNIDO (2015).

Table 12.5 presents cross-country comparisons of the eight IC indicators for the top 15 economies for industrial competitiveness in 2010. Given its population size and stage of development, China, of the 15 countries listed, is the country with the lowest per capita values for MPC and MXPC, but the country with the highest values for the aggregate items, including MWS and MXWS. China outperforms most of the other 14 economies in industrial intensity, as measured by M/GDP and MX/X, but rates poorly by the share of medium and high-tech manufacturing value and exports in total, respectively.

Table 12.5 Top 15 economies for industrial competitiveness in 2010

			Capacity				Intensity		Quality	
Rank	IC index	Economy	MPC (US$)	MXPC (US$)	MWS (%)	MXWS (%)	M/GDP (%)	MX/X (%)	MQ (%)	MXQ (%)
1	0.54	Japan	7,994	5,521	14.1	6.5	20.4	91.6	53.7	79.7
2	0.52	Germany	4,667	13,397	5.3	10.2	18.6	86.8	56.8	72.3
3	0.48	United States	5,522	2,736	24.0	8.0	14.9	76.8	51.5	64.7
4	0.40	Korea	4,783	9,280	3.2	4.2	29.1	96.9	53.4	75.8
5	0.36	Taiwan	6,153	10,825	2.0	2.3	29.9	96.0	61.9	72.4
6	0.35	Singapore	8,198	35,709	0.5	1.5	24.5	89.7	73.4	69.0
7	0.33	China	820	1,124	15.3	14.1	34.2	96.2	40.7	60.5
8	0.31	Switzerland	7,168	23,652	0.7	1.7	18.4	91.5	34.9	69.7
9	0.31	Belgium	3,794	34,138	0.5	3.3	15.0	87.4	42.3	54.9
10	0.31	France	2,885	7,237	2.5	4.2	12.2	88.4	45.4	65.8
11	0.29	Italy	2,848	6,935	2.3	3.8	14.9	91.6	39.3	53.9
12	0.29	Netherlands	3,325	22,081	0.8	3.4	1258	74.0	4017	55.0
13	0.29	Sweden	6,559	15,376	0.8	1.3	20.0	89.7	47.0	57.7
14	0.28	United Kingdom	3,162	5,248	2.7	3.0	11.4	79.5	42.0	63.2
15	0.27	Ireland	6,507	23,960	0.4	1.0	23.1	91.7	64.1	53.8

Notes: same as in Table 12.3.
Source: UNIDO (2015).

A summary of China's position in global industry can be derived for industrial capacity, industrial intensity and industrial quality. First, China has raised its industrial capacity by an unprecedented amount in a short time, in both manufacturing output and manufacturing exports. Due to its scale, no country is likely to challenge China seriously on these dimensions in the near future. Second, China's industrial intensity has grown to a level that is comparable with or even higher than many industrialised economies. Third, China has made significant progress in industrial quality, although it still has a long way to go to catch up with the leading economies. China is continuing a process of upgrading its manufacturing exports from simple, labour-intensive products to capital and technology-intensive goods. It should be noted, however, that the high ratios of MQ and MXQ—40.7 per cent and 59.8 per cent respectively (Table 12.5)—overstate China's performance in technological upgrading due to the extensive role played by China in vertical integrated global value chain and processing exports, which is discussed later.

In sum, China's manufacturing success is mainly due to extraordinary performance in aggregate *capacity* and *intensity*, but not yet in *quality*.

Why was China's performance extraordinary?

A range of factors influences industrial development. These include the macro and microeconomic environments and the policy environment. To understand which combinations lead to successful industrial performance, it is essential to distinguish between endowments or conditions and the causes of industrial performance. A country's advantageous (disadvantageous) endowments or conditions relative to other countries can be viewed as its comparative advantages (disadvantages) in industrial development. These, however, are not the causes of good (bad) industrial performance. Causes of a particular outcome are instead generative forces or events that are the origin of the outcome or the factor that make it happen.

The initial advantages China had for industrial development included abundant cheap labour; huge potential markets; a high saving rate; a culture of patience, persistence and learning; good relations with the Western, economically developed world in 1978; and an efficient, centralised governance system (although this is open to debate). China's disadvantages included low labour quality; low industrial technology; poor infrastructure; an inefficient planned economic system; a weak market system; and shallow human capital. These endowments or conditions had existed for some time, but cannot be

attributed to China's industrial success. There are instead two driving causes: a well-designed development strategy and industrial policy, and an effective export and FDI attraction strategy.

