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Made in China 2025: A New World Order?

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Executive summary

Will Made in China 2025 reshape the global economy?

- China's supercycle is winding down with the old growth drivers—export and investments— slowing, debt remaining disconcertingly high; the work force having peaked; and US-China trade frictions intensifying.
- China aspires to reshape its economy through Made in China 2025—*a* 10-year plan—to usher in the fourth industrial revolution and secure dominance in global technology while expanding its global influence via the Belt and Road Initiative.
- China is well-placed to achieve self-sufficiency if not world leadership in tech, telecommunications, AI, Fintech, internet, NEVs, high-speed rail, and clean energy by 2030.
- But as the rise in US-China trade frictions indicate, these aspirations will be challenged if they continue to be implemented through extant industrial policies and controls on market access.

What are the global implications of a slowdown in China's growth?

- Made in China 2025 does not make China's inexorable rise inevitable as deleveraging and public sector restructuring are needed to keep China from slowing below 4.5% over the next decade.
- China's high debt level remains its Achilles heel, requiring both financial-sector and SOE restructuring, with the risk that policy mistakes could trigger a "man-made financial crisis."
- China's medium-term growth could slow by 2%-points to 4.5% by the end of the next decade, reducing global growth by 0.4%-points, with a risk that base metals prices fall 40% to 60% from current levels.

How will the reshaping of US-China strategic relations impact the world?

- Markets are focused on the risk for a "great power competition" between the US and China with implications for technology leadership, supply chain and end product makers reorganizing along security alliances.
- Cybersecurity is the new frontier with a persistent state of conflict due to the lack of effective deterrence structures. We think both sides will seek self-sufficiency rather than global domination in technology, but China's large internet players may take global leadership in AI.
- China is rising to global leadership in clean energy across autos, solar and wind power, and green bonds.
- US-China tensions can potentially trigger the existing manufacturing supply chain to permanently shift out of China to ASEAN countries and others.

How quickly will China open its financial markets?

- The global reach of China's financial markets and currency will proceed gradually even as China enters mainstream equity and fixed income indices.
- Successful execution of the Made in China 2025 agenda likely makes MSCI China a structural overweight, though without corresponding strength in the currency.

This report is the latest from in our thematic and strategic research series, *J.P. Morgan Perspectives*, which brings together views and analysis from across the broad scope of J.P. Morgan's Global Research franchise. This series features in-depth analysis of critical global issues impacting economics and markets across all disciplines. In this report, we examine the dynamics shaping US-China relations and explore the implications of Made in China 2025 for China and the global economy. We hope this series will both inform and foster public debate on evolving economic, investment, and social trends.

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Made in China 2025: A new world order?

- **China's current supercycle is winding down, with the old drivers of the economy—export and investment—slowing, persistently high debt levels, and a peaking work force, alongside a rise in US-China trade frictions.**
- **China aspires to reshape its economy through Made in China 2025—a 10-year plan to bring about the fourth industrial revolution and secure China's dominance in global technology, while its global influence spreads via the Belt and Road Initiative.**
- **Made in China 2025 does not make China's inexorable rise inevitable, as deleveraging and public sector restructuring are needed to keep China from slowing to less than 4.5% and to avoid zero interest rate policy over the next decade.**
- **China's high debt level remains its Achilles heel, and requiring both financial-sector and SOE restructuring, with the risk that policy mistakes trigger a "man-made financial crisis."**
- **A projected 2pt slowdown in China's medium-term growth translates to a 40bps reduction in global growth, with base metals prices likely to fall 40% to 60% from current levels.**
- **Markets are focused on the potential for a"great power" conflict between the US and China with implications for technology leadership, supply chains, and end product makers reorganizing along security alliances.**
- **China is well-placed to achieve self-sufficiency, if not world leadership in tech, telecommunications, robotics, Fintech, internet, NEVs, high-speed rail, and clean energy.**
- **J.P. Morgan analysts expect China to be highly self-sufficient in tech by 2030, but to recede in importance as a global tech manufacturing hub as tech supply chains are shifting toward ASEAN.**
- **The global reach of China's financial markets and currency will proceed gradually even as China enters mainstream equity and fixed income indices.**
- **Successful execution of the Made in China 2025 agenda probably renders MSCI China a structural overweight, though without corresponding strength in the currency.**

How will Made in China 2025 reshape the global economy?

The rise of China as a global economic powerhouse is the most remarkable change in the global economy over the past 40 years, marked by three cycles of growth dating back to 1978. The first cycle from 1978 to 1990 was marked by reform to the agricultural sector, while the second cycle from 1991 to 1999 was characterized by macro reforms after the Asia Financial Crisis accompanied by domestic stimulus. The third cycle from the early 2000s was fueled by globalization and China's entry into the World Trade Organization (WTO) with China becoming the world's fastest growing economy, while Chinese demand turned China into the number one global destination for exports and the number one source of imports, with a dominant position in the global supply chain. On the eve of entering the WTO, China made up only 2% of world GDP. Today it is 17%, and 2/3rds of US GDP. China has become an engine for global growth, alongside the United States, contributing roughly one-third of global growth since 2008 (Lupton et al.).

During the 2008 Global Financial Crisis, China's provision of fiscal and credit stimulus played a stabilizing role for the global economy, with the equivalent of 7% of GDP of stimulus measures. The collateral damage of years of credit growth and stimulus has now become apparent as China's debt has ballooned to over 260% of GDP, while its consolidated fiscal deficit has settled around 10.5-11% of GDP in recent years, having peaked at 13.7% in 2009. At the same time, its workforce has begun to decline and old-age dependency is rising.

In 2015, with the current growth unwinding, China's State Council laid out the framework for the fourth cycle of growth with the announcement of Made in China 2025, setting the blueprint for China's manufacturing sector for the next 10 years and beyond, highlighting 10 key sectors for advancement alongside plans to continue with institutional reform.

We find that transformative technology is reshaping China's economy but its inexorable economic rise is not inevitable. We expect China to achieve self-sufficiency in tech by 2030, but for it to recede in importance as a global tech manufacturing hub. A smooth transition requires a continued shift in the sources of growth to consumption, while restructuring of the public sector is necessary to achieve productivity gains as its demographics shift and China moves from being a current account surplus to a current account deficit country.

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As China's development strategy has shifted to global high tech manufacturing, US policy toward China is moving from a policy of strategic engagement to a "great power competition."[1] (Sullivan et al.). At the core of US-China tensions is China's quick catch up in the technology race, with friction extending beyond trade issues and encompassing intellectual property rights, technology transfer, cybersecurity and market openness. The U.S.-China conflict will likely intensify over coming years, but we doubt very much it will become destructive, as historical lessons have been learned and understood by both sides. Instead, we will have continued lower-level trade and cyber wars, and efforts to protect each side's technology advantages.

In this issue of *J.P. Morgan Perspectives*, our team of 50+ economists and strategists assess the implications of Made in China 2025 for China's domestic economy and the world economy, geopolitical relations and individual sectors.

How will China's economy look in 2030 and what are the global implications?

China's growth potential will slow to 4-5% into 2025-30. Globalization has slowed markedly since the 2008 Global Financial Crisis and political support for further expansion has waned significantly across DM economies. We expect China's growth potential will further slow from the current 6.5% level to 5.5% in 2021-25 and 4.5% in 2026-30, or about half the growth rate from 2000-2015. China will remain the second-largest economy much longer than expected, approaching 90% of the United States' economic size by 2030. The transition to a slower potential growth could be volatile and requires balancing reforms to move to a more domestically driven growth model with deleveraging and public-sector restructuring. China's high debt remains a key risk factor and policymakers will need to avoid a debt-deflation cycle in which tight monetary policy and debt reduction jointly lead to a slowdown in economic activity and increase deflationary pressures. Without accelerated disposal of "zombie" public-sector firms, the economy could be forced to adopt a zero interest rate policy (Zhu et al.).

China's 2%-pt slowdown will dampen global growth by ~0.4%-point, by our estimates. With a massive domestic consumer base and as the downstream producer for global industry, fluctuations in China's economy have had a large impact on the rest of the world. Since 2000, any 1% shock to China's GDP has changed GDP in the rest of the world by 0.4% on average. China has accounted for a third of world growth, or 1%, this past decade. It's likely slowing, from a much larger base now, and should reduce its net contribution to global growth to less than 0.8%. We do find that China is becoming less tied to the global economy as its growth drivers are becoming more domestic. This means to us that our projected slowing in Chinese growth by 2% should dampen world growth by only 0.4% (Lupton and Kasman).

China slowdown could lead base metal prices 40% to 60% lower. The rise of China over the past three decades has created a supercycle in industrial metals that is now winding down as investment growth and exports are set to decline. The last 200 years have seen four supercycles in metals prices, driven by secular growth cycles in the UK, US, Europe and now in China. As China is slowing, is reorienting towards consumption, and is moving into external deficit, industrial metals prices have a lot further to go down, probably another 40-60% before the next supercycle can start (Kaneva and Shearer).

How will the reshaping of US-China strategic relations impact the world?

Cyber security is the new frontier

The rise of China is changing all aspects of its relationship with the rest of the world, especially as the Trump administration has shifted US-China relations away from strategic engagement. The current US-China conflict encompasses trade imbalances, technology/IP protection, Made in China 2025, and the strategic relationship in the long run. Cybersecurity is the new frontier and we think both sides will want to become more self-sufficient in technology. Supply chains and end product markets will reorganize along security alliances: Evidence of supply chain moves to India, Indonesia, Vietnam, Thailand, and Malaysia already exist, while Chinese equipment is already banned in US, Australia, parts of Europe (Sullivan et al.).

Our base case is a persistent state of **cyber conflict** due to a current lack of effective deterrence structures and the attractiveness of asymmetric cyber tools. In the cyber arms race, there is an argument to be made that big-data focused innovation favors centrally controlled autocratic markets over decentralized democratic markets (Chen, Sullivan et al.).

[1] See 2018 Summary of the National Defense Strategy of the USA: Sharpeing the American Military's Competitive Edge https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf

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Belt and Road Initiative: A grand plan for regional cooperation and investment

China is also actively trying to get more influence in the world through its **Belt and RoadsInitiative** (BRI). This program is an ambitious development strategy initiated by the Chinese government in 2013, with the main goal to improve regional cooperation and connectivity on a trans-continental scale. It consists primarily of the **New Silk Road Economic Belt**, which will connect China with Europe through Central and Western Asia, as well as the **21st Century Maritime Silk Road**, which will connect China with Southeast Asian countries, Africa and Europe. BRI has focused on infrastructure development, which will better connect the economies involved and foster closer trade, investment and economic links, hence boosting regional economic co-operation. According to the Chinese government, the BRI program involves 125 countries so far, which, together with China, constitute about 37% of world GDP. China's accumulated ODI to the BRI related countries amounted to $154bn by the end of 2017, and Chinese enterprises have managed to secure steady contracted construction projects in the BRI-related countries, with the value of contracts signed amounting to $90bn during the first eleven months of 2018 (Ong et al.).

While in principle a strategic path to boost productivity and infrastructure among BRI host countries, concerns have grown about both corporate and political governance. The initiative is dogged by concerns about it **worsening debt sustainability of host countries** and producing only a low economic return to China, even as it pays political dividends (Ong et al.)

Alongside initiatives to improve regional cooperation, China is modernizing its defense capabilities. China has **accelerated defense spending**, focused on the navy. And while it has cut one quarter of its manpower, it is providing its soldiers with more and better equipment, e.g., providing now eight tanks per 1,000 soldiers, compared with only half that in 2004, even as it remains behind the US with 20 tanks/1,000 soldiers (Xu).

Implications of Made in China 2025: Self-sufficiency rather than global domination for most sectors

Technology is changing the landscape of China's economy. Policy support via Made in China 2025, higher labor costs, and an increasing need for customization are driving innovation. The **Made in China 2025** strategy aims to address long-standing issues and gaps that China's manufacturing sector faces, including: 1) lack of independent innovation and high dependence on foreign technologies; 2) product quality that still trails those of advanced economies; 3) low efficiency and severe environmental pollution; and 4) digitalization and new technologies that have not been integrated into manufacturing. To address these issues, Made in China 2025 is providing fiscal and funding support to intelligent manufacturing sectors through tax policy, PPP funding, and policy bank lending and cultivating talent for advanced manufacturing sectors. It also proposes reform of the SOEs; promotion of fair market practices and open markets and streamlining administrative processes (*Made in China 2025*, H. Zhu et al., July 1, 2018).

J.P. Morgan's analysts have been thinking through how this program and other longer-term forces will create dramatic change in the more value-added industries, focusing on semiconductors, automation, Fintech, internet, AI, planes, trains, cars, alternative energy and telecommunication. We expect self-sufficiency for most sectors rather than global domination, but China's large internet players may take global leadership in AI**.** China is leading in clean energy developments and appears likely to become the largest new energy vehicle (NEV) market in the world, with the potential to become the top global supplier for solar PV and wind power by 2025.

Self-sufficiency in tech by 2030, but receding as a global tech manufacturing hub

We believe China has already attained self-sufficiency in most consumer tech areas now as growing national security concerns, the increased importance of **tech infrastructure,** and the need to upgrade homegrown tech supply chains to higher value-added areas prompted China to actively build self-sufficiency in its tech supply chain over the past decade. Amid a supportive national policy and sizable domestic demand, China has made progress with some domestic players, such as Huawei, Lenovo, and Xiaomi, rising to become leading global brands in both infrastructure and consumer tech. Semiconductors and key elements of infrastructure tech are the remaining areas where China Tech has been lagging behind, given a high level of technology intensity, R&D requirements, lack of talent and access to IP (Hariharan).

In **industrial automation**, the government aims to close the gap of domestic players versus foreign brands as foreign brands currently constitute 75% of the total industrial robot market. Industrial automation (IA) is a key growth sector in China, given its aging population as China's median age will rise by 11 years over 2015-50 versus the global average of six years. By 2025, R&D

expenses are targeted to reach 1.7% of the revenue of scale manufacturers, the value-added rate is targeted to increase 4% over that of 2015, and the **domestication rate of core components and key materials is targeted to reach 70%.**

According to the Development Plan of the Robots Industry issued in 2016 by MIIT, China aims to achieve an annual **industrial robots** (IR) output by domestic brands of more than 400K by 2030 versus 35K units in 2017, with more than half of these being high-end articulated units. Under the same plan, the government aims to build 3-5 leading IR companies and to raise the market share of domestic firms to more than 50% by 2020 versus 25% in 2017.

Japanese firms dominate the IR market as Chinese companies do not have a presence in the key components required in the manufacturing of IR and thus rely on imports as the corresponding technologies are still held by a handful of advanced economies. However, **Chinese brands are significantly cheaper** compared to foreign brands and hence have high penetration in small and medium-sized enterprises. In contrast, large manufacturing companies still prefer foreign brands due to their reliability. To gain access to technological capabilities, Chinese companies are looking at cross-border M&A opportunities, particularly in Japan and Germany (Li).

Large China Internet players may take global leadership in AI

Growth of the existing three-pillar business model of China's **Internet** space is maturing, and new growth drivers will shift from consumer-oriented business models to business-oriented ones over the next 5-10 years. AI development and industrial digitization will take place across most aspects of the economy, from consumption to supply-chain management, manufacturing, agriculture, etc. While the US still leads AI investment in terms of deal share, the majority of funding has been directed to China over the past five years. A study by PwC estimates that China will benefit from AI the most by 2030, with potential gains in GDP by up to 26%. Leading Chinese internet companies with world-class AI capabilities should benefit from these changes, influencing most areas of the economic system, and extending their exposure overseas (Yao).

China to become the world's largest NEV market and top global supplier of solar and wind power

China possesses the potential to become the top global supplier for **Renewables** by 2025 as China is relying on **solar** PV (photovoltaics) and **wind** power to shift away from fossil fuel. Currently, renewable power development is constrained by costs but development will accelerate when grid parity is reached during 2021-2025. China's upstream solar PV (LONGi, GCL-Poly) and wind turbine (Goldwind) makers have access to the domestic market, and hence, scale advantage (Hon and Wu).

The overall **car** market slowed down dramatically last year and will likely just stabilize this year. We expect NEV demand to grow at a 48% pa rate from 2017-2020 or 26% pa to 2025. This will make China the largest NEV market in the world. High-Speed **Railway** ridership should continue to gain market share in total railway passenger demand in China. Low MU density ratio and inter-city rail are emerging as a new driver and represent upside to MU demand (Li and Xu).

Fintech market is still underpenetrated while banks are transforming into service providers

Fintech is transforming behavior in payment, consumption and financial management. Increasing competition from internet companies has forced banks to transform their business models. Over 90% of banking transactions are done electronically in China, even for SOE banks. The rise in Fintech increases households' access to credit and financial services. Retail banking growth has further scope to accelerate. Household leverage should rise to 70% by 2025 from 52% in 2017 while their debt-service ratio should grow from 20% in 2017 to 25% by 2025. This may intensify concerns about China's high debt levels. On the positive side, this helps China transform its growth engine from export and investment to services (Lei).

Telecommunications to focus on 5G over next five years

Telecommunications infrastructure, specifically 5G, is expected to drive a significant economic contribution between 2020 and 2030, contributing as much as 6% of China's GDP by 2030. Concerns about operators' potential reckless 5G capex have arisen in recent years, with growing concerns that 5G network deployments will be more costly than earlier generations of mobile technology, as higher frequencies of 5G spectrum require higher density of networks. China has decided to adopt the standalone (SA) version of 5G network, which costs more in the early stage but is able to perform more 5G functions than the non-standalone version (NSA).The government has been

pushing an ambitious timetable, aiming to start commercial trials by the end of this year, and a commercial launch next year. Many overseas operators are choosing NSA as an interim cost-saving solution, in light of the low visibility of 5G monetization opportunities (Wei).

Better life quality: consumption and services upgrades as incomes improve

Consumption patterns in China continue to shift from necessities to discretionary as incomes grow. China's total population has yet to peak and may still well grow to around 1.5 billion in 2027 before it starts to decline. Consumption and service upgrades will continue in health care, insurance and leisure activities. As household incomes improve, life insurance spending has increased. The increase in the older population has increased pressure to provide better healthcare services at reduced costs. Structural oversupply persists in the real estate sector but the residential sales market should shrink by 60-70% in 2025 due to demographics. The demand for customized services remains high and after-school K-12 tutorial growth remains robust despite a series of new regulations in 2018 (Chik).

China's spending on **health care** will continue to outpace GDP growth as the current spending at 6.2% of 2016 GDP, remains well below global levels. The government is focusing on shifting to effective therapies with clear indications of success and will continue to promote policies that boost innovation. The best opportunities in China health care include biotech innovators, contract research and manufacturing for biotech and innovative pharmaceutical companies (Chik).

An ageing society will boost the demand for life insurance. The protection and health insurance businesses generally move into a hyper-growth stage once the country's GDP per capita exceeds $10k as households start to actively seek better medical services and family protection. In life, the core profit source is set to shift from investment spread margin to mortality/morbidity fee margin, while in non- life, the share of car insurance should steadily fall. Following IFRS 17's accounting and a stricter solvency standard, insurers are set to lower relative holdings of equities and non-standard assets (Kim and Joshi).

The business model and nature of residential, retail and office real estate will likely remain similar over the next 5-10 years. Since 2010, the boom of the residential market has effectively shifted debt from the government to households, and the process should be mostly finished by 2025, with household debt as a share of GDP—mostly mortgages—catching up to the DM world. Residential sales should be gradually shrinking due to demographics, eventually to about 60-70% of current market size. With funding costs trending down, developers will be reinvesting capital into long-term rental properties including retail malls, offices, industrial buildings and rental homes. The China-REIT (C-REIT) market should gradually open up. Within the investment space, apart from home builders, there will be some world-leading landlords/REITs with >$2bn annual rental income that will become investable (Li).

Experience is key for the new China consumer and technology is an enabler as Chinese consumers are becoming increasingly sophisticated and demanding in their preferences for **consumption goods.** Spending on leisure, such as sports, travel, dining out, as well as education has been growing steadily, and in our view will continue to take a larger share of income over the coming 5-10 years as the millennial population totals around 560 million (Yin et al., Chik).

Implications for global companies: Will global supply chains relocate out of China?

The tariff war has accelerated corporate strategy and long-term planning on supply chain locations. Global companies have been grappling with the trade-offs of keeping production capabilities in China to serve its growing domestic demand and uncertainty about the US-China relationship and the potential for tariffs to add costs on exports between the US and China.

ASEAN to benefit from supply chain shifts, with Korea and Japan largely immune

US-China tensions have the potential to trigger a relocation of the supply chain with a permanent shift out of China. Rising production costs and past CNY appreciation have prompted a rare decline in China's regional export share. Lower-cost production centers like Vietnam have picked up the slack. The tech supply chain is the most affected, with Taiwan/China IT sectors and US vendors with large China-centric production (such as Apple) most significantly impacted, while Korea and Japan are largely immune. Economies with large working-age populations, relatively low-cost wage structures, and high skill levels or infrastructure capacity are emerging as relative winners, benefiting the ASEAN countries in particular. Analysis of 2,600 transcripts from 850 companies indicate that Vietnam, Thailand and Malaysia are the biggest potential beneficiaries of supply chain reorganization (Sharma). Supply chains, rather than

consumers, are likely to bear 70-80% of the cost in the next 18 months. The Apple supply chain is slow to move, though, and unlikely to see severe dislocation unless tariffs become extremely punitive (Ng and Shatil, Batra et al.). We do note, however, future risks to margins on the back of relocation expenses (see *Apple Supply Chain in Asia*, N. Chang et al., 11 Jan. 2019).

China's focus on semiconductor technologies represents both threats and opportunities for the global semiconductor supply chain but we do not expect domestic China equipment suppliers to become a meaningful threat over the medium term. The biggest threat to global semiconductor companies over the next 5-10 years is in memory, low- to mid-end logic and analog and heterogeneous computing and acceleration (Moriyama et al.). There is less threat in general purpose compute and high-performance analog. Leading global semiconductor equipment companies should benefit from a multiyear investment cycle in China. IT companies, including Apple, plan to continue to invest in China, both in retail and R&D. US networking equipment hardware companies remain excluded from China, and vice versa. Software companies will stay out of China until IP is provided by China (Sur, Auty and Chatterjee).

Downside risk for auto industry and slow prospects for commercial aerospace

Slower economic growth creates downside risk for car demand in H1 of this year. This creates a serious risk of a price war as companies try to protect market share. Chinese capacity utilization at ~60% is much worse than Europe or the US which are near historic means. Electrified vehicles' market share should rise to ~30% by 2025 and 60% by 2030. Within EVs, battery EVs should have a 9% overall share in 2025 and 20% in 2030. Within our coverage, BMW and Daimler are the most exposed to any additional tariffs implemented on exports from the US into China (Asumendi). While China aspires to become an aircraft original equipment manufacturer (OEM), progress remains exceptionally slow as incumbents such as Boeing and Airbus have deep relationships with major global carriers (Seifman).

Global reach of China's financial markets and currency will increase, but gradually

A slowing but reforming and opening China will have significant impact on the performance and functioning of its financial markets. Further market opening should attract inflows, while residents' portfolio diversification should drive capital outflows once financial accounts liberalize. Overseas investors currently hold only ~$430bn or 2.3% of onshore Chinese equities and bonds. This is more than double the amount they held a few years ago but still small compared to the size of the market. We expect individual investors to channel their investments through mutual and pension funds as investment products diversify. At present, Chinese households are heavily underinvested in financial markets, with bank deposits accounting for 66% of total household financial assets, whereas stocks and mutual funds are just 16% and 4%, respectively. We look at China's financial markets from nine different angles, beginning with globalization of the RMB, implications for capital flows, inclusion in bond and equity indices, its growing green bond market, returns on its equity, bond and credit markets and how international investors should adjust their tactical asset allocations.

China's debt markets are now too big to ignore with a total market capitalization size of $12tr, including all onshore bonds, including CGBs and local government bonds, financial bonds and corporate bonds, making them the third largest in the world after the US and Japan according to the BIS. By comparison, China's equity market is relatively small at only 47% of GDP and highly driven by retail investors, compared to over 100% of GDP for most developed economies. The potential share of Chinese onshore equities and bonds in global equity and bond universes stands as high as 11% and 18%, respectively, on a free-float unadjusted basis.

Capital outflows remained subdued last year despite CNY depreciation pressure, while non-resident non-FDI inflows recovered to $267bn in 2017 after China revalued the CNY in August 2015. Both domestic retail and institutional investors favor fixed income and money market products, while their exposure to equities remains low. Further market deregulation, the transformation of the asset management industry, and opening to foreign investors should drive capital into onshore equities in coming years. Pension liberalization and increasing individual offshore investment will raise demand for professional wealth management services and shape the asset management industry (Liao and Cheung).

One area where China has so far made little inroads is the **globalization of the RMB** which remains marginal and presents as many risks and opportunities to China. The appetite of FX reserve managers for Renminbi assets returned last year, especially in Q2 as indicated by the IMF's COFER data. The involvement of central banks is important as it adds legitimacy to the renminbi market even as the onshore renminbi is not yet fully convertible (Kim et al. and Panigirtzoglou and Inkinen). However, the end of US dollar hegemony is probably still years, if not

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decades, away, despite serious long-term US issues, and rapid RMB internationalization to date (Hui).

Bond index inclusion of Chinese onshore equities and bonds began last year and is intensifying this year. On January 31, 2019, Bloomberg announced that Chinese RMB-denominated government and policy bank securities will be added to the Bloomberg Barclays Global Aggregate Index starting April 2019 and phased in over a 20-month period. Our global index team estimates that inclusion of China in the major fixed income benchmarks could generate as much as $250-300bn inflows. The enhanced accessibility and favorable policy measures have brought the RMB-denominated bond market in scope for potential eligibility in prominent global bond indices, including the J.P. Morgan Emerging Markets Government Bond Index Global Diversified (GBI-EM GD) and the FTSE World Government Bond Index (WGBI).

Equity index inclusion: China's total share in EM equity indices is expected to rise from around 30% currently to above 50%, implying equivalent total share of China in world indices at around 5.5%. This includes both onshore and off shore exchanges. China's onshore A-shares entered the major equity indices in June 2018, entering the MSCI China and MSCI Emerging Markets indices, with a 5% inclusion factor. So far, purely passive investor inflows have been small. China's A-shares now have a 0.7% weight in the MSCI Emerging Markets Index and attracted approximately $2 billion of passive inflows. FTSE has announced plans to include China A-shares, phasing in between June 2019 and March 2020. In the initial phase, we expect China A-Shares to constitute 5.5% of the total FTSE Emerging Index, with the potential to attract $10-15bn of passive inflows and as much as $100bn, if active inflows are included.

A key requirement for globalization of the RMB and index inclusion to play out over the coming years is currency convertibility. And this is where the challenge lies with Chinese policy makers as currency volatility and uncertainty about China's currency regime have taken their toll over the previous years. Standard Chartered's Renminbi Globalization Index (RGI index) declined between 2015 and 2017. It rose modestly this year helped by Chinese reforms to open their onshore equity and bond markets to international investors and by index providers announcing the inclusion of onshore Chinese equities and bonds to their indices

China's nearly $100bn in **green bond** issuance in three years cements it as a leading player in using the instruments to help achieve its environmental goals. Regulators are increasingly turning to financial markets through such initiatives as carbon trading and corporate environmental transparency to address air and water pollution challenges. Chinese companies will be forced to confront their laggard environmental disclosure practices, and worse environmental, social and governance (ESG) performance (Elders).

What **returns and risks** can we expect from onshore bonds and equities? China's equities have produced returns well below what should be expected given its superior economic growth within EM and globally, returning only 3.2% annually over the past 10 years compared to over 10% for the S&P 500. This underperformance is largely due to regulatory problems, dominant SOE sectors that are not profit oriented, a relatively closed capital account and the investor base. Regulatory reform, institutionalization and openness are key to equity market development (Zhu, Chen and Cheung).

China Government Bonds. The stock of China's government bond (CGBs) market has grown to reach $2.1 trillion. Over the past four years, total returns have slumped to an annualized 0.6% in USD terms as CNY weakened, compared to 7.4% total returns in the decade ending 2014. With policy rates expected to stay low for long in the context of moderating growth, CGBs offer international investors: 1) a return-volatility ratio commensurate with both a global cross-asset portfolio and a global government bond portfolio; 2) real long-term yields reasonably compensating for China's rising public debt and the narrowing current account balance; and 3) low cross-correlation with other DM and EM bond markets. However, the scope for CNY FX outperformance to enhance total bond market returns appears limited beyond the normalization of an arguably expensive global USD, and shorter-term events related to a trade war truce and China's fiscal stimulus (Shridharan and Luk).

In Credit, we believe that China's onshore **corporate bond** market will evolve into an important funding source for corporates, as it is in other developed markets. At present, capital markets make up only a small share of total social finance (14.2%), compared to 72.3% for bank lending. The onshore bond market is highly concentrated in AAA and AA-ratings and does not provide much credit differentiation. The entry of foreign rating agencies and stronger regulation can play key roles in this regard. While painful at the moment, the recent rise in the onshore default rate signals a maturing market. A more rule-based and consistent regulatory framework should also increase the appeal of onshore corporate bonds to foreign investors, which have thus far focused largely on the offshore bonds

issued by Chinese corporates. The total market capitalization of China's issuers in J.P. Morgan's Asia Credit Index has increased to $455bn by the end of 2018 from $25bn at the end of 2010.

The eventual opening and maturing of the onshore bond market should thus open up an even bigger space for foreign investors. It would also allow investors more flexibility to allocate between onshore and offshore markets, depending on their currency and rate views (Lim and Hughart).

Finally, how should the **international investor** approach China? Successful execution of the Made in China 2025 agenda probably renders MSCI China a structural overweight, though without corresponding strength in the currency. Regardless of the 2025 agenda, it still seems appropriate to think of **base metals** and **Metals and Mining stocks as inferior cyclical assets,** despite their cheapness (see also Kaneva and Shearer). As long as Chinese fixed investment continues to slow, China-related cyclicals will keep on underperforming within Equities. Should the 2025 agenda fail or be delayed materially due to the US-China conflict, shorting the currency offers better risk-reward than underweighting Chinese Equities given relative valuations (Normand).

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Through the looking glass: China in 2030

- **China's growth potential will slow from the current 6.5% level to 5.5% in 2021-25 and 4.5% in 2026-30.**
- **This means that China will remain the second largest economy much longer than expected.**
- **The transition to slower potential growth could be volatile and requires balancing reforms to move to a more domestically driven growth model with deleveraging and public-sector restructuring.**
- **This will reshape China's role in the global economy**
- **China's high debt remains a key risk factor and without accelerated disposal of zombie public-sector firms, the economy could be forced to adopt a zero interest policy.**

China's inexorable economic rise is not inevitable

The rise of China as the new economic powerhouse is the most remarkable change in the global economy in the last 40 years. But this was not inevitable. In the aftermath of the ravages of the Cultural Revolution it was almost unimaginable that within the next three decades China would emerge to be the second-largest economy in the world. China's successful transformation was largely a result of hard reforms and some luck. The reforms of the 1980s and 1990s liberalized a tightly-controlled extant economy and opened the door to a market economy. They came at a very high cost before their rewards spread through the economy. A critical element behind China's success was its entry into the WTO and the global trading system in the early 2000s that coincided with the rise in the globalization of manufacturing. Over the next two decades China not only took full advantage of the expansion in global supply chains to become the fastest growing economy in the world but continued with reforms across the economy, albeit at a more incremental pace than in the past, to safeguard and enhance the hard-earned economic gains.

As the economy expanded, the labor force aged, and global trade slowed after the global financial crisis, China's growth declined from the double-digit average of the previous three decades. At the same time, with the rapid rise of the Chinese economy there has been growing uneasiness in the DM world regarding the favorable status extended to China at the time of entering the WTO, including industrial policies and market access restrictions. The current trade and non-trade tensions between China and the US are a reflection of such concerns. But more importantly, even the declining growth in the last decade has been driven less by productivity gains and more by leveraged investment that has resulted in debt ballooning to over 260% of GDP. China has embarked on rebalancing the economy away from its over-dependence on exports towards more domestic sources of demand through reforms to expand the role of the private sector, restructure state-owned enterprises, raise productivity, and reduce the economy's leverage.

We expect China's potential growth to slow from the current level of 6.5% to 5.5% in 2021-25 and then further to 4.5% over 2026-30. But a smooth transition is not inevitable. It will require continued reforms that shift the sources of growth on the demand side to consumption and on the supply side to higher productivity by restructuring the public sector and increasing private sector participation, while reducing leverage to a more sustainable level, changing its industrial policies, and increasing market access to foreign competition. These are all doable and as China has proven in the past it is capable of implementing hard reforms and bear their attendant costs. However, there is still the question of balance and timing. For example, a slower pace of reforms could force growth to be supported by more leveraged investment instead of productivity thereby worsening China's debt burden and intensifying investor concerns. Similarly, while the US-China trade tensions appears prima facie as a bilateral issue, China's continued reliance on industrial policies to buoy public enterprises and curbing market access to foreign manufacturing and services could well intensify and expand into a global concern.

Where China stands today in the global economy

Despite slowing down in the last few years, since the start of economic liberalization in 1978 China's growth has averaged 9.6% in the past 40 years, and China's share in the global economy increased from 1.8% in 1978 to 15.2% in 2017 (Figure 1).

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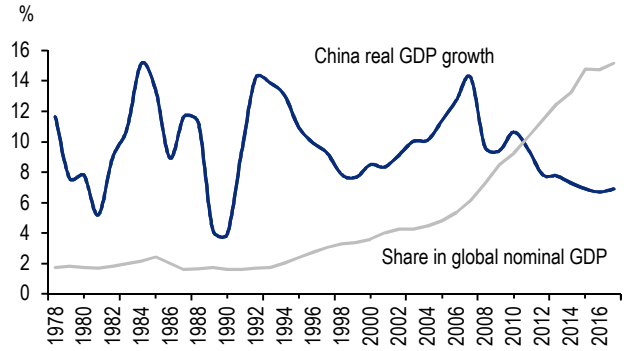
Figure 1: China's economic growth and share in global economy

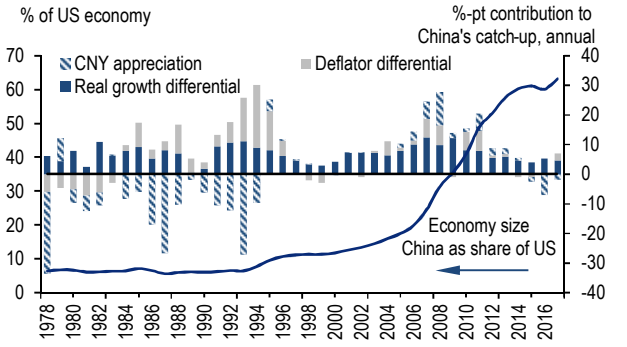


Source: World Bank, J.P. Morgan

There were three supercycles in China's economic growth in the past 40 years. The first cycle was between 1978-90, when the growth picked up from 5-8% and peaked at 15.1% in 1984, then declined to ~4% in 1989-90. The first wave of strong economic growth was due to reform in the agriculture sector and in developing township enterprises. The second cycle over 1991-99 saw growth first accelerate to 14% in 1992-93, benefiting from domestic policy stimulus (in response to the DM sanctions in the aftermath of Tiananmen Square events in 1989), and then slow to 7-8% in late 1998-99. During this period China experienced the 1994 reform (including SOE reform, exchange rate reform, fiscal reform, etc.) and Asia Financial Crisis. The third cycle was after 1999, with 2007 as the peak year. Growth accelerated from 7.7% in 1999 to 14.2% in 2007, benefiting from the 1998 housing reform, WTO access in 2001, and urbanization (land financing and industrial park model). Growth has slowed thereafter, particularly post-GFC to 6.5-7%.

Despite the economic slowdown in the past decade, China's contribution to global economic growth stands at around 30% and it became the second-largest economy in 2010. Relative to the US economy, China has increased from 11.8% in 2000 to 63.1% in 2017 (Figure 2).

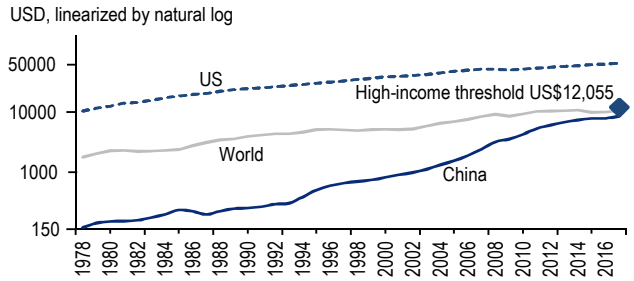
Figure 2: China's catch-up with the US



Source: World Bank, J.P. Morgan

The catch-up process was in part driven by higher nominal GDP growth and in part due to currency appreciation (cumulative 21.1% appreciation over 2000-17, especially in 2005-13 when CNY appreciated by 26.3% against the USD). This catch-up appears more dramatic when set against the average global per capita income (Figure 3).

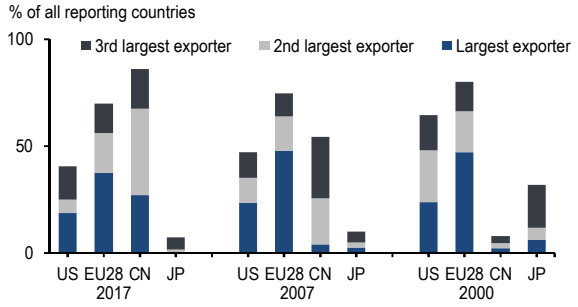
Figure 3: GDP per capita



Source: World Bank, J.P. Morgan

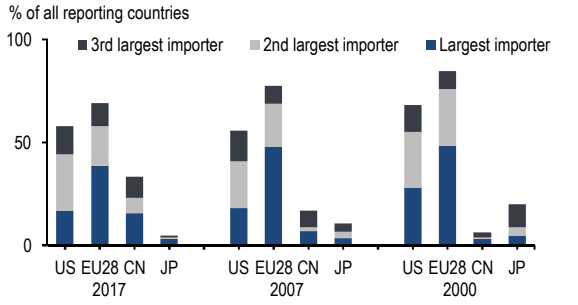
Much of this rise has been due to expansion in trade. In 2017, China was the number one source of imports in 27% of the countries in the world increasing from 2.3% in 2000 and was among the top three importing sources for 86% countries. China was also the number one destination for exports for 15.6% countries in 2017 (versus 3% in 2000) and among the top three destination for 33.5% countries in 2017 (Figures 4 and 5).