China's development strategy was one of a mixed-economic transition that gradually introduced market elements into the pre-existing planned economy, including and especially by opening up to foreign trade and FDI. This export-led and FDI-led industrial development approach served as a catalyst for the effective utilisation of China's then advantages so as to offset or transform its disadvantages. For example, cheap labour was utilised in processing exports and foreign-invested labour-intensive manufacturing enterprises; the large domestic market was used to attract foreign investors; industrial upgrading took place over time via rising foreign trade and FDI; and so on.

China is unique in its endowments, especially in having been the world's most populous country and also one of its poorest, in addition to being an economy that was autarkic before 1978. In being a low-income country, however, China did share many features in common with other developing economies. What China did differently from others are its market-oriented reforms, which led to an effective development strategy and industrial policy and its opening to trade and FDI, which helped build up industrial competitiveness, especially industrial upgrading.

China's export structure changed dramatically, as suggested by data in Tables 12.6 and 12.7. In 1985, exports of primary products and resource-based manufactures specifically represented 49 per cent of all exports. By 2013, less than 30 years later, that share had fallen to 7.5 per cent. In contrast, the share of non-resource-based manufactures rose from 50 per cent to 92 per cent (Table 12.6). Within that category, the share of high-technology exports jumped from 3 per cent in 1985 to 34 per cent in 2013, and for medium-technology exports the share increased from 8 per cent to 29 per cent. Table 12.7 reports export structure by Standard International Trade Classification (SITC) in 1984–2013. The biggest change took place in SITC 7 (machinery and transport equipment), which now makes up almost half of China's exports (about $1 trillion in 2013), compared with less than 6 per cent ($1.5 billion) in 1984.

Table 12.6 China's export structure: 1985–2013 (percentage)

Sectors	1985	1995	2002	2013	Changes in 1985-2013
Primary products	35.0	7.0	4.1	3.3	-31.7
Manufactures based on natural resources	13.6	7.4	4.7	4.2	-9.4
Manufactures not based on natural resources	50.0	84.6	91.2	92.1	+42.1
Low technology	39.7	53.5	44.7	29.8	-9.9
Medium technology	7.7	16.9	19.8	28.6	+20.9
High technology	2.6	14.2	26.7	33.7	+31.1
Others	1.4	1.0	1.0	0.4	-1.0
Total Exports	**100**	**100**	**100**	**100**	**100.0**

Sources: UNCTAD (2002a and 2002b) and WTO (2014).

Table 12.7 Export upgrading by SITC, 1984–2013 (percentage)

SITC	Description	1984	1986	1990	1995	1998	2001	2007	2013
0+1	Food, animals + beverages, tobacco	13.7	12.1	11.3	7.5	6.3	4.7	2.6	2.6
2+3+ 4+5	Crude materials + mineral fuels, lubricants + animal & vegetable oils + chemicals	37.3	27.0	21.1	12.5	11.5	10.3	7.4	7.6
3	Mineral fuels, lubricants							1.6	1.5
5	Chemicals							5.0	5.4
6	Goods classified chiefly by materials	18.8	17.3	20.2	22.0	16.7	17.5	18.1	16.4
7	Machinery and transport equipment	5.8	2.6	17.7	20.0	25.1	33.0	47.4	47.1
8	Miscellaneous manufactured articles	17.1	15.4	25.2	38.8	37.0	36.1	24.3	26.2
9	Not classified elsewhere in the SITC	7.3	24.5	2.0	0.4	0.2	0.11	0.2	0.1
Total		**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

Source: Author's calculations based on UN (2015).

China's process of industrial upgrading displayed several turning points since the inception of reforms in 1978. The first of these appeared in 1986, when exports of textiles and clothing exceeded those of crude oil, indicating the transition from exporting resource-intensive products to labour-intensive manufactured goods. The second turning point was in 1995, when exports of machinery and electronics overtook those of textiles and clothing. This signified the transition from exporting labour-intensive goods to capital-intensive products. China's entry to the World Trade Organization (WTO) in 2001 indicated the third wave of upgrading, after which not only did product sophistication increase, but also high and new technology exports grew rapidly. Many Chinese exporters have through these transitions become an integral part of the global supply chains of large multinationals that lead the automobile, computer and aviation industries (Lin and Wang 2012). In 2014, China initiated several programs that worked on not only increasing value-added exports and moving up global value chains, but also encouraging firms to go global. Such programs include the 'one belt and one road' strategy, and supporting financial organisations proposed mainly by China: the Asia Infrastructure Investment Bank, Silk Fund and the New Development Bank.