Figure 4: Number of times as top origin



Source: UNComtrade, J.P. Morgan
Note: Data points where EU members reporting EU as the largest partner are excluded

Figure 5: Number of times as top destination



Source: UNComtrade, J.P. Morgan
Note: Data points where EU members reporting EU as the largest partner are excluded

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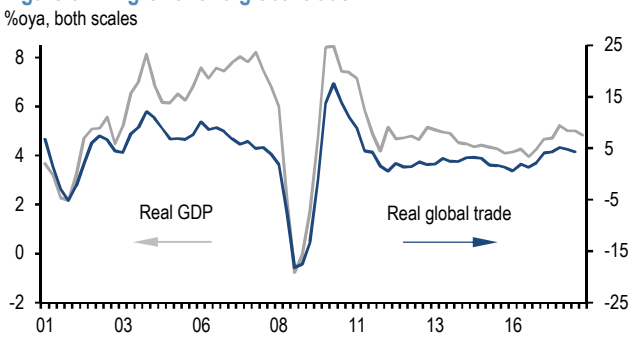
Key medium-term changes

China's success in economic growth has benefited from both external (globalization) and domestic (market-oriented reform and open-up policy) reasons. These factors have changed in recent years and have affected China's growth dynamics, and such an impact will continue to exist in the medium term.

First, globalization has slowed markedly since the GFC and political support for further expansion has waned significantly across DM economies. Despite recovering since 2015, world trade growth has floundered in recent years and with that the fortunes of EM economies waning in general and export-oriented economies like China in particular (Figure 6).

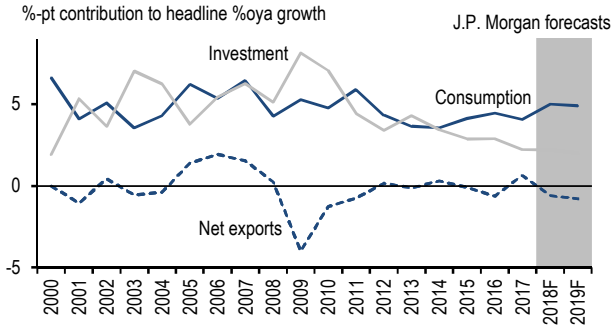
Figure 6: EM growth and global trade



Source: National sources, CPB, and J.P. Morgan

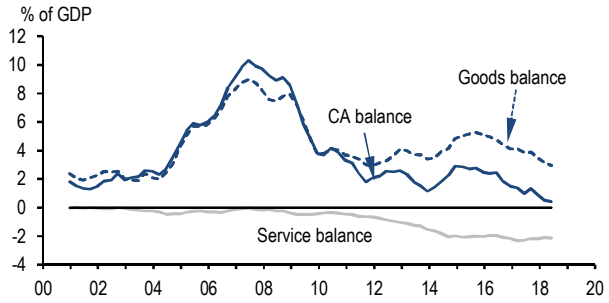
Second, China has been a current account surplus (CAS) country since it joined the WTO in 2001. For many years, net exports have been a key contributing factor to China's fast growth (Figure 7). It peaked in 2007 with CAS at 9.9% of GDP (Figure 8), with net exports contribution to GDP growth at 1.5%-pts. Since then, China's CAS has continued to decline, falling to 1.3% of GDP in 2017 and most likely below 0.5% of GDP in 2018. In the next one to two years, it is very likely that China will turn from a CAS country to a current account deficit (CAD) country (our forecast is a CAD of 0.3% of GDP in 2020). Such a change has two-sided implications. On the one hand, China will need to increasingly rely on domestic demand, while on the other hand, China's role in the global economy will shift from supply side (biggest exporter) to the demand side as one of the fastest expanding consumption markets.

Figure 7: Contribution to headline GDP growth



Source: NBS, J.P. Morgan

Figure 8: China current account balance



Source: SAFE, J.P. Morgan

Third, on the domestic front, there will be continuing effort to transform from an investment to a consumption driven growth model. In the aftermath of the GFC, China rolled out a large-scale stimulus plan, mainly via investment. Excessive investment has led to a decline in investment efficiency and other structural problems. But a fundamental problem is that high investment, high output, but low domestic consumption cannot coexist with relatively weak global demand. Therefore, the transformation from investment to consumption is a necessary part of China's rebalancing.

Fourth, as the economy shifts from being a CAS to a CAD economy, China will move from an excess-savings economy to a deficit-savings economy despite the likely decline in investment (Figure 9). This decline in the savings rate will be felt across both households and corporates. The adjustment has already started in recent years and will continue going forward ("China's saving rate", H. Zhu, G. Ng and M. Chen, 1 July 2016). Part of the decline, of course reflects the ageing of China's population, which will become more severe in the coming decade (Figure 10, also see below discussion).

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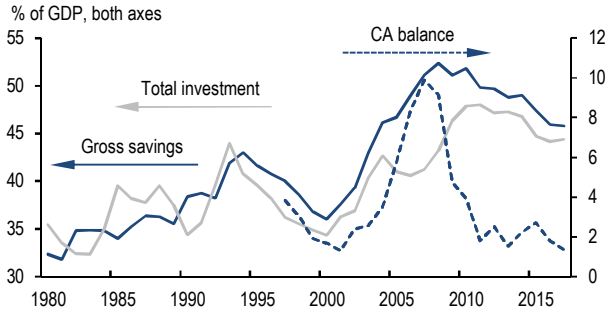
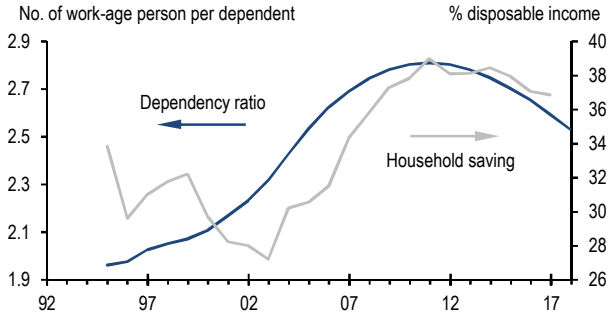
Figure 9: China savings, investment and current account



Source: IMF-WEO, J.P. Morgan

Figure 10: Dependency ratio and household savings

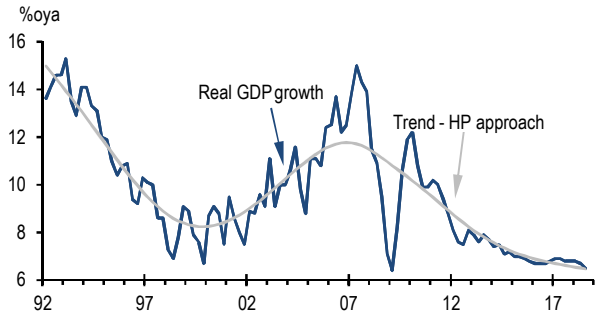


Source: J.P. Morgan

China growth potential will further slow down to 4-5% in next 10-15 years

In 2013, we forecasted that China's potential growth would slow down to 6.5% by 2020, which is pretty close to the actual economic developments (*China's growth trend to slow below 7%*, H. Zhu and G. Ng, 1 Feb 2013). An updated analysis (using both statistical—HP filter—and analytical—production function—methods) suggests that China's potential growth has indeed declined from 11-12% in 2007 to currently around 6.5% (Figure 11).

Figure 11: China's economic growth

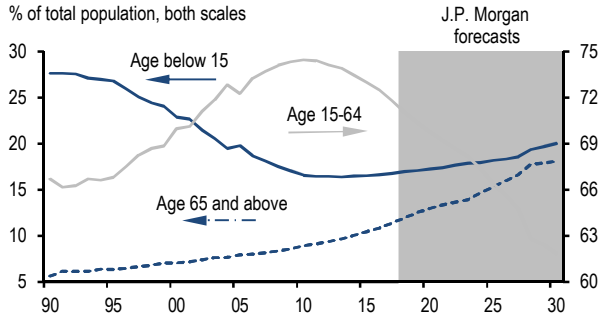


Source: NBS, J.P. Morgan

We use the production-function based approach to forecast China's growth potential in the long run (2018-2030). Overall, we estimate China's growth potential will slow from the current level of 6.5% (over 2016-20) to 5.5% in 2021-25 and 4.5% in 2026-30. This decline reflects a number of factors that are enumerated below.

Population ageing. China's one-child policy, introduced in the 1980s, has had a major impact on demographics. China's large population base, especially in rural areas, has been a key contributor to China's economic miracle in the past decades. However, since 2011 the working-age population has been gradually on the decline. Despite the relaxation of one-child policy to two-child policy in recent years, the birth rate has stay at low levels (1.2-1.3%) in recent years. We expect the birth rate will rise modestly to 1.6% by 2030, but China's total population may peak at around 1.5 billion in 2027 and then start to decline. In addition, the ageing of the population has become more severe. The share of the population aged 65 and above rose from 5.6% in 1990 to 11.4% in 2017, and is expected to further increase to 18.1% by 2030 (Figure 12). As a reference, the United Nations defines an ageing society as one in which more than 7% of the population is over the age of 65.

Figure 12: China's demographic structure



Source: NBS; J.P. Morgan estimates

Shrinking labor dividend. Labor input contribution in the production function-based approach refers to total employment in the non-agriculture sector, hence it depends on three factors: 1) total number of working-age population; 2) employment ratio in working age population; and 3) the ratio of non-agriculture employment in total employment As discussed above, the total number of working-age population has started to decline in China, and will likely continue to be a drag going forward. The low birth rate will likely lead to further relaxation in the "two-child" policy, and retirement age will be postponed to increase the scope of economic active population. In terms of employment ratio in working-age population (similar to labor force

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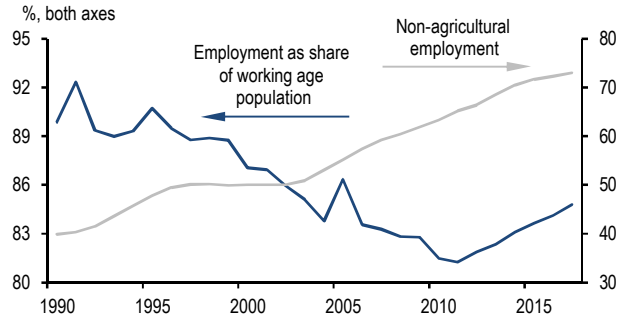
participation ratio), the ratio gradually came down from around 90% in the 1990s to 80-85% in recent years (Figure 13), and we expect it will be around 80% until 2030. Support for the labor dividend mainly comes from the urbanization process, i.e., increasing ratio of non-agriculture employment in total employment. Over the years, the ratio moved up from about 40% in 1990 to 73% in 2017. We expect the pace of urbanization will slow down, but the urbanization process will continue, and the ratio of non-agriculture employment will rise to 80% by 2025 and 82% by 2030. Taking all factors together, labor contribution to China's GDP growth was on average 1.6%pt in 2000-15, and will come down to 0.8%pt in 2016-20, 0.4%pt in 2021-25, and 0.1%pt in 2026-30.

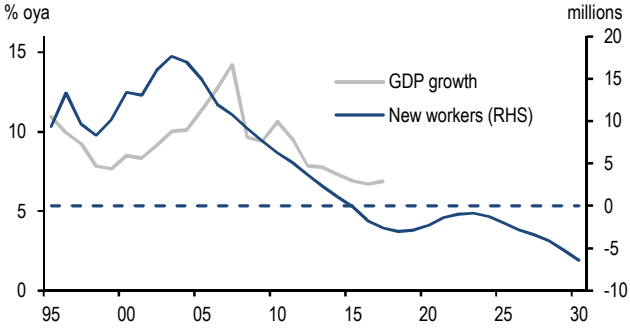
Figure 13: China's employment



Source: NBS, J.P. Morgan

At the same time, the decline in the labor force provides China's policymakers the space to tolerate a lower growth rate without having to worry about creating a vast number of jobs every year. In popular discourses, it has often been argued that China cannot afford to slow growth as it needs to create millions of new jobs to employ new workers entering the labor force each year and, in turn, maintain social stability.

Figure 14: Demographics and growth

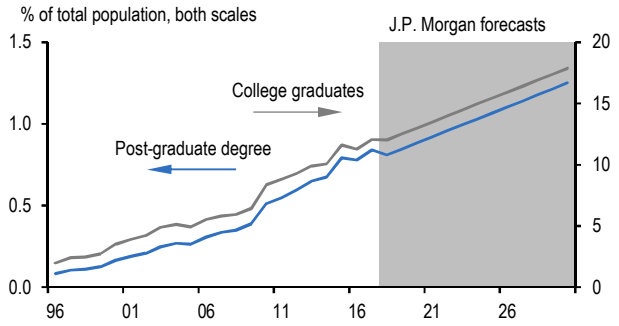


Source: UN Population statistics and NBS

As Figure 14 shows that this was the case in the 2000s when 9-10 million new workers entered the workforce each year (measured as change in the working age population). But that is no longer the case. Since 2015, the net addition to the workforce has been negative and will likely to be so in the coming decades. Clearly, the need to create jobs, especially higher paid ones, will be there as in any other country. But the pressure to keep growth up just to maintain social stability is now much less.

Human capital. Human capital is measured as the average schooling level, which has generally improved and is a stable contributing factor to China's GDP growth. The share of college (and above) graduates was only 2% of total population in 1996, and surpassed 10% in 2013 and reached 12.9% in 2017. We expect the ratio will continue to rise to 19 % by 2030, and its contribution to GDP growth will be pretty steady at 0.7%pt in 2021-30.

Figure 15: China's human capital



Source: NBS; J.P. Morgan estimates

Capital input. Investment has been the most important growth engine in China, especially after the GFC. Capital input on average contributed 4.8%pt to China's GDP growth in 2008-15. In recent years, with the efforts for economic rebalancing, especially with the progress in supply-side structural reform that focused on overcapacity reduction and constrained investment in overcapacity industries, investment growth has continued to slow down. But overall, the pace of economic transformation has been gradual: according to the IMF, investment still accounted for 44.4% of China's GDP in 2017 (versus the peak of 48% in 2011), and will stay at 41.5% in 2023, still one of the highest in the world (Figure 16).

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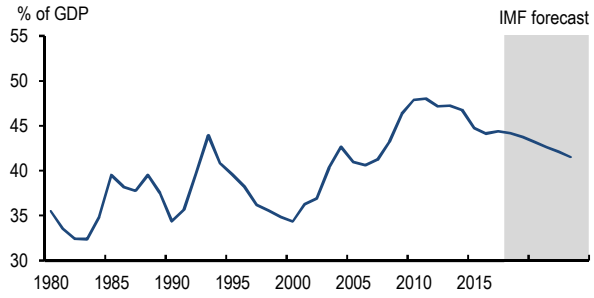
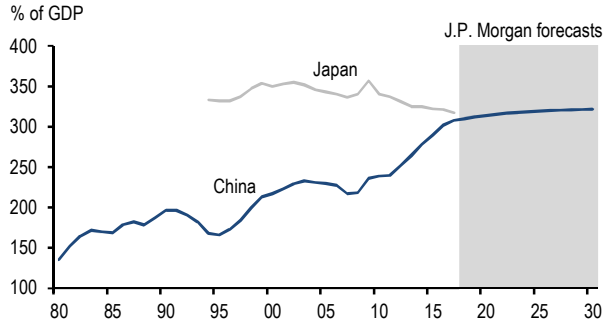
Figure 16: China total investment



Source: IMF-WEO, J.P. Morgan

From a stock perspective, China's capital stock (measured as a percent of GDP) started from a low level (150% in the early 1980s) but has risen rapidly. In 2012, China's capital stock exceeded 250% of GDP. We estimate that China's capital stock further increased to 308% of GDP in 2017, the same level as Japan (Figure 17). The rapid increase in investment has led to excessive investment and the necessity for economic rebalancing. In our forecast, we expect China's capital stock will further increase to 320% of GDP by 2030, and the investment/GDP ratio will come down to 42% by 2020 and 36% by 2030. Based on these assumptions, the capital input contribution to growth will average 3.3%pt in 2016-20, 2.2%pt in 2021-25, and 1.7% in 2026-30.

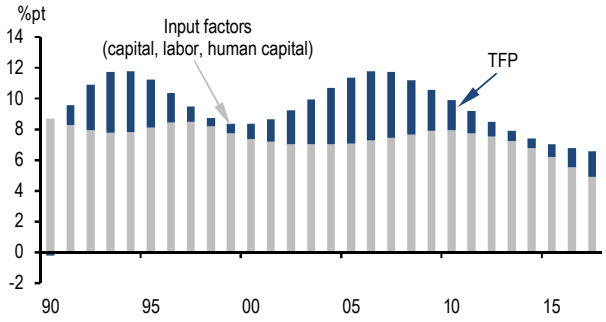
Figure 17: Capital stock



Source: NBS, Economic and Social Research Institute, J.P. Morgan

Productivity. The decline in total factor productivity (TFP) since the GFC has been the main contributor to the decline in China's potential growth. In particular, the TFP contribution fell from 2.7%pt in 2000-07 to 2.0%pt in 2008-15 and around 1.5%pt in recent years. The good news is that TFP contribution seems to have stabilized in recent years (Figure 18). If China sticks to the reform agenda as laid out in the 3rd Plenum Session of the 18th CPC Party Congress, TFP contribution could pick up again in the coming years. Our baseline scenario assumes that TFP contribution will gradually pick up to 2%-pt by 2030 (from the current 1.5%pt). It is unlikely to move back to the 3%pt range as observed in 2000-07 because further productivity upgrades will take more effort than in earlier stages, and China will most likely continue to adopt a gradual-reform strategy going forward.

Figure 18: Contribution to potential growth



Source: J.P. Morgan estimates

Looking back, there were two episodes when TFP increased notably (to above 4%-pt) – one in 1993-95 and the other in 2002-07. Reforms played a critical role in both episodes. In the first episode, in response to very weak economic growth in 1989 and 1990 (4.2% and 3.9%, respectively) and sanctions from major industrialized economies, Deng Xiaoping made his famous south China tour speech in early 1992 and reaffirmed the reform program. In the years after, the government implemented fiscal reform, financial reform, and exchange rate reform, and encouraged non-SOE developments, and tackled the SOE problems. The SOE reform and factor reforms significantly improved efficiency in the economy. In the second episode, the WTO access by China in 2001 opened the gate for China to participate in the wave of globalization, supplemented by domestic policies to improve infrastructure and promote industrialization.

Possible sources of further productivity growth could come from the following areas. First, China's urbanization process is still incomplete. The urbanization rate was 58.5% in 2017, and the *hukou* population is only 42.4%. The new urbanization process, which focuses on the settling of rural workers in urban areas not only as workers but also as citizens (with social security coverage) and consumers, will have major potential to increase consumption and investment demand. Rural land reform could be critical in addressing funding for the new urbanization process. Second, China has a comprehensive manufacturing structure and a skilled labor force, which can support innovations and industry upgrade if the government continues market-oriented reforms. Third, the large domestic market itself enables China to develop deeper trade ties, and reforms to unify the domestic market should also improve efficiency.

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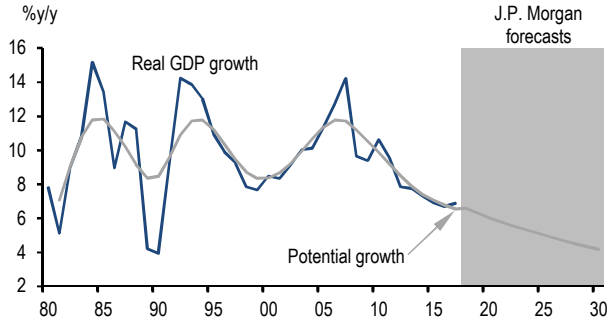
To sum up, we estimate that China's growth potential will slow down further in the next decade (Table 1 and Figure 19). For a country that has experienced an average growth rate of 9.6% in the past 40 years, a growth rate in the range of 4-5% might be disappointing. But for the second-largest economy in the world, we see such a growth rate as healthy and encouraging. Moreover, we estimate China's GDP per capita will increase to close to $20,000 by 2030.

Table 1: China's growth potential

	TFP	Capital	Labor	Education	Growth potential
2000-2007	2.7	4.7	1.7	1.1	10.1
2008-2015	2.0	4.6	1.6	0.8	9.0
2016-2020	1.6	3.4	0.8	0.8	6.6
2021-2025	1.9	2.3	0.4	0.8	5.4
2026-2030	2.0	1.7	0.1	0.7	4.5

Source: J.P. Morgan estimates

Figure 19: China's economic growth



Source: NBS, MOHRSS, Ministry of Education, J.P. Morgan

How will the economy look in 2030?

First, it will take longer than expected for China to surpass the US to become the largest economy in the world. Many investors expect it will happen over the next 5-10 years, based on the rapid catch-up since 2000. Going forward, the pace of the catch-up process will depend on three factors: growth differential (in real terms) between China and the US, GDP deflator differentials, and USD/CNY exchange rate movements. In our baseline scenario, if China's growth gradually slows down to 4-5% (while the US economy grows by 1.5-2% in the long run), the GDP deflator stays at around 3% (versus 2% on the US side), and the CNY depreciates against the US by about 10% (cumulatively), China's economy will continue to catch up with the US, but likely reach 90% of the latter's size by 2030.

Second, China's economic structure will become more consumption-oriented. We expect the share of consumption in China's GDP will exceed 60% before 2025 and will likely increase to around 65% by 2030, in line with the rest of the world. By contrast, the share of capital formation in GDP will gradually decline to 36% by 2030.

Third, China will become a major source of global demand, not only in commodity demand but also in other products. This is driven by the change in current account balance and the shift in domestic demand. On the one hand, China's global share in exports will likely peak off but its global share in imports will further increase. On the other hand, the shift from investment to consumption-driven growth model suggests that China's demand will shift from investment-related commodity products to service-related products.

China's debt problem

Our analysis has so far not addressed the possibility of a major financial or economic crisis for China, which should not be ruled out ex-ante. Over the years, the biggest concern regarding financial stability and the sustainability of economic growth has been China's ballooning debt problem, especially in the corporate sector. Since late 2016, the government has taken deliberate steps to encourage deleveraging. Since then, the debt level in the non-financial sector has started to stabilize at around 265-270% of GDP, and also encouragingly the regulatory loopholes in shadow banking activity has been addressed and new rules on asset management products and wealth management products are introduced to end irregular practices (e.g., implicit guarantee, maturity mismatch, etc.).

China's debt problem, however, is largely structural (Figure 20). Corporate debt is among the highest in the world at 162% of GDP, and concentrated in SOEs, local government related entities (not officially recognized as local government debt), and a few sector dominated by non-SOEs (e.g., real estate and mining industries). In some cases it is ambiguous to draw a line between corporate debt (SOE and local government related entities) and government debt, because of prevalent implicit guarantees especially from local governments. By contrast, central government debt is healthy at 16% of GDP. Household debt has also climbed up quickly in recent years, from 17.5% of GDP in 2008 to the current level of around 50%, in line with the world average but higher than the average in emerging market economies.

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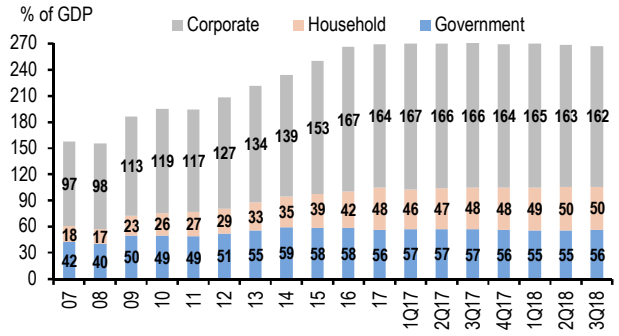
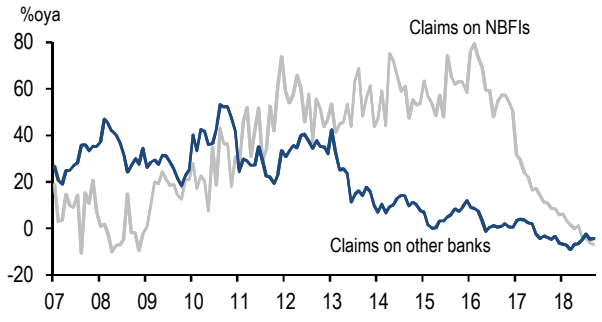
Figure 20: Total social debt



Source: PBOC, NBS, J.P. Morgan

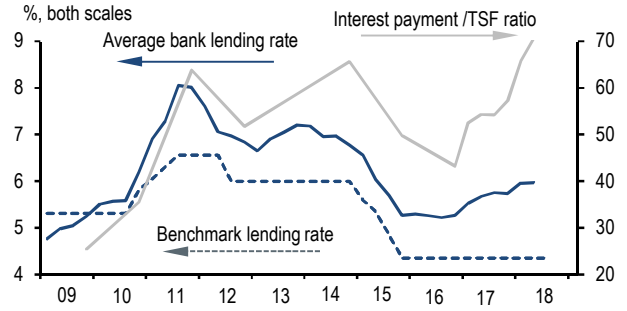
The biggest dilemma to address the debt problem comes from the tradeoff between debt sustainability, growth and monetary policy. At the current debt level, average annual interest repayment burden of non-financial sector (using average bank lending rate) is equivalent to 70% of annual total social financing (TSF flow, Figure 22). This implies that only 30% of new TSF flow can be used to support new economic activity, which is a key reason why credit policy transmission has been weakened in recent years. In addressing the debt problem, policymakers should avoid a debt-deflation cycle in which tight monetary policy and debt reduction jointly leads to slowdown in economic activity and increases disinflationary and deflationary pressures. If this were to occur, then the debt/GDP ratio will continue to climb despite deleveraging efforts, which, in turn, will force further policy tightening, worsening the situation. On the other hand, an accommodative credit policy (i.e., credit growth significantly above nominal GDP growth) will be growth supportive but runs the risk of fueling leverage (Figure 23).

Figure 21: China interbank assets



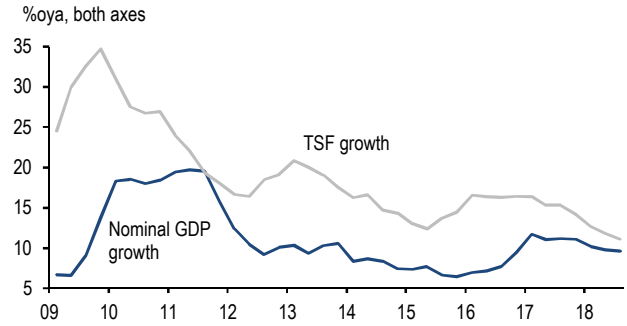
Source: PBOC, J.P. Morgan

Figure 22: Interest payment burden of China's debt



Source: PBOC: J.P. Morgan

Figure 23: Credit growth versus GDP growth



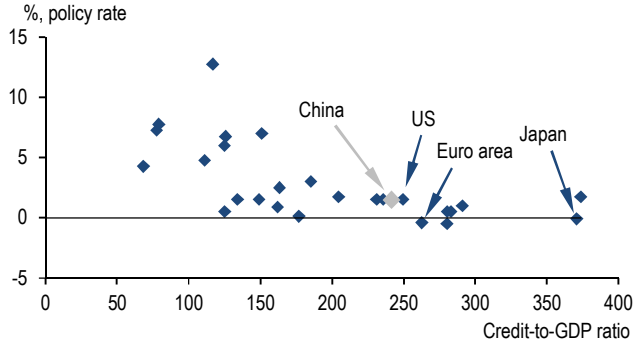
Source: PBOC, J.P. Morgan

In our view, the right policy combination should include low rates (to reduce interest rate burden), prudent credit policy (to reduce or at least stabilize the debt level), tightened credit standards and accelerated disposal of bad debt (to improve credit efficiency). All three elements are important. Since 2017, China has kept interest rates at historically low levels and tightened credit policy; meanwhile, the write-off of bad debt has somewhat been accelerating. The pace of bad debt disposal is still lagging; in particular, the continued prevalence of implicit guarantees for SOEs has been a major distortion in the credit market (a key reason why banks prefer to provide credit to the public over the private sector). This protection of "zombie" SOEs should be removed and the proper bankruptcy scheme (legal based and market oriented) should be established to help an orderly restructuring of such firms.

The longer China continues to delay the disposal of zombie SOEs, the more it risks amplifying market distortions and reducing productivity growth. In addition, it is not by coincidence that countries with the highest debt levels generally have low interest rates (or even negative interest rates, Figure 24). The PBOC may become the next major central bank to move towards zero interest rate

policy, before the debt problem goes out of control sending the economy into a crisis.

Figure 24: Policy rate and debt level



Source: BIS, J.P. Morgan

More generally, reforms that induce higher productivity should not be delayed because of the adjustment costs that these might entail. It is important for China to increasingly promote and pursue productivity gains as a source of growth. Not doing so will exert pressure to keep growth buoyed by increasing investment through easy credit that will worsen the debt problem further raising investor concerns. The path to a smooth transition of the economy is not guaranteed. It requires balancing reforms to rebalance the economy towards greater reliance on domestic sources of demand, restructure SOEs to increase efficiency and reduce leverage, and allay the global community's concerns over unjustified use of industrial policies and curbs on market access.

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Global Economic Research
J.P. Morgan Perspectives
31 January 2019

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China and the global economy

- **After rapid gains, China's share of the global economy is projected to stabilize a bit below 20% over the coming decade.**
- **A 1%-point correction in China has dampened rest-of-world growth by 0.4%-point on average since 2000. This relationship is changing, however, and likely diminishing.**
- **The projected 2%-point slowdown in Chinese potential growth over the coming decade is estimated to dampen global potential annual growth by 0.4%-point.**
- **Slowing productivity growth in China should dampen wage inflation, but continued upward pressure compositional shifts could be inflationary for global economy.**

The rise of China over the past three decades has altered the global landscape in terms of its direct contribution to economic activity as well as its impact on production and demand dynamics across the rest of the world. With potential growth in China now expected to slow over the coming decade (as outlined above), the impact on the global economy will also be material. In this section, we examine China's evolving relationship with the global economy and consider how this relationship will change as China's economy continues to mature (and decelerate) in the coming years. Several points are made:

- **Bigger seat at the global table**. The incredible rise in China's economy has lifted its share of global GDP from 2% in 1990 to 17% as of 2017 (in market-exchange rate terms). The jump has come largely at the expense of Developed Market (DM) economies outside the US, while other parts of the EM have also gained share.
- **Shifting tides mask steady growth contribution**. Despite the slowing in China growth from 10-12% in the 2000s to 7-8% in the current expansion, its rising share of the global economy has kept China's contribution to global growth remarkably stable at roughly 1%-point per year this expansion. Put differently, China has comprised roughly one-third of global growth since 2010. With potential growth in China projected to slow by 2%-points over the coming decade, however, China's share of global GDP is likely to stabilize under 20% and so its contribution to global growth will slow to less than 0.8%-point.
- **China matters for the global economy**. Owing in part to its size but also importantly to its role in the global production chain, developments in China matter for the rest of the world. As a downstream processor for global industry, moves in China factory output are a useful lens on the global cycle. At the same time, China's large base of domestic demand provides an important causal link to growth dynamics throughout global industry. On average since 2000, a 1%-point GDP correction in China has a 0.4%-point impact on the rest of the world (for a total global impact of 0.6%-point) over four quarters.
- **But China's role has diminished somewhat**. China appears to have become less connected to the rest of the world over the past half-decade. Chinese correlations of GDP (and manufacturing output) have declined both with DM and even with EM. Some of this may be cyclical in nature and relate to the rolling deleveraging cycles across DM and EM over the expansion. But some may also be structural, as China turns inward with increased consumer service sector spending that shifts the composition of growth away from imported goods and commodities.
- **Slowing China potential to damp global growth 0.4%pt**. Based on recent IMF work, we extrapolate that the projected 2%-point slowdown in China potential growth over the coming decade could damp global potential GDP growth by roughly 0.4%point. The impact will be particularly felt by commodity exporters while the US will be more insulated given the resulting fall in commodity prices. A greater shift in China's growth composition will shift the distributional impact of the slowdown.
- **China inflationary forces rising despite growth slowdown**. For nearly two decades, China has been a significant disinflationary force as its cheap labor and rising exports has damped global goods pricing. While slowing productivity growth will be a headwind, a rising middle-class that is higher skilled will demand higher wages, which are already not nearly as competitive as they were upon enter WTO in 2001. Such a turn could weigh on corporate margins.

China's rise

China's rise as an economic powerhouse has been remarkable. From its inclusion into the WTO in 2001 and up until the Great Recession, GDP growth averaged roughly 11% annualized. This boomy pace was fueled by a surge in fixed asset investment, as well as robust external demand. Aided in no small part by a weak-currency policy that yielded a stunning surge in FX

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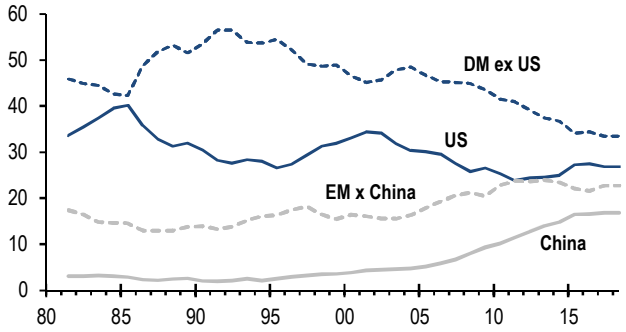
reserves to $4 trillion at its peak in 2014, China was able to tap into an abundant supply of relatively cheap labor to greatly expand its manufacturing sector to meet this rising export demand.

As a result, China's share of global output has surged from about 3% to 17% over the past two decades. At the same time, China's climb has helped lift other EM economies, which in aggregate (excluding China) have seen their share of global activity rise from 16% in 2000 to 23% as of 2017. While the US has lost some ground, the rise of EMs has come largely at the expense of other developed markets—particularly Japan (Figure 1).

Figure 1: Global nominal USD GDP shares

Percent

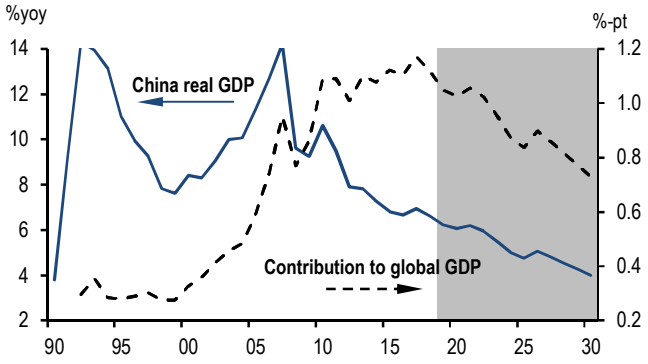


Source: IMF, J.P. Morgan

Over time, the export oriented growth model led to excesses (over-investment) and serious imbalances (high savings). In order to address these problems, Chinese officials have taken steps in recent years to shift to an economic model geared towards consumption and services, and to reduce the reliance on non-bank ("shadow") lending. This in part has resulted in GDP growth slowing to 6-7%. Along with slowing labor force growth, potential growth in China is expected to slow over the coming decade to under 5% annualized by the late 2020s. In the event, China's share of global output is likely to stabilize near its current level.

Concerns about how slowing growth in China would impact the rest of the world are understandable. Despite the downshift in Chinese GDP growth from double-digit gains to under-7% in recent years, China's rising share of global output has kept its contribution to global growth remarkably stable at over 1%-pt annualized, or somewhat more than one-third of global GDP growth, since 2011 (Figure 2).

Figure 2: China's real GDP contribution



Source: National statistical agencies, J.P. Morgan

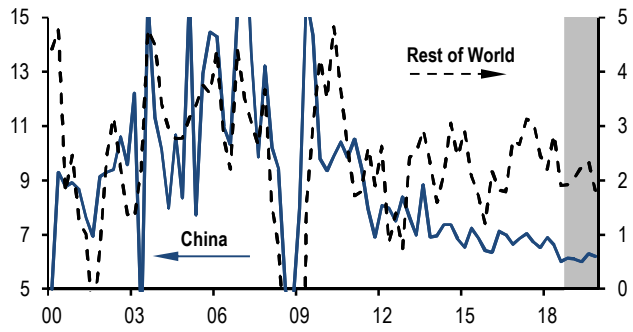
Chinese potential GDP is expected to slow in the coming years, in part due to intended policies to contain excess investment but also owing to headwinds from deleveraging and slowing population growth (See section above). Assuming China potential growth slows 2%-points as expected, and assuming more modest slowing elsewhere, China's share of global GDP will only edge up a little further and remain below 20% by 2030. With much slower growth, China's contribution to global growth will slip to below 0.8%-point.

Structural analysis highlights China links

Given China's increased scale in global activity over the past two decades, a slowing in its potential growth—and the rotation in domestic growth drivers—will have important implications for the rest of the world. In the last expansion, China's super-charged growth was geared strongly to the rest of the world. Large quarterly swings in growth coincided with large swings elsewhere. However, this expansion has been different. Growth volatility has declined in most countries but it has fallen precipitously in China (Figure 3).