Development strategy and industrial policy

The role of development strategy and industrial policy in China's structural upgrading is impossible to ignore (Ahrens 2013; Harrison and Rodriguze-Clare 2010). Strategy and policy here refer to the ways in which and policy tools with which China's government aims to build up the country's manufacturing competitiveness.

The key to China's development strategy is following, not defying, comparative advantage (Lin and Wang 2012). This type of policy enabled China to selectively promote certain industries or activities with the aim of encouraging them to develop their latent/potential comparative advantage. The comparative advantage-following strategy should be taken not in a static but in a dynamic way, and a nation should not only follow the initial comparative advantages, but also create new comparative advantages over time. The Chinese Government has been playing a pivotal role in industrial development in developing such dynamic comparative advantages, although the importance of the market economy has grown. The government has, in particular, directed both domestic and foreign investment towards specifically targeted sectors as soon as the latent/potential comparative advantages began to appear. Investment promotion has mainly assumed the form of (public) investment in physical infrastructure, the provision of credit at preferential interest rates and fiscal incentives.

Compared with many developing economies, China's strategy and industrial policy seem to be successful in enhancing industrial development and manufacturing upgrading. Before 1978, China's comparative advantage was suppressed by its heavy industry-oriented development strategy. As heavy industries are capital intensive and incapable of absorbing more workers, employment opportunities in the industrial sector were limited in spite of large investments. The economic reforms introduced since 1978 put China's development strategy more in line with its comparative advantages, in which priority was given to labour-intensive manufactures in order to take advantage of its abundant cheap labour (Lin and Wang 2012).

In addition to the comparative advantage-following strategy, China's industrial policy in the past three decades emphasised principles of developing through industrialisation and long-term policy goals rather than random and short-term behaviours. The policy contains the following elements: market-oriented industrial development, export-led manufacturing, FDI-led manufacturing, investing in infrastructure, and innovation through industrial agglomeration and large market-led business models. The current policy targets include developing the higher end of the global industry chain; promoting technological innovation and investing in research and development (R&D); increasing China's discourse power in the global supply chain; raising the value of made-in-China brands through improving technology, management and marketing; changing from original equipment manufacturer (OEM) to original design manufacturer (ODM) and original brand manufacturer (OBM); changing from parts manufacturing to machine manufacturing; and changing from single-business globalisation to multiple-business globalisation.

China's development strategy is premised on leveraging its advantages, including the size of its potential market and the low cost of its factor inputs—chiefly labour, but also the cost of land, electricity and raw materials. Over time, China has sought to add to these advantages by seeking to minimise its weaknesses (bureaucratic red tape, low-quality labour), upgrade its logistics capabilities and move up the technology value chain. China also seeks to leverage economies of scale, and it has made major investments in infrastructure and logistics to lower transportation costs and to speed the time to market for export products. The growth of China's supply-chain cities—led by FDI-driven clusters in Guangdong and single-product clusters in Zhejiang—is a perfect illustration of how China's government and enterprises are turning scale-driven specialisation into a persistent competitive advantage for the country. China has a coherent and multidimensional upgrading strategy to diversify its industrial mix and to add high-value activities. China is developing high-tech exports in a regionally

integrated fashion, based on complex networks of export production that link leading electronics multinational enterprises (MNEs) and their first-tier suppliers and global contract manufacturers.

Exports and foreign direct investment

China and many other developing countries have pursued export-oriented and FDI-oriented strategies, but with different implications for industrial upgrading. While many developing countries followed a model associated with extensive privatisation and open markets, China has attained record levels of export growth and FDI inflows through a more statist approach to its industrial development. Liberalising imports alone was not considered to be sufficient to jump-start exports. The Chinese way has two equally important parts: economic system reform and the gradual opening of its markets to the outside world. Both are indispensable for achieving industrial growth.

The opening up of China's trade and FDI occurred in five stages. The first (1979–87) was characterised by reforms to break the state monopoly in trade, to experiment with special economic zones (SEZs) and to provide incentives for exporters. Foreign borrowing and FDI were encouraged. In the second stage (1988–93), the responsibility system and the shared foreign exchange revenue system were introduced to promote exports, and the dual exchange rate system was implemented and import tariffs began to be reduced. The third stage (1994–2001) witnessed further liberalisation in trade and FDI to prepare for WTO entry, including unifying the foreign exchange rate and reducing the tariff rate unilaterally from 40 per cent to 16 per cent. China's entry to the WTO was the start of the fourth stage (2001–14). As China's laws and institutions were conforming to international standards, trade and FDI inflows expanded dramatically (at an average annual rate of 35 per cent until 2007), and trade value exploded from $510 billion in 2001 to $2.174 trillion in 2007, and more than $4 trillion in 2014. The export structure was upgraded rapidly as well, making it comparable with that of a high-income rather than a developing economy (Rodrik 2006). The last stage began in 2014, with China 'going global': China overtook the United States as the largest trading nation; its outward FDI exceeded inward FDI; it proposed and established the Asia Infrastructure Investment Bank; and initiated the 'one belt and one road' program to encourage closer links with the rest of the world.