Figure 3: Real GDP

%q/q, saar; both scales



Source: National statistical agencies, J.P. Morgan

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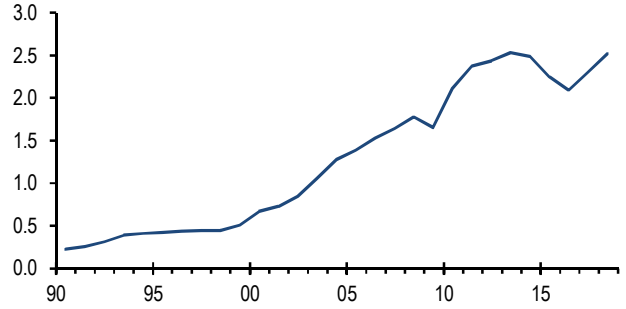
While the correlation of China with the rest of the world is still present in the current expansion, the reduced volatility in China's GDP growth indicates its gearing toward the global economy has moderated. The cause of the reduced volatility is unclear. Structurally, it could reflect the shift away from heavy industry. But it could also reflect a concerning shift to artificial data-smoothing by the national statistical agencies.

Figure 4: China imports of goods as a share of global GDP
% of global GDP, through2018

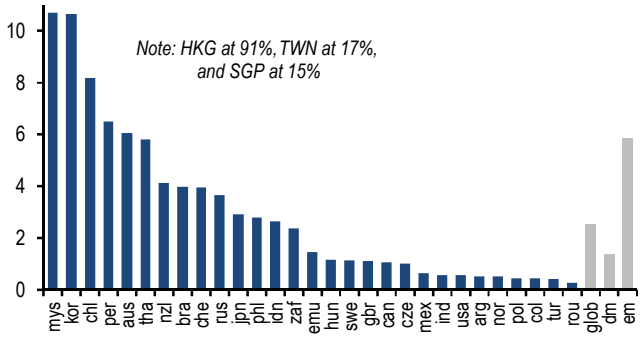


Source: National statistical agencies, IMF, J.P. Morgan

Shifts in Chinese growth are propagated to the rest of the world in various ways, including through trade and financial channels. China's importance as a global demand engine has grown rapidly in the last two decades (Figure 4). Imports of goods from the rest of the world were $2.1 trillion, or 2.5% of global GDP in 2018. For comparison, exports to the US from the rest of the world amounted to 3% as of global GDP last year (estimate based on available data). This greatly overstates China as a domestic demand engine. With roughly 50% of Chinese exports simply processed imports for re-export, China is still roughly one-half the demand engine of the US. Nevertheless, as China moves away from running a large current account surplus, its role as an independent demand engine will grow.

China's evolving role in the trading system will have important implications for existing linkages. Currently, emerging markets trade is more integrated with the region's largest economy (Figure 5). By contrast, DM is less exposed to transmissions of shocks through trade. DM exports to China as a share of GDP are a mere 1.4%, compared to 6% for EM. As China reduces its role as a re-exporter in coming years, there will be broader ramifications for its closest neighbors. Processing or intermediate goods make up a significant share of China's imports and other EM has benefited enormously in the past two decades from this. But as the composition of China's demand changes, the current distribution of beneficiaries is likely to shift as well.

Figure 5: Exports to China
% of GDP, 2018Q3



Source: IMF, J.P. Morgan

While the winners and losers of China's maturing are not set at this stage, EM appears to be more immediately. Intraregional trade and financial links between China and the rest of EM Asia are particularly extensive compared with those in DM. Moreover, in the event of any shocks or a hard landing during China's transition, capital flight back into safer DM assets lowers interest rates, mitigating negative spillover effects.

In previous research, we have quantified how a shock in China is transmitted over time to the rest of the world using a structural vector autoregression (VAR) that allows for lagged responses to country shocks as well as for dynamic feedback between each country. Specifically, a vector of real GDP growth (%q/q) for the US, Euro area, Japan, the rest of the DM, China, EM Asia (excluding China), Latin America, and EMEA EM, along with the growth rate of the price of oil, is regressed on its own lag from 1Q00 to 3Q18 (see "When China sneezes, who catches a cold?", J. Lupton and D. Hensley. 4 Sept. 2015 for assumptions).

Table 1 reports the China VAR impulse analysis (last column) alongside the impulse responses to real GDP shocks in the US, Euro area, and Japan for comparison. Economic shocks in China have a much larger impact on the rest of the EM than the DM. Within the DM, a China shock is larger for the Euro area and Japan than for the US. Specifically, a 1% real GDP correction in Chinese real GDP growth dampens growth in the rest of EM roughly one for one after four quarters. The impact is fairly broad-based, though slightly less in EM Asia. By contrast, the impact on the DM is only 0.2% of real GDP over four quarters. For the US, the impulse is negligible while for the Euro area and Japan it adds up to about 0.4%-pt. The US is more insulated given its role as a "safe haven" for capital flows.

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J.P.Morgan

Table 1: Impact of growth shocks on real GDP

%pt cumulative impact after 4qtrs from 1%pt real GDP impulse

	Impulse			
	USA	EMU	JPN	CHN
Global	1.2	0.8	0.2	0.6
Direct	1.6	1.9	1.2	1.8
Spillover	1.1	0.6	0.1	0.4
Developed	1.3	0.5	0.2	0.2
US	…	0.3	0.3	0.0
EMU	1.2	…	0.1	0.3
Japan	1.8	1.0	…	0.4
Emerging	0.9	0.6	0.0	1.0
Asia	0.6	0.5	0.0	0.5
Latam	1.5	0.7	0.2	1.4
EMEA	2.1	1.3	0.4	1.4

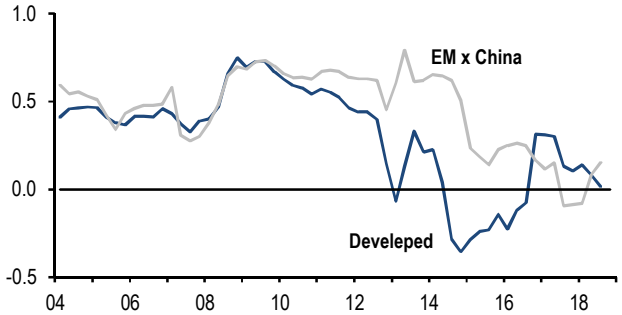
Source: J.P. Morgan; Sample 1Q00 to 3Q18. The spillover impact is the effect on GDP in the group excluding the impulse country. The global impact includes the direct impact of the country experiencing the shock (it is equal to its GDP-weightt multiplied by the cumulative 4-qtr impact plus the spillover effect multiplied by its weight).

Regional linkages are evolving

The VAR analysis is based on the average relationship from 2000 to 2018. While this is a useful guide, its application to future developments is limited given that China's role in the global economy has been evolving rapidly and is expected to continue evolving. The high frequency data suggest that there is some evidence China's linkages with the rest of EM are already changing. China is an important player in a complicated supply chain. It has played a large part in boosting growth in other EM economies, most notably its immediate neighbors. Its demand for commodities has also boosted growth in commodity exporting nations. This largely explains the strong correlation with Chinese economic activity over most of this expansion (Figure 6 and 7).

Figure 6: Correlation with China real GDP growth

Rolling 4-year (backward) correlation of %q/q GDP growth

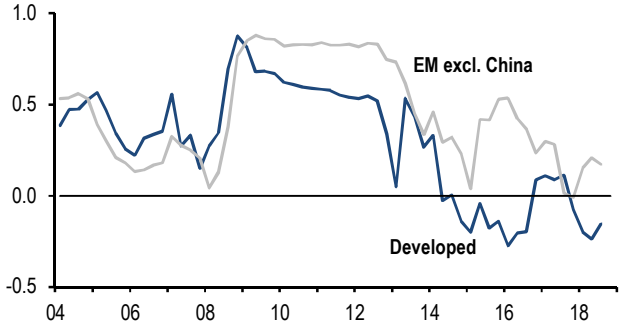


Source: National statistical agencies, J.P. Morgan

More recently, however, the relationship between China and the rest of EM has declined steadily, in terms of both GDP and manufacturing output. At the same time, the China-DM relationship remains weak. Some of this may be tied to the credit cycle and thus cyclical in nature. A likely large driver of the strong China-EM versus weak China-DM correlation earlier in this expansion was the rotation of the global credit cycle away from the DM and toward the EM. The Great Recession and a deleveraging cycle curtailed DM demand growth for goods. By contrast, easy DM monetary policies helped fuel aggressive EM leveraging over that period (Figure 8).

Figure 7: Manufacturing correlation with China

Correlation, rolling backward-looking 4year (%q/q, saar)

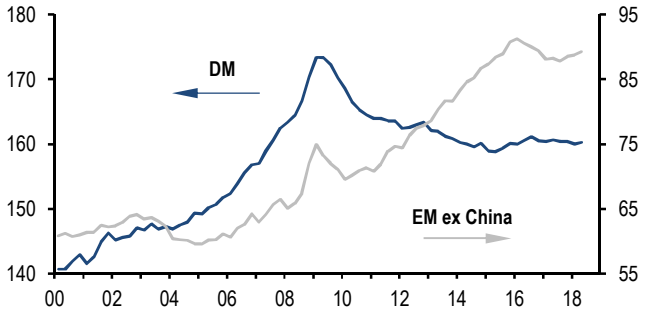


Source: National statistical agencies, J.P. Morgan

Following the commodity price collapse in 2014-15, credit growth in EM ex-China slowed substantially and a mild deleveraging phase took hold. Credit growth continued to outpace nominal GDP growth in China, where the government maintains a high degree of control over credit growth. The divergent credit cycles likely played some part in damping the correlation between Chinese and EM economic activity in recent years, as it did the China-DM correlation earlier in this expansion.

Figure 8: Private non-financial credit

% of GDP, both scales



Source: National statistical agencies, J.P. Morgan

China and the global economy in the 2020s

To the extent that the recent decoupling of China from the DM and EM in terms of both GDP and IP owes to the rolling nature of the credit cycle, China's gearing should recover as credit imbalances are righted. However, if there

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are structural shifts, as discussed above, then the VAR analysis may be misspecified.

Policymakers in China have expressed a desire to fundamentally change the composition of Chinese growth. The Made in China 2025 program intends to lift Chinese factory production up the value-added chain. No longer does China want to produce low-value consumer goods. Rather, China's aim is to produce sophisticated high-value technologies across a wide-range of application, including 5G mobile, driverless cars, bio-tech, and artificial intelligence. If policymakers are able to successfully make this transition, work through the huge stockpile of inefficient capital investment (and associated credit), and adjust to a much lower pace of population growth, China will emerge a stronger and healthier economy.

Even still, the transition will generate winners and losers. A shift away from heavy industry and fixed asset investment will reduce demand of raw materials from commodity-intensive economies. At the same time, a rising consumer sector along with reduced precautionary saving (in response to a wider social safety net) implies a shift to current account deficits. Such a turn would increase the linkages to countries that export consumer goods and services, potentially booting growth in those economies. Also, the shift to higher-value added goods and service production leaves an opening for lower-wage countries to meet the demand for low-value consumer goods, benefiting those economies. On balance, the shift is likely to reduce China's reliance on external demand as the primary growth engine. The net effect overall on the rest-of-the world is not clear.

The VAR analysis from above provides some insight on the overall effect on the rest of the world. However, it is more useful for analyzing how one-off, transitory shocks to China growth are transmitted to the rest of the world, and thus more relevant for cyclical dynamics.

A downshift in potential growth in China requires a more structural framework. Potential growth can be decomposed into trend movements in the labor force and structural growth in productivity, both of which are projected to decline in China over the coming decade. The slowing in labor force growth owes to simple demographic slowing, cushioned to some extend by urbanization. The slowing in China structural productivity and its implications for the rest of the world is more complicated. China has invested heavily in capital over the past 15 years, arguably in a suboptimal way that has come at the cost of slower growth in GDP per capita. The excess capital has started to weigh on productivity growth. China has also benefited extensively from the adoption of foreign technologies and so some of its projected slowing in productivity growth owes to this process having run its course (amplified by the recent crackdown on intellectual property theft).

According to a recent study by the IMF, a 1%-point reduction in Chinese structural (or potential) growth that reduces the level of China GDP by roughly 5% over 5-years damps average rests-of-world growth by roughly 0.1%-point per year for a 5-year impact of 0.5%.[1] The projected structural slowing in Chinese productivity growth (and hence slowing in Chinese potential growth) is expected to reduce business demand for capital and lower the pace of wage growth. Both of these will damp domestic demand growth and hence weigh on imports. At the same time, the resulting rise in the currency will damp exports. The net impact on the current account is positive as Chinese households will need to rebalance their portfolios toward more foreign assets in a world with a reduced domestic capital stock.

Table 2: China slowing impact

%pt impact on potential growth (avg %ann rate)

	2021-2025	2026-30	2021-30
China	-1.2	-0.9	-2.0
Rest of world	-0.1	-0.1	-0.2
Global	-0.2	-0.2	-0.4

Source: J.P. Morgan

Extrapolating the IMF analysis to our projected 2%-point annualized decline in China potential growth over the coming decade suggests the rest of the world will see slower annualized potential growth of 0.2%-point. Combined with the China decline, the analysis suggests global potential growth will be damped 0.4%-point annualized on average over the coming decade (Table 2). As noted above, the impact of China's slowing will not be shared equally. The IMF analysis identifies key impacts on the rest of the world from the structural slowing in China:

- **Commodity exports disproportionally hurt**. Exporters of raw materials will see a largest hit. This includes the metals producing countries in Latin America and the oil exporting nations. Indeed, the IMF model shows a 1%-point structural slowing in China will damp oil and metal prices by 7% over 5-years.
- **Asia impact close to global average**. Outside of China, EM Asia is adversely impacted by the slowing in demand from China but the reduced commodity prices

[1] A. Dizioli, B. Hunt, W. Maliszewski, "Spillovers from the Maturing of China's economy," IMF Working Paper (WP/16/212), November 2016.

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helps and so the regional impact is on par with the average spillover.

- **US benefits slightly**. As seen by the cyclical VAR analysis, the limited export exposure and sensitive to commodities actually leaves the US a touch better off in the IMF model.
- **Euro area slightly larger negative impact**. Similar to the US, the Euro area benefits from lower commodity prices. However, the Euro area has a large exposure to China through trade. Moreover, given its already very low policy rate and the likelihood it this extending for a number of years will limit the degree to which monetary support can cushion against falling China potential growth.

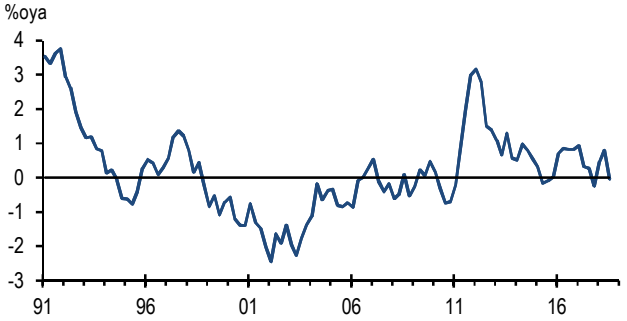
It is important to note that the results in Table 2 are generated by a model that does not account for the shifting composition of China growth. To the extent that this is an important part of China's maturing, the distributional impacts noted above are likely to be modified.

China and global inflation

The transition to slower growth in China will come with come with both disinflationary and inflationary pressures. Based on the IMF model discussed above, the slowing in China's productivity growth will damp wages while the resulting slowing in demand growth will outpace the slowing in structural growth. As a result, core inflation in China sees some modest downward pressure over the coming decade when potential growth slows by a projected 2%-point. At the same time, the hit to commodity prices will also damp headline inflation rates around the world. However, aside from these transition dynamics, the change to the global landscape in the form of rising wages could be more inflationary. If not, then rising wages could end up compressing corporate margins.

China is often labeled as being the prime suspect in the disinflationary dynamic of the past two decades. However, while China has played an important role, the past three decades has seen a set of broadly based disinflationary forces roll through the global economy. Supply-chain technologies, including containerization and just-in-time-inventories, greatly reduced the cost of delivering goods to markets. The steady drop of tariffs over the 1980s and 1990s, which the WTO facilitated, led to more efficient allocation of production capital. This was amplified by China's entry into WTO in 2001.

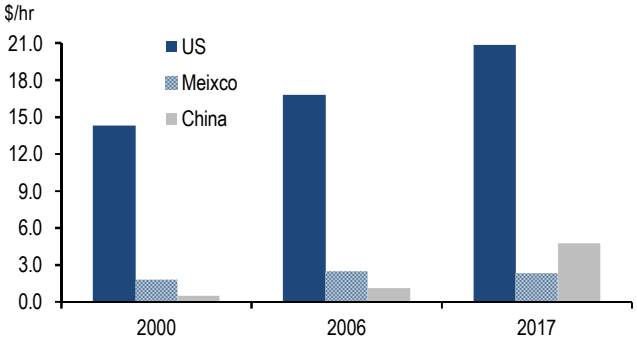
Figure 9: Apparel prices in the CPI, Developed Markets



Source: National statistical agencies, J.P. Morgan

At the same time, the advent of new technology consumer products, with ever improving characteristics (and thus faster rates of depreciation) added to downward pressure on pricing. The combination of these forces had a damping effect on global goods prices. For example, in the DM, apparel prices in the CPI slowed sharply between 1990 and through mid-2000 (Figure 9). Clothing accounts for a large share of China's exports and is among those goods whose price is more sensitive to international inflation pressures. While the other factors mentioned helped push down goods prices, China likely had a restraining influence over the 2000s.

Figure 10: Average hourly wage, manufacturing workers



Source: BLS, INEGI, China National Bureau of Statistics, J.P. Morgan

However, this disinflationary tide is turning. Supply chain technologies are ever improving but at nowhere near the pace seen in the past. If anything, there is some movement back toward local-sourcing for domestic markets for better product-control. Tariffs are rising and cheap labor is becoming harder to find. China is at the center of this dynamic as domestic wages rise (Figure 10) and the US-China trade-war intensifies. Moreover, technological progress boosts pricing as product-cycles are extended. All of this suggests the China-disinflation dynamic may be turning. With slowing growth but rising consumer demand relative to fixed investment, upward pressure on global goods price could increase.