Foreign investors played a vital role in providing the market connections for the types of products needed by the international market, and for accessing orders for exports and the technology suitable for the development stage of the country. Thus, labour-intensive industries were able to expand rapidly. China's success has been a unique form of industrial organisation called supply-chain cities

(Gereffi 2009), which has permitted it to achieve economies of both scale and scope in global value chains. China's unique path is fascinating in its own right, but China's escalating importance as a supplier, a market and recently as a source of outward FDI makes many countries in the world highly dependent on China's future economic performance.

China also uses FDI to accelerate learning in new industries and knowledge spillovers in its domestic market. Despite restrictions imposed by the WTO against domestic performance requirements for MNEs, China's local market is sufficiently attractive for multinational manufacturers that they are willing to comply with the wishes of local, regional and national government authorities, despite stringent technology transfer requirements.

Caveats for export structure and industrial upgrading

The title of 'world's factory' was first applied to the United Kingdom during the Industrial Revolution, when that country was dominant in global industry. As the United States took off in the 1870s and surpassed the United Kingdom in terms of GDP, the United States became the world's factory, especially after World War II, when the United States made up almost half of global GDP. The strong manufacturing performance of Germany and Japan (especially the latter's industrial miracle in the 1970s) won the description of 'world manufacturing centres' for those countries.

How can China's world-factory position and advanced export structure be assessed relative to traditional industrial powers. According to the data, China's export composition resembles that of a country with an income per capita level three times higher than China's (Rodrik 2006). The overlap between China's exports to the United States and those of Organisation for Economic Cooperation and Development (OECD) countries to the United States increased from 15 per cent in 1994 to 21 per cent in 2005 (Schott 2008). Two caveats should be noted. One is that foreign-invested enterprises (FIEs) have played a very important role in China's expansion and industrial upgrading. The FIE share of China's exports rose from less than 10 per cent to 60 per cent in 1985–2007, and fell but remained at 50 per cent in 2013. FIE export share in high-technology goods is even higher. More than 90 per cent of China's high-tech exports to the United States were produced by FIEs, and about 65 per cent of China's high-tech exports to the United States were from various policy zones in China (Schott, 2008).

Another caveat relates to processing trade. A large share of China's exports involves assembling duty-free imported inputs for export in processing trade zones. The share of processing trade in China's exports rose from 47 per cent in 1992 to 55 per cent in 2007, before falling to 42 per cent in 2013. In the high export growth machinery sector, most of this growth is indeed due to growth in processing trade. More than 95 per cent of China's high-tech exports were processing exports during 1995–2006, and 90 per cent of China's expanding high-tech exports to the United States are in processing trade (Rodrik 2006 and Schott 2008).

Nevertheless, even after taking account of these caveats—that is, small value added in vertical integration and processing trade—China is still likely to outperform all other countries in export structure and industrial upgrading.

In sum, China has come a long way in upgrading, but it has been only partially successful. China has become competitive with industrial countries in high-tech sectors, but it still has a long way to go to climb the technological ladder.

Conclusion

This chapter studies China's manufacturing performance and industrial development in 1978–2014, focusing on two issues: the global position of Chinese industry and the main drivers of China's rapid industrial growth. Taking advantage of recent UNIDO (2015) data on cross-country industrial competitiveness, we assess China's industrial development based on eight indicators grouped into three dimensions (industrial capacity, industrial intensity and industrial quality). The main conclusions from this work are 1) China's large manufacturing success is manifested mainly in volume, although further development will depend on industrial quality; and 2) China's industrial development has been driven by development strategy and industrial policy, and success in exports and FDI.

International comparisons suggest advantages and disadvantages for China in industrial development. The advantages include strong and effective central government, abundant and cheap but productive labour, a huge and growing domestic market, high quality of infrastructure, and a culture of patience, persistence, innovation and frugality. The disadvantages include lack of innovation and therefore dependence on Western technology, low value added due to processing/assembly manufacturing at the bottom of the 'smiling curve', and weaknesses in logistics, marketing and sales channels. The future of China's manufacturing represents the future of emerging economies and the

future of the world. There is still a long way to go for China to transform from a manufacturing giant to a centre of manufacturing quality. Innovation and operational excellence are the keys to the transformation.

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