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China and the supercycle in base metals

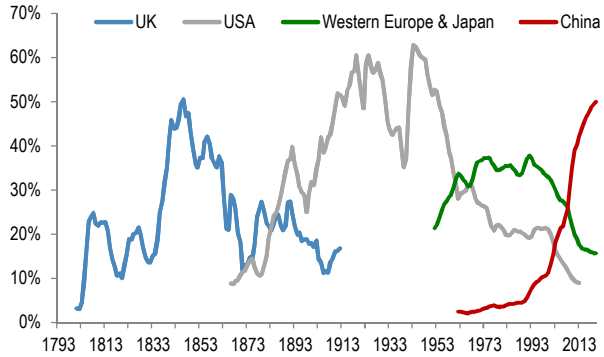
- **The coming decade will be characterized by supercycle lows and business cycle highs for base metals.**
- **The current China-driven supercycle has peaked and is unwinding as Chinese investment growth and exports are set to decline.**
- **Relative to price declines during the last two supercycles, we are less than half-way down the price cycle.**
- **Until a new supercycle commences, base metals prices will likely fall 40% to 60% from current spot levels to the next low.**

The current supercycle is unwinding as Chinese investment growth is set to decline

The cyclical, decades-long booms and busts in commodities prices (i.e., supercycles) result from fundamental supply/demand imbalances that occur as major emerging economies progress through the process of industrialization and urbanization. As a new major economy or region begins to industrialize, its demand for commodities rapidly intensifies as it becomes a dominant component of global demand and competes for resources from the rest of the world. During this ascent, demand growth outpaces supply and ensuing deficits push prices higher. Long lead times for additional supply, given the time and resources required for the discovery and construction of new mines, result in a mismatch in timing between a pickup in demand growth and the subsequent response in supply. Inversely, as the commodities-intensive industrialization process slows, demand growth decelerates more quickly than supply can adjust, resulting in structural surpluses and price declines. Given the great amount of sunken capital costs and the high cost of closures of mines and smelters, there is a natural reluctance to shutter capacity, thus only exacerbating the situation.

From a long-term perspective, over the last 200 years we track four major periods of industrialization (supercycles) that led to over 200% metals price appreciation, on average: the Industrial Revolution of the United Kingdom in late 1700s through the first half of the 19th century; industrial rise of the United States after the Civil War in the 1870s and lasting for the ensuing 50 years; post-WWII reconstruction of Western Europe and Japan throughout the 1950s and 1960s; and, most recently, China, whose rapid growth in the past two decades was especially metals- and energy-intensive (Figure 1).

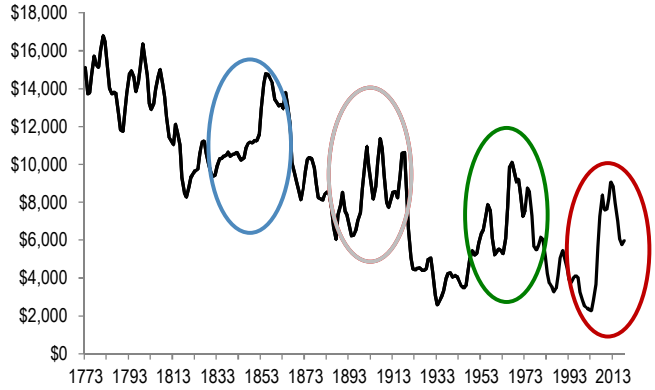
Figure 1: Copper demand share
Percent of global consumption



Source: USGS, WBMS, Wood Mackenzie, CRU, The Copper Handbook, World non-ferrous metal production and prices 1700-1976 (Schmitz), Mineral statistics of the United Kingdom of Great Britain and Ireland, The Statistics of the Copper Mines of Cornwall, Statistics of British Commerce, Abstract of British historical statistics, J.P. Morgan Commodities Research. Four copper supercycle concept attributable to J.P. Morgan Private Bank

Using copper as an example, in the previous three supercycles, the industrialized country's metals demand share peaked out at between 40%-60% of global demand. The upcycles lasted 33 years on average, driving prices over 200% higher in the process. On the downside, the length of the previous three down-cycles averaged 28 years, with demand shares retreating to about 10%-15%, dragging real prices almost 80% lower (Figure 2).

Figure 2: Real copper price (2018$)
$/ton inflation adjusted to 2018 US CPI level



Source: Wood Mackenzie ,World Bank, Federal Reserve, BoE, USGS, World non-ferrous metal production and prices 1700-1976 (Schmitz), Forecasting: methods and applications (Makridakis, Wheelwright and Hyndman), Mineral statistics of the United Kingdom of Great Britain and Ireland, J.P. Morgan Commodities Research

During the rise of China, over the past 30 years its share of global metals consumption went from 4% in 1988 to 50% last year, averaging 11% per annum growth in the

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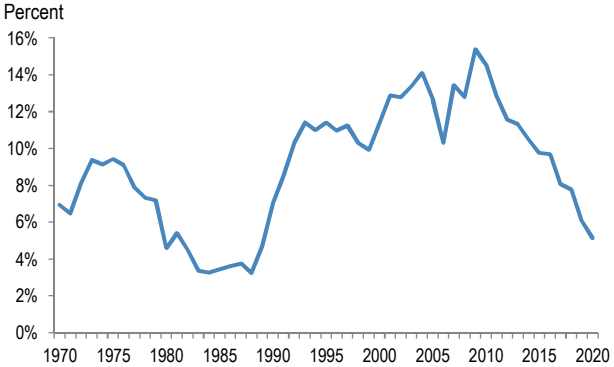
case of copper. In terms of price, the current metals supercycle experienced its peak between 2006 and 2011, with copper prices peaking the latest in 2011 at a yearly average of roughly $9,840/t in real 2018 dollars. In the seven years since, prices have declined by over 30%.

China's remarkable growth has been driven by investment and productivity growth with capital investment the largest contributor (especially after the global financial crisis), adding on average 4%-pts (or nearly 40%) to annual GDP growth in the period between 1991 and 2011. Going forward, the same factors are expected to lead to a significant slowdown in China's growth, with GDP growth expected to average 6.0% over the next five years, sliding to a 5.0% pace over the next 10, compared with average growth of 10.4% in 2001-2011 and 7.1% in 2012-2018 (see previous chapter by Zhu). The biggest driver of this structural slowdown will likely be the decline in investment to a more sustainable pace, with the contribution from investment to overall economic growth expected to decline from 4.6%-pts in 2008-2015 to 3.4% in 2016-2020 and 2.3%-pts in 2021-2025.

While China's near-term policy could be influenced by bouts of policy easing/tightening (China has implemented policy stimulus approximately every three years), our base-line scenario remains for China's investment to GDP ratio to gradually move from 48% in 2011 to 41.5% in 2023. While still one of the highest in the world, this shift would suggest the Chinese economy will become less investment-dependent and hence less commodity-intensive in the medium term (Zhu). Reflecting this trend, China's metals demand growth has already slowed meaningfully. In the case of copper, it halved from an average 12.8% growth rate during 1988-2011 to 6.0% since (Figure 3). History shows that in the next decade, average Chinese metals demand growth should shift even lower.

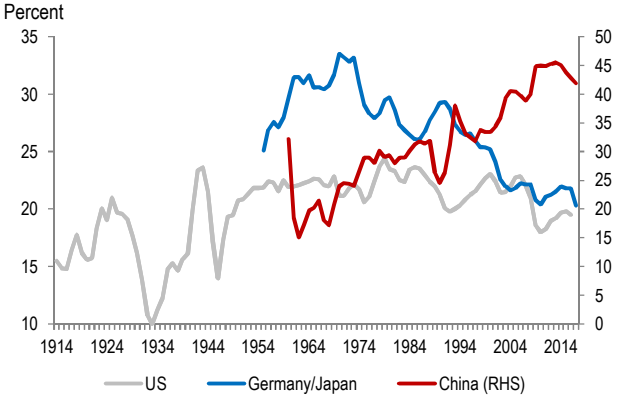
Figure 3: China copper demand growth, 10-year rolling averages



Source: Wood Mackenzie, CRU

After the industrial rise of post-Marshall-plan Western Europe and reconstructed Japan, both regions experienced a similar deceleration in investment that in turn marked the end of their investment cycle (Figure 4). Consequently, their combined copper demand share more than halved from almost 40% from its peak reached in 1991 to about 15% currently, and Japan's copper demand growth moved from an average 9% in 1955-1991 to a 2% contraction since.

Figure 4: Gross fixed capital as share of GDP



Source: World Bank, Federal Reserve, BEA, Bundesbank, The Cabinet Office of Japan, J.P. Morgan Research

Prices to realize 40% to 60% lower during the supercycle trough

In term of influence on price, the rapid rise in an industrializing country's demand growth (as reflected by its rising demand share) is much more significant than any incremental growth once demand share levels off. We believe that China's current market share of global metals demand likely constitutes a peak in China's demand dominance as the country shifts toward less metals-intensive growth in the future. From a long-term perspective, history indicates that in the next 5-10 years, incremental Chinese growth will slowly continue to cede its pricing influence. Put another way, China's demand cycle has likely topped out, and relative to the price declines over the last two supercycles, on a spot basis, we are less than half-way down the price cycle.

The question from a supercycle framework then becomes at what level will prices trough, and in what range will they trade at the bottom part of the cycle. Using the past price cycles as a guide both from an outright real trough price level and from a measure of historical peak to trough selloffs, it appears metals prices likely have further to fall, especially copper, nickel and zinc.

For example, the real copper price is downward sloping, with the mean price of each supercycle significantly lower than that of the previous cycle. That is, the real copper price has experienced a significant deterioration in the last 240 years (see *World Development: Super-cycles of commodity prices since the mid-nineteenth century*, Erten and Ocampo, World Development Vol. 44, pp. 14–30, 2013). The mean of the current cycle (calculated as the average real price for the period between 2002 and 2018) is about $1,150/t higher than the mean in the preceding cycle. However, the current cycle is not complete, which likely means that the contraction phase of the cycle will bring the mean price lower. The story is similar in other metals with the exception of aluminum—a relatively 'new' metal—where technological advances likely mean prices could trade lower relative to historical ranges.

Overall, until the new supercycle commences, the price ranges will also be influenced by the business cycle forces. In the case of copper this means a trading range of $2,200-5,500/t, averaging around $3,800/t, whereas nickel prices will likely range between an average low of $6,900/t and $14,000/t, and zinc prices will likely range between $1,000/t and $2,300/t. Although aluminum prices seem to be fairly valued from a long-term perspective, a high level of cost deflation in recent years from low-cost Chinese smelting capacity additions likely means prices could trade lower relative to historical ranges. Here we peg the bottom level at around mid-$1,600s or only 10% lower from current spot prices.

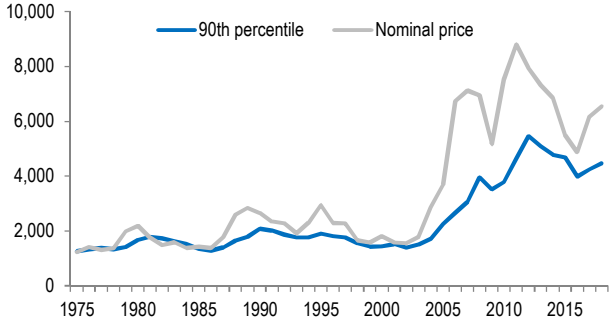
Acknowledging that aluminum seems well-supported at current levels, we estimate supercycle trough prices to average 40%, 50% and 60% lower for nickel, copper, and zinc, respectively.

Marginal cost analysis yields similar results

In the upswing phase of the supercycle, prices tend to trade well above the marginal cost of production (as higher prices are needed to incentivize new supply). But when the cycle peaks and starts to unwind, the price is firmly bound by the marginal cost and deviates from it slightly only during the peaks and troughs of the shorter-term business cycle.

Real metals costs have increased significantly during the current supercycle, ballooning by 250% over the period between 2002 and 2012 in the case of copper (Figure 5). The convergence between price and marginal cost has been taking place since 2012 and 22% of the cost inflation built up in the early 2000s has been unwound through the last year. We believe the marginal cost will deflate further, and the price will continue to come down until it converges with the marginal cost of production, which lies around the 90th percentile, by our estimates.

Table 5: Copper marginal cost of production and price
US$/mt (real 2018$)



Source: Wood Mackenzie, J.P. Morgan Commodities Research

Cost is not a static concept and tends to inflate (deflate) in line with the demand cycle. While cost data are not available for the previous supercycles, we have copper costs going back to 1975, spanning almost 2/3 of the downslope of the last cycle. Results are revealing and very similar to the supercycle framework outcome (Table 1). Based on current spot prices relative to past troughs and average marginal costs, it appears prices for copper, zinc and nickel have further to fall between 30% and 60%, while aluminum seems to be fairly valued.

Table 6: Base metals prices and marginal costs during previous down-cycle
US$/mt (real 2018$)

	Current spot price*	Trough price	Average marginal cost	Price decline vs. trough price	Price decline vs. marginal cost
Copper	$5,942	$2,200	$3,000	-63%	-50%
Aluminum	$1,836	$1,840	$2,000	0%	9%
Zinc	$2,492	$1,060	$1,780	-57%	-29%
Nickel	$11,460	$6,940	$7,800	-39%	-32%

Spot price as of January 11, 2019. Cost history starting from 1975 for copper, 1984 for aluminum, 1982 for zinc and nickel. Marginal costs defined at 90th %-tile for copper, 50th %-tile for aluminum and nickel and 75%-tile for zinc.

Source: Wood Mackenzie, World Bank, Federal Reserve, BoE, USGS, *World non-ferrous metal production and prices 1700-1976 (Schmitz), Forecasting: methods and applications (Makridakis, Wheelwright and Hyndman), Mineral statistics of the United Kingdom of Great Britain and Ireland, J.P. Morgan Commodities Research*

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A survey of geopolitical tensions

- **US-China tension remains perhaps the most important geopolitical risk over the medium to long term, but other ongoing tensions have the potential to flare up in the coming years.**
- **China is involved in many longstanding territorial and maritime disputes, with the Taiwan Straits issue being the most sensitive.**
- **At the core of the US-China tensions is China's quick catch-up in the technology race. Export bans and scrutiny on companies such as Huawei and ZTE reflect the US containment policy for China.**

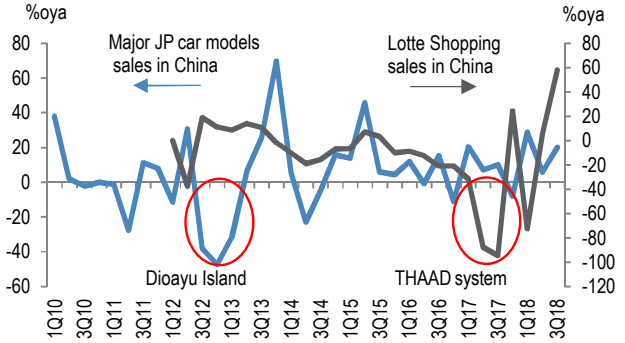
As China continues to expand its presence on the world stage relationships with other countries and trading partners will continue to evolve, particularly as China attempts to advance its manufacturing capabilities and move up the value-added chain in the global economy, while avoiding the middle-income trap. The process will take time and there will be frictions along the way. China's "Made in China 2025" plan, intellectual property rights, technology transfer, and market openness are core issues amidst the US-China tensions that escalated rapidly last year (see *U.S.-China tension: U.S. announces additional $200 billion tariff list*, H. Zhu et al., 12 July 2018 and *The consequence of heightened tariff war risk*, H. Zhu et al., 29 Sept 2018). Given the size and influence the two economies, US-China tensions remain perhaps the most important geopolitical risks over the medium to long term. However, it is also important to remain cognizant of other current and ongoing geopolitical tensions related to China that have the potential to flare up in the coming years. These tensions span across areas of territorial and maritime disputes, trade issues, intellectual property rights, and, in more recent years, technology concerns and cyber warfare.

Not one inch

With the longest border in the world and 14 neighboring countries, China is no stranger to territorial and maritime disputes. Under President Xi, China has struck a more aggressive stance with regards to territorial disputes. That China will not give up even "an inch" of its territory has been emphasized in several of President Xi's high level speeches.

Indeed, several disputes have led to varying degrees of conflict over the years and remain ongoing concerns, notably the **Diaoyu Islands** (or Senkaku Islands) dispute with Japan, the South China Sea involving ASEAN nations, and the longstanding concern over the Taiwan Strait issue. The violent protests in 2012 over the Diaoyu Islands**,** leading to temporary shutdowns of many Japanese factories and businesses in China, are an important reminder that these flare ups can spill over into economic activity, although the damage is usually only temporary, followed by a recovery. As for **South Korea**, the government's approval of THAAD missile system sparked severe tension with China, which led to a sharp drop in Lotte Shopping's China revenue, as Lotte Group offered its land for the system buildup.

Figure 1: Impacts of geopolitical tension



Source: Wind, J.P. Morgan; Note: major models include Toyota Corolla, Nissan Teana, Honda Accord, and Toyota Camry.

In the **South China Sea**, it appears that, at least on the surface, there was progress in negotiations between China and the ASEAN nations last year. In August 2018, both sides agreed on a single draft negotiating text for the Code of Conduct in the South China Sea, but it is still unclear how geographical disputes will be handled. Nonetheless, China has set a target for the final agreement to be negotiated within three years (by 2021), and developments here will be important to watch, particularly how the US responds given its presence in the region. Indeed, the US has affirmed support for many counterparties, including Japan, Taiwan and ASEAN nations in their territorial disputes with China.

Among the various issues, U.S. relations with **Taiwan** is most sensitive to China. The US passed the Taiwan Travel Act in March 2018 that allows for high-level US officials to visit Taiwan and vice versa. In December 2018, the US Senate passed a bill to reaffirm further arms sales to Taiwan. The cross-strait relationship could be a major geopolitical risk factor in the medium term.

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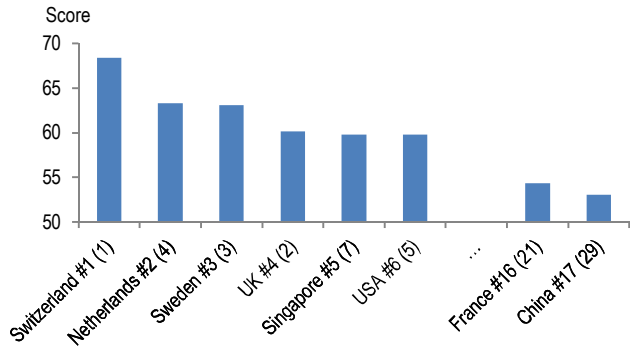
The technology race

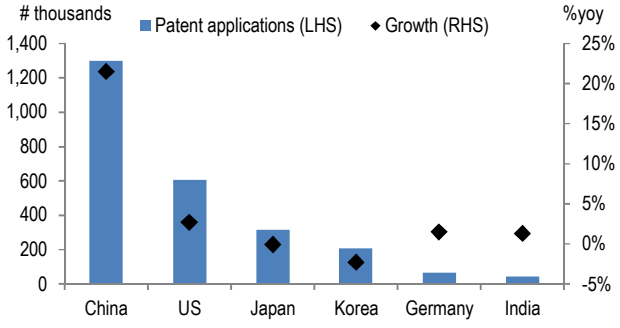
Beyond the tariff war, at the core of the US-China dispute is the pace at which China has caught up to the developed world in terms of innovation and technological advancement, and whether Chinese companies have an unfair advantage in terms of market openness, forced technology transfer, and intellectual property rights. Based on WIPO data, China ranked 17th in the global innovation index in 2018, up from 29th in 2015, in part driven by patent filings that far outpace the rest of the world.

Figure 2: Global innovation index 2018 rankings



Source: WIPO, J.P. Morgan

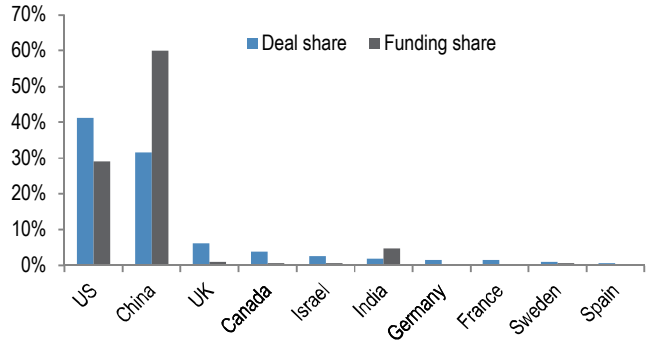
Figure 3: Patent applications (2016)



Source: WIPO, J.P. Morgan

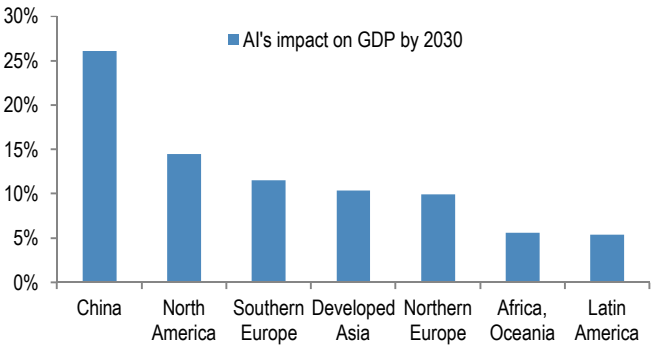
China's fast ascension in technology and innovation is by design and one of the main goals of the "Made in China 2025" plan (see *Made in China 2025*, H. Zhu et al., 1 July 2018). If successful, China would be on the right path to becoming a world class advanced manufacturing nation in direct competition with the US by 2049. Indeed, both the US and China are aggressively investing in future technologies, such as AI. According to the China Academy of Information and Communications Technology, while the US still leads AI investment in terms of deal share, the majority of funding has been directed to China over the past five years. Meanwhile, a study by PwC estimates that China will benefit from AI the most by 2030, with potential gains in GDP by up to 26%.

Figure 4: Geographical distribution of global AI investment and financing (2013-2018 Q1)



Source: CAICT, J.P. Morgan

Figure 5: AI's impact on GDP by 2030



Source: PwC, J.P. Morgan

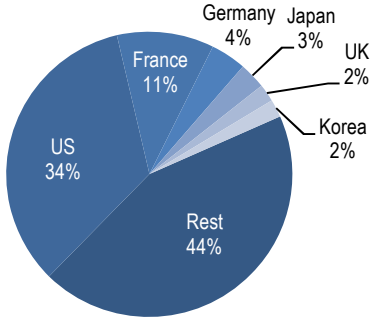
The USTR section 301 report investigation of China's policies published in 2018 detailed key US concerns over the Made in China 2025 plan. Concerns largely revolve around the Chinese government support: its role in funding, subsidies, regulatory support for domestic corporations; forced technology transfer of foreign companies through JVs and administrative processes; and government directed outbound investment to systematically acquire foreign technologies. While many of these issues are still under negotiation between both sides, the US has also taken steps in its policies, which is indirectly aimed at containing China. Reforms to the CFIUS[1] review process were passed by Congress last year,

[1] CFIUS Reform Bill, which will lead to the expansion of US export control laws, increased US authority to limit expansion of Chinese companies through acquisition of US firms and technology; similar to the effect of the ZTE export ban last year, which was subsequently reversed.

as well implementing export control processes involving newly defined "emerging and foundational technologies" (see *US-China tension: CFIUS reform,* H. Zhu et al., 18 August 2018).

With the deadline for a temporary trade war truce set for March 1, 2019 China has taken steps to address some of the concerns from the US side. Following the G20 meeting, 38 government agencies jointly released guidance to strengthen IP protection on December 4, 2018 and the State Council passed a draft amendment of Patent Law on December 5, 2018. Meanwhile, a new court of appeals began operation on January 1, 2019 in Beijing to focus on intellectual property cases. Indeed, intellectual property disputes involving foreign counterparties have increased over the years. According to the Higher People's Court of Shanghai, the US accounted for the major share of IP civil disputes that involved foreign litigants in 2014-2017.

Figure 6: IP civil dispute involving foreign litigants (2014-2017)



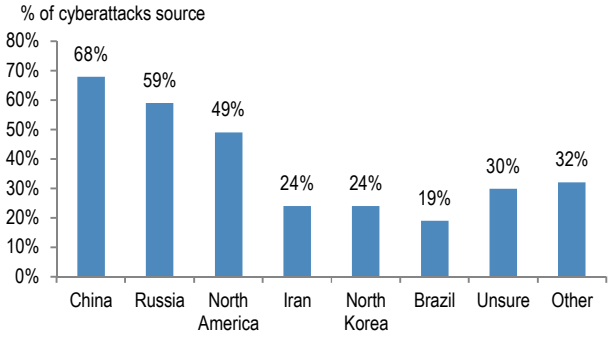
Source: Higher People's Court of Shanghai, J.P. Morgan

Despite these steps, the pace of implementation may not meet the US side's expectations and overall we still expect negotiations to be a bumpy process. The demand list from the US requires structural changes from China and many of these issues such as market access, IP protection, and geopolitical issues are long-lasting disputes that are not likely to be resolved easily.

Cybersecurity a new frontier

China's quick advancement in technology and innovation over the past decade has led to broad concerns from developed markets, centered on China's state-sponsored practices amidst the technology catch-up. One area of contention has been the rise in cyberattacks and hacking, particularly against sectors that overlap with the Made in China 2025 plan. Figure 7 highlights an independent survey quoted by the USTR section 301 that estimates the origins of cyberattacks.

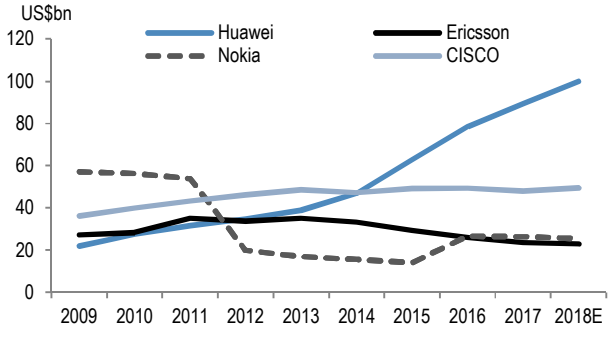
Figure 7: Incident response professionals' survey of cyberattack origins in 3Q18



Source: Carbon Black, USTR, J.P. Morgan; Note: Respondents were given the choice to select all that apply

The threat of cybersecurity has led to increased scrutiny of Chinese companies such as Huawei and ZTE, given their importance to the Chinese telecommunication sector and development of next-generation technologies such as 5G infrastructure, which represents the future of connectivity. 5G technology, expected to be available for commercial use around 2020, allows for faster and more reliable connectivity and enables new technologies such as self-driving cars, smart cities, and the 'Internet of Things'. As the largest maker of telecommunication equipment in the world and a frontrunner of 5G development, Huawei's global expansion has led to strong pushback from the US. One important piece of legislature passed last year was the CFIUS Reform Bill, which revised export control laws reinforcing the US's ability to limit the scope of the expansion of Chinese companies, similar to the ZTE export ban last year, which was subsequently reversed.

Figure 8: Huawei outpaced global peers on revenue growth



Source: Bloomberg, J.P. Morgan

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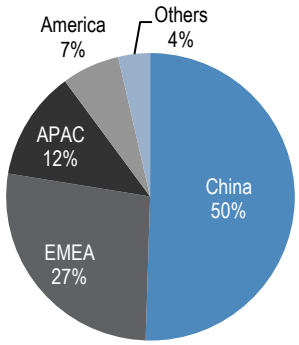
Figure 9: Huawei's revenue exposure in 2017



Source: company report, J.P. Morgan

While the ZTE export ban and arrest of Huawei's CFO were due to sanction violations, the timing of the incidents adds another angle to already escalating tensions between US and China, and were likely used as leverage in the ongoing negotiations. More recently in December, the US Justice Department announced indictments accusing China officials of broad economy espionage via cyber theft, citing that 90% of Justice Department cases alleging economic espionage over the past seven years involved China. Nonetheless, concerns about Chinese technology are not limited to the US; Japan, Australia and New Zealand are amongst countries that have barred Huawei and ZTE from 5G network development over security concerns.

Table 1: Anti-China activities regarding cyber sector

Date	Case
8-Oct-12	The US House intelligence committee labeled Huawei and ZTE a national security threat. Huawei and ZTE have been barred from big US businesses since then.
22-Mar-18	USTR published Section 301 report, accusing China of cyberattacks and espionage.
Apr-18	US Federal Communications Commission barred wireless carriers from using federal subsidies, which serves rural areas and low income groups, to buy Chinese telecommunication gear.
16-Apr-18	US imposed a seven-year ban on American component sales to ZTE.
6-Jun-18	ZTE agreed to pay US$1.4bn fine to lift the US ban on buying from US suppliers.
23-Aug-18	Australia banned Huawei and ZTE from participating in the 5G network construction.
20-Nov-18	USTR published Section 301 update report, accusing China of cyberattack and espionage.
28-Nov-18	New Zealand bars Huawei from its 5G network over security fears.
1-Dec-18	Huawei CFO Meng Wanzhou was arrested in Canada, with allegations of a breach of US sanctions on Iran.
10-Dec-18	Japan banned China's Huawei and ZTE from government contracts.
12-Dec-18	Huawei executive Meng Wanzhou released on bail in Canada.
20-Dec-18	The U.S. Justice Department announced indictments accusing China of an espionage campaign to steal IP and other data from dozens of companies and government bodies.

Source: J.P. Morgan

We believe the cybersecurity issue is one that will not be easily solved and will likely increasingly become a global point of tension. Even if a deal is struck with the US in the current 90-day window, as China continues to push forward in technology and becomes more integrated in the global technology supply chain, questions will again arise over cyber espionage and data theft.

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Global Equity Research
J.P. Morgan Perspectives
31 January 2019

Potential impacts of constant cyber competition

- **Our base case is an ongoing constant state of cyber competition due to the current lack of effective deterrence structures, the attractiveness of asymmetric cyber tools, and the emergence of a multi-polar world defined by "Great Power" competition. This ongoing activity will drive real world impacts in technology leadership, supply chain, and end product markets.**
- **Technology Leadership: The end of Moore's law, Shannon/Hartley theorem and others create the opportunity for a change in technology leadership. We suggest an era of scaled, big-data focused innovation favoring centrally controlled autocratic markets over decentralized democratic markets.**
- **Supply chains and end product markets will reorganize along security alliances: Evidence of supply chain moves to India, Indonesia, Vietnam, Thailand and Malaysia already exist, while Chinese equipment is already banned in the US, Australia, and parts of Europe.**

The US-China strategic relationship is being redefined as both nations adjust their foreign policy stance. US policy appears to be moving away from a policy of strategic engagement to a "great power competition"—witness recent policies towards China and Iran.. This is evidenced both by the formal published US *National Security Strategy*, Dec 2017, as well as U.S. Vice President Pence's Oct 4, 2018 *Hudson Institute remarks*. Meanwhile, Made in China 2025 strategies appear to place China on a more aggressive footing, looking to achieve leadership status in several areas seen as core to the global economy. An additional potential catalytic factor common across both nations is the fact that as economic growth slows, leaders who have based their legitimacy on strong economic management may reach for new legitimacy functions, with the all too obvious march of nationalism filling this role in many countries today.

These dynamics may be exhibited through an ongoing increase in the level of **Cyber Competition**. The emergence of a multi-polar world despite continued US hegemony in the physical space has led to the significant use of asymmetric cyber tools to advance national agendas. Nation states seek to establish and/or refresh spheres of influence by strengthening control over said areas, while also weakening the ability of others to engage in limiting activities. These strategies leverage practitioners' relative areas of strength, where centralized political and economic control enables a more aggressive "whole of nation" approach versus decentralized traditional democracies, while seeking to limit conflict to a level prohibiting head-to-head physical contacts (staying in "the seam").

Integrated information tactics have not been established practice in nations such as the US. They are seen very differently in other countries, however. In Russia the Deputy Chief of the General Staff of the Armed Forces has highlighted their view that non-military means have exceeded the utility of conventional weapons and that information tactics should be applied in coordination with the "protest potential of the population" (the **Gerasimov Doctrine**). We note that some suggest China also appears to be channeling this strategy, with their goal of "splitting apart different domestic groups" ("Propaganda and Censorship Notice" June 2018), although this view has been disputed by Chinese officials. Recent changes to US Cyber Strategies regarding "defending forward" and Presidential Policy Directives (specifically PPD-20) governing the use of cyber tools indicate the use of similar tools, if differently deployed.

We assume an ongoing, constant state of **cyber aggression as the new normal.** Rising levels of cyber aggression, especially in the absence of a coherent cyber deterrence framework, pose significant risks to global markets.

Ongoing high levels of cyber activity could lead to:

- **Cyber Arms Race.** We have contended in the previous *J.P. Morgan Perspectives: Geopolitics and Markets: Risks on the Rise*, J. Loeys, 1 Nov. 2018, that the nature of innovation is changing. The individualistic, two people in a garage model that has driven Silicon Valley for decades, at least in mythology, is giving way to scale innovation due to the impact of the large data sets required to train AI models. If scale is the new driver of innovation, centralized autocratic nations have a theoretical competitive advantage. China is already aggressively pushing AI and machine learning investments on a far more centralized basis than the US, with additional strategic investments in quantum computing. We expect to see a new arms race focused on these fields, creating significant confusion for commercial markets given the dual use nature of many of these technologies.
- **Reorganization of supply chains along the lines of geopoliticial partnerships.** Rising security concerns

will reach down into supply chains for national security as well as trade related reasons. We see profit risks for downstream tech supply chain players, particularly in China and Taiwan, with Korean and Japanese companies more immune (see *Rising likelihood of supply chain relocation for Greater China downstream players*, G. Hariharan, 13 Nov 2018). Our big data analysis of 2,600 transcripts from 850 companies show most likely relocation destinations for Greater China players to be Vietnam, Thailand, and Malaysia (see *Big Data approach to tracking shifts in tech supply chains,* R. Sharma, 9 Jan 2019).

- **Reorganization of end product markets.** We are already seeing active prohibitions against Chinese communications infrastructure equipment in the US, Australia, New Zealand, and Japan, with Great Britain, Canada, Germany, Italy and India exploring options. Prohibitions against physical goods will likely increase in scope and scale as security concerns mount. Similar prohibitions have existed in services. Social media are an obvious example with Facebook banned in China. Again we would expect to see rising odds of similar bilateral prohibitions across a range of online services in the name of consumer privacy as well as national security (might WeChat be banned in the US, for example?). The overwhelming effect from this is likely to be a negative for China's ambition to become a global player in high-tech universe, since non-Chinese companies by and large do not participate in building sensitive Chinese high-tech infrastructure, with the exception of semiconductors.
- **Changes to visa structures:** Limitations on citizens' ability to work and study in respective countries may become more difficult, particularly in advanced STEM fields.

Competition for Spheres of Influence

Chinese TMT Companies have heavily invested in the Indian, SE Asian and other Internet ecosystems, while US Internet service providers are operational in many of these markets. As these markets mature and the importance of Internet and data becomes more widely assimilated, respective governments and regulators are likely to form policies on nationalization and localization of their own Internets. The outcome of these actions and how big the respective spheres of influence (for the US and China TMT players) could be very important in developing long-term investment theses for both US and Chinese TMT vendors in the five to10 years.

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China's defense: mechanization and modernization

- **Accelerating growth in defense spending.**
- **Soldiers are better equipped.**
- **Continued navy expansion.**
- **More advanced weapon systems.**

Accelerating growth in spending

In dollar terms, China's defense spending in 2017 was second only to that of the US, and more than triple that of the other major powers' $40-70bn level.

We expect the growth of China's defense spending to accelerate by 9% p.a. in 2019-20 from 7-8% p.a. in 2017-18 as military reforms and the related uncertainties come to an end.

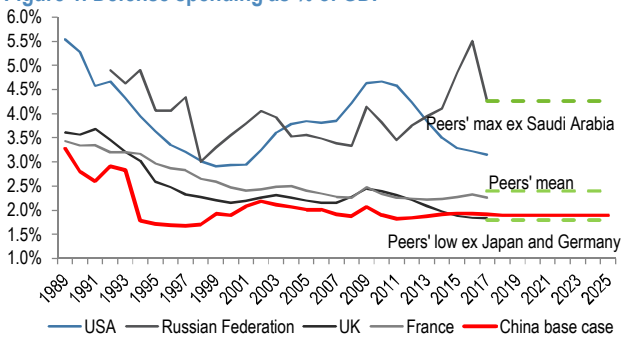
Table 1: Defense spending as % of GDP

Country	Military expenditure 2017	% of GDP
U.S.	609,758	3.1%
China, P.R.	228,231	1.9%
Saudi Arabia	69,413	10.3%
Russian Federation	66,335	4.3%
India	63,924	2.5%
France	57,770	2.3%
U.K.	47,193	1.8%
Japan	45,387	0.9%
Germany	44,329	1.2%
South Korea	39,153	2.6%
	Max	10.3%
	Weighted average	2.5%
	Median	2.4%
	Min ex Japan and Germany	1.8%

Source: SIPRI, J.P. Morgan.

There is potential upside to our forecast of China's defense spending, given that our assumption of defense spending being 1.9% of GDP is substantially lower than the average of 2.5% for the top 10 defense spenders.

Figure 1: Defense spending as % of GDP



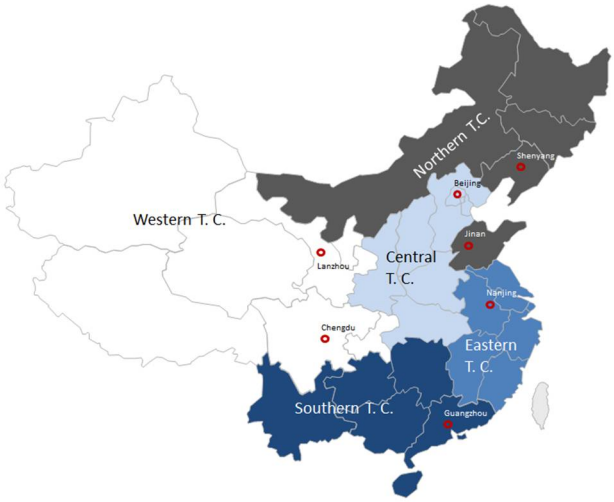
Source: SIPRI, Bloomberg, J.P. Morgan estimates.

Military reforms in 2015-2017

China initiated a military reform process in November 2015, aiming to enhance combat capabilities that would keep up with technology developments and weapon modernization trends to conduct advanced joint operations and prevail in regional incidents using a real-time data-networked command. The reform consolidated its seven military regions (18 army groups) into five theatre commands (13 army groups) in February 2016 in a bid to enhance warfighting readiness through joint operations, training, and strategy development.

The military also flattened and streamlined the command chain by replacing its four general departments with 15 functional departments, offices and commissions in 2016 that report directly to the Central Military Commission.

Figure 2: Map of theatres of PLA (People's Liberation Army)



Source: U.S. Department of Defense, J.P. Morgan.

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Soldiers are better equipped

We think defense spending will skew towards equipment procurement from personnel expenses, because the Chinese army demobilized more than 300,000 soldiers in 2010-2017, or 27% of the total. Meanwhile, there has been substantial growth in the number of tanks and artillery pieces.

Table 2: Chinese army overview

Ground forces	2004	2010	2017
Personnel (active in combat units)	1,600,000	1,250,000	915,000
Tanks	6,500	7,000	7,400
Artillery pieces	11,000	8,000	10,600

Source: U.S. Department of Defense.

Chinese army soldiers were better equipped in 2017, with eight tanks per 1,000 soldiers, than in 2004, with only four tanks per 1,000 soldiers. However, there is still significant upside compared to the 20 tanks per 1,000 Army soldiers in the U.S. in 2016.

Figure 3: Number of tanks and artillery pieces per 1,000 army soldiers, China

Source: U.S. Department of Defense.

Continued navy expansion

We estimate that the majority of the defense spending in 2004-2017 was for the Navy, given the significant expansion of the fleet, such as destroyers, frigates, and the first aircraft carrier.

Table 3: Overview of the Chinese navy

Naval forces	2004	2010	2014	2017	2004-17 growth
Aircraft carriers			1	1	n.a.
Destroyers	21	26	21	28	33%
Frigates	43	53	52	51	19%
Corvettes			15	28	n.a.
Amphibious transport	20	27	29	33	65%
Medium landing ships	23	28	28	23	0%
Diesel attack submarines	51	49	53	47	-8%
Nuclear attack submarines	6	5	5	5	-17%
Ballistic missile submarines				4	n.a.
Coastal patrol (missile)	51	86	86	86	69%

Source: U.S. Department of Defense.

We think the substantial expansion of the navy reflects the demand for greater anti-access/area-denial (A2/AD) capabilities in the South China Sea and the East China Sea, where China has been overlapping territorial claims with neighboring countries.

China's first aircraft carrier, Liaoning, was delivered to the navy in 2014 and has since been deployed most of the time along the Chinese coastline. The carrier executed flight operations in the South China Sea in January 2017.

China's second aircraft carrier, known as Type 001A, will likely join the fleet in 2019, and construction of the third carrier may have begun in 2018, according to the U.S. Department of Defense. We estimate that China may have four carriers versus 14 carriers of the U.S. Navy by 2030E.

Figure 4: Map of Liaoning deployments

Source: U.S. Department of Defense 2018 China Military Power Report.

From 2011-2017 the Navy was the main driver of military aircraft demand in China. The Navy's aircraft accounted for 16% of the military's total aircraft as of end-FY17. It still has significant upside compared to the 30% of military aircraft in the U.S. under the navy and marine corps.

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Table 4: Military aircraft by military branch, China and the US

China	2011	2013	2015	2017	17/11 CAGR
Air Force	1388	1438	1492	1500	1%
Ground Force	0	20	10	11	n.m.
Naval Air Force	183	239	287	287	8%
Total	1571	1697	1789	1798	2%
% of military aircraft					
Air Force	88%	85%	83%	83%	
Ground Force	0%	1%	1%	1%	
Naval Air Force	12%	14%	16%	16%	
U.S.					
Air Force	3637	3546	3482	3275	-2%
Ground Force	261	299	265	252	-1%
U.S. Marine Corps	622	451	451	485	-4%
U.S. Navy	957	960	991	1018	1%
Total	5477	5256	5189	5030	
% of military aircraft					
Air Force	66%	67%	67%	65%	
Ground Force	5%	6%	5%	5%	
U.S. Marine Corps	11%	9%	9%	10%	
U.S. Navy	17%	18%	19%	20%	

Source: Flight Global.

Air forces need to narrow the gap

The US had 2.8 times the number of military aircraft (excluding helicopters) as China as of end-2017. The largest gap was in tankers, followed by special mission aircraft and transporters, which are generally used in deployment and overseas missions.

We think these types of aircraft will see relatively higher growth in the Chinese fleet going forward, as the missions of the Chinese military transform from mainly homeland defense to power projection.

Table 5: Military aircraft breakdown by type, China and the US

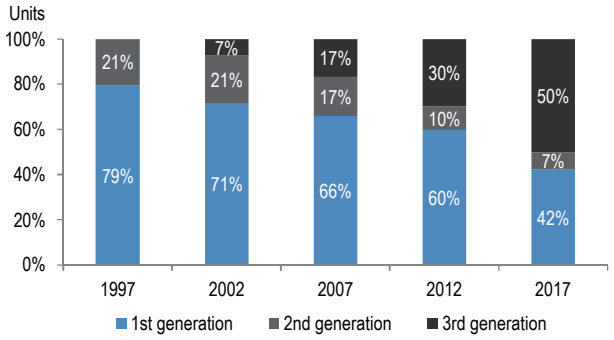
China	2011	2013	2015	2017	17/11 CAGR	U.S./China multiple (x)
Fighters	1061	1063	1125	1125	1%	1.3
Bombers	391	390	403	402	0%	3.4
Transport	109	193	181	185	9%	5.2
Special mission	10	51	78	83	42%	8.1
Tankers			2	3		191
Total	**1571**	**1697**	**1789**	**1798**	**2%**	**2.8**
U.S.						
Fighters	1527	1479	1481	1453	-1%	
Bombers	1343	1300	1304	1377	0%	
Transport	1332	1129	1065	958	-5%	
Special mission	691	753	753	669	-1%	
Tankers	584	595	586	573	0%	
Total	**5477**	**5256**	**5189**	**5030**	**-1%**	

Source: Flight Global, J.P. Morgan.

More advanced weapon systems

We see a trend across the military branches of upgrading equipment towards more advanced systems, involving tanks, fighter jets and transport aircraft. The percentage of third-generation battle tanks increased from 0% in 1997 to 50% in 2017. Most of China's third-generation battle tanks are Type 96s and Type 99s. Type 96s were in production in 1997-2005, and Type 99s are currently in production, according to International Institute for Strategic Studies. Type 99s' key specifications are similar to those of M1-Abram, in our opinion. Type 99s features a smaller crew, higher speed and greater engine power, according to data from Sina News. M1-Abram is the main third-generation battle tank in the U.S.

Figure 5: Generational change of China's tanks fleet



Source: The Military Balance 2018 by International Institute for Strategic Studies (IISS).

Tensions call for greater capabilities to secure air superiority, in our opinion. China's fighter fleet grew 5% between 2012 and 2018, according to FlightGlobal, driven mainly by the deployment of fourth-generation fighter jets (J10s).

China conducted the first test flight of its fifth-generation fighter, J20, in January 2011. The model is developed by Chengdu Aircraft Industry Group, based in Sichuan Province, and was inducted into the combat units of PLAAF in 2017, according to Xinhua.

The key specifications of the J20 look similar to those of the F35, a typical fifth-generation jet developed by Lockheed Martin, though the J20 may have slightly weaker stealth capabilities and avionics.

Table 6: China's fighter fleet

Model	Generation	2012	2015	2018	Growth
J-7	2	419	418	418	0%
J-8	3	144	143	143	-1%
J-10	4	202	206	261	29%
J-11/Su-27/30/35	4	273	272	276	1%
J-15/Su-30/33	4	23	27	25	9%
JH-7	4	107	106	104	-3%
J-20	5	0	0	2	

	Generation	2012	2015	2018	CAGR
	2 (total)	419	418	418	0%
	3 (total)	144	143	143	-1%
	4 (total)	605	611	666	10%
	5 (total)	0	0	2	
	Total	**1168**	**1172**	**1229**	**5%**

Source: FlightGlobal, J.P. Morgan.

Y20 is the latest transport aircraft model of the Chinese military. The model entered service in 2016. Y20 has a maximum payload of 66 tons versus the current mainstream model Y8's 20 tons.

We think demand for Y20 will be strong, even though the unit cost is more than 6 times that of Y8, because it will be the only model capable of heavy-duty missions. For example, a type 99 tank weighs 54-58 tons. No other model can carry such heavy equipment in the Chinese military.

Table 7: Transport aircraft, China

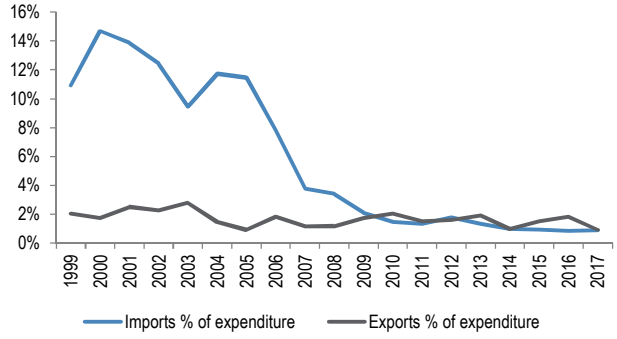
Model	ASP (US$ mn)	Payload (tons)
Y7	10	6
Y8	30	20
Y9	45	25
Y20	200	66

Source: Air Force Technology, J.P. Morgan estimates.

Increasingly independent supply chains

Imports accounted for 10-15% of China's military expenditures in 1999-2005, according to SIPRI data. However, China's defense industry seems to have become increasingly independent since 2006 and turned into a net exporter in 2010.

Figure 6: Imports and exports as a percentage of military expenditures, China



Source: SIPRI, J.P. Morgan estimates.

China is a net exporter of missiles and more traditional arms, such as armored vehicles, artillery, ships (China is the largest shipbuilder in the world by tonnage) and air defense systems, given that it does not have a strong air force. However, China remains a net importer of arms of higher-technology content, such as aircraft, engines, naval weapons and sensors.

More than half of China's arms imports in 2012-2017 were from Russia (60%), followed by Ukraine (15%) and France (14%). The majority of China's arms exports over the same period went mostly to oil exporters such as Algeria (8%), Venezuela (4%) and Indonesia (3%), or South Asian countries, along the energy import routes such as Pakistan (36%), Bangladesh (18%) and Myanmar (10%).

Table 8: China's net exports by weaponry

Net exports	2011	2013	2015	2017
Aircraft	-132	57	-88	-179
Air defense systems	17	36	185	-23
Armored vehicles	263	606	288	261
Artillery	48	26	36	23
Engines	-279	-449	-318	-239
Missiles	30	58	130	130
Naval weapons	-8	-23	-9	-11
Sensors	-88	-48	-143	-111
Ships	290	356	608	162

Source: SIPRI. Note: 1990 constant US$ in millions.

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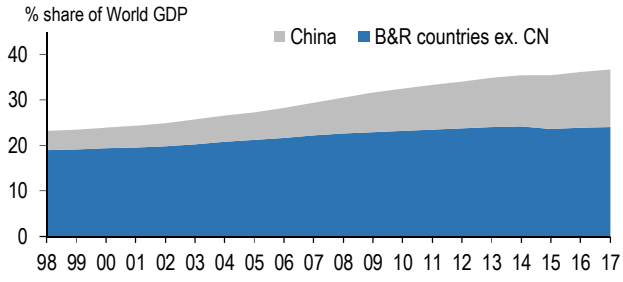
The Belt and Road Initiative

- **BRI provides a platform to lever China's experience with infrastructure to the world.**
- **In principle, BRI should be a positive sum game but it has been affected by issues around debt sustainability in some recipient countries.**
- **Malaysia's experience provides an interesting case study of positive BRI engagement.**

The Belt and Road Initiative (BRI) is an ambitious development strategy initiated by the Chinese government in 2013, with the main goals to improve regional cooperation and connectivity on a trans-continental scale. The Belt and Road Initiative consists primarily of the **New Silk Road Economic Belt**, which will connect China with Europe through Central and Western Asia, as well as the **21st Century Maritime Silk Road**, connecting China with Southeast Asian countries, Africa and Europe. The BRI program has focused on infrastructure development, which will better connect economies involved and foster close trade, investment and economic links, hence boosting regional economic co-operation. According to the Chinese government, the BRI program has involved 125 countries so far, which, together with China, constitute about 37% of world GDP (Figure 1).

Figure 1 B&R countries' share of world GDP



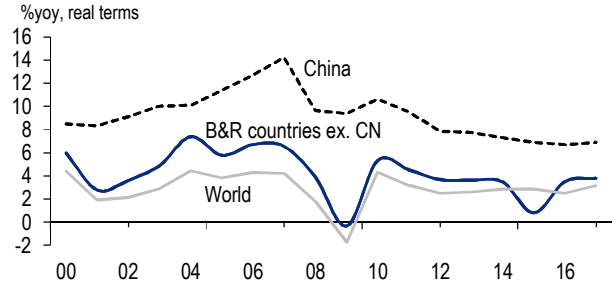
Source: World Bank, J.P. Morgan

The grand plan on regional cooperation and globalization

The BRI has been an important strategic program initiated by the Chinese leadership. Notably, China's latest constitutional revision has elaborated its foreign policy by adding the phrases "adhere to peaceful development strategy" and "adhere to open policies based on mutual benefit and win-win situation"; with the target of "building human community together" with other nations (see *China politics: A new era*, H. Zhu et al., 26 Feb 2018). In this regard, the BRI is a key component of China's further openness policy and its intension to play a larger role on the global stage. From China's perspective, the BRI could help to lift the productivity and growth potentials of the related countries by strengthening their infrastructure, trade and investment links, especially as the global economy has been stuck in a phase of slower growth since the Global Financial Crisis, with a lack of new near-term growth drivers. In addition, amid a growing wave of protectionism and rising trade tensions, China believes the BRI could help to engineer the next round of free trade development and globalization.

Structurally, the BRI program would match China's solid experience in infrastructure development and the need of many developing economies involved in the program to develop and upgrade their infrastructure (including the construction of railways, roads, ports, bridges, industrial estates, etc.). This could in turn pave the ground for further industrialization in these economies, hence enhancing their growth potentials, which is somewhat similar to the path of development that China has trekked in recent decades. According to the Asia Development Bank, in Asia alone, the funding need for infrastructure investment projects between 2016 and 2030 would amount to $26 trillion.

Figure 2: B&R countries and world growth



Source: World Bank, J.P. Morgan

From China's perspective, the proposal of the BRI program came at a time when the economy's potential growth had slowed notably since the GFC, with overcapacity and rising leverage reducing productivity. As the country explores new sources of growth, the BRI program would be an interesting way to boost China's own infrastructure investment, especially in the regions involved in the BRI program, including provinces in the coastal region and the less-developed, southwestern parts of the country. In the near term, the BRI could boost the trade flows between China and the other BRI countries, as growing investment in these economies tend to lead to rising import demand for investment goods and machineries (which will likely boost demand for Chinese exports). In the medium term, BRI economies' improving

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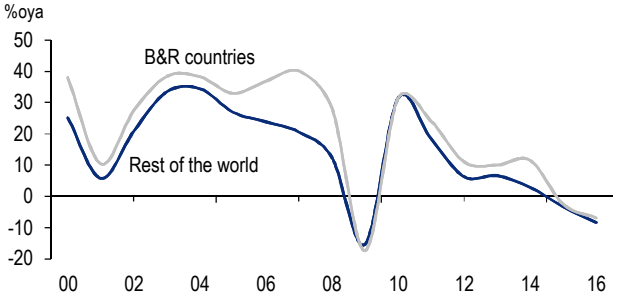
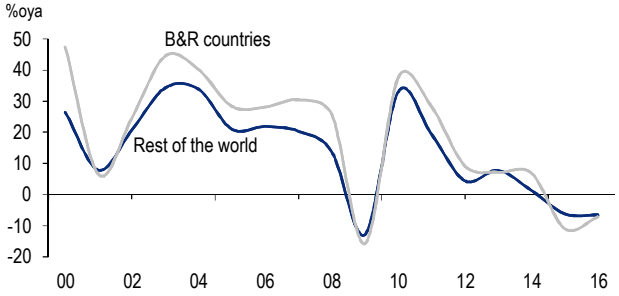
growth implies higher purchasing power, and hence potentially stronger import demand from China. From the longer-term strategic perspective, intensifying regional cooperation and improving connectivity with the BRI-related economies, many of which are well-endowed with energy and various natural resources, could help to improve the security of energy and raw material supply for China. Moreover, the funding for BRI infrastructure projects partly through RMB could promote the RMB as an international currency.

Figure 3: China's export growth



Source: WITS, J.P. Morgan

Figure 4: China's trade growth



Source: WITS, J.P. Morgan

The funding source for BRI

The source of funding is a key issue for the ambitious BRI program. A number of organizations have been established in recent years, including the Asia Infrastructure Investment Bank (AIIB), with $100bn of initial capital; the Silk Road Fund, with $100bn and 100bn yuan of initial capital, as well as the New Development Bank (BRICS Development Bank), with $50bn of starting capital. In addition, China's policy banks (including China Development Bank and the Export-Import Bank of China), the Postal Savings Bank and the major state-owned banks have together committed more than $700bn in loans and equity investment for BRI-related investment projects, most of which go to infrastructure projects such as roads, railways, ports, as well as telecommunication and energy projects.

Table 1: Financing source

Institution	Financing activity
Policy banks	The outstanding loan related to B&R projects provided by the three policy banks and the Postal Savings Bank amounted to 1.53 tillion yuan ($230 billion) as of end-2017, up 22.58% from 2016.
State owned banks	ICBC, CCB, BOC provided a total of $527 billion for financing of 1012 investment projects through June 2017.
Silk Road Fund	Established in Dec 2014 with initial capital of $40 billion and RMB 100 billion. As of June 2017, the fund had signed 16 contracts and committed to invest $6.8 billion.
Asian Infrastructure Investment Bank (AIIB)	Founded in Dec 2015 with $100 billion in subscribed capital and 57 member countries, which has now expanded to 93. As of Dec 2018, it has approved over $7.5 billion in investment projects.
New Development Bank (BRICS Development Bank)	Founded in July 2014 by the BRICS emerging economies with starting capital of $50 billion to focus on infrastructure investment. As of June 2018, NDB has approved 21 projects with the a portfolio exceeding $5.1 billion.
Private sector	Chinese enterprises have invested over $60 billion since 2013.

Source: Various newswire.

With high-profile policy support for BRI, China has committed steady outward direct investment (ODI) to the related countries in recent years. China's accumulated ODI to BRI-related countries amounted to $154bn by the end of 2017, with an additional $13bn committed during the first eleven months of 2018. Notably, while the Chinese authorities have tightened restrictions on outbound corporate FDI since 2H16 to curb capital outflows, policy support for BRI-related outward FDI has remained unabated. By industry, not surprisingly, BRI-related ODI projects are heavily geared towards the infrastructure sector, especially energy and transportation. On a related note, Chinese enterprises have managed to secure steady contracted construction projects in BRI-related countries, with the value of contracts signed amounting to$90bn during the first eleven months of 2018 (accounting for almost half of China's total contracted foreign construction projects during the period, while exports related to total foreign construction projects in turn grew 15%oya).

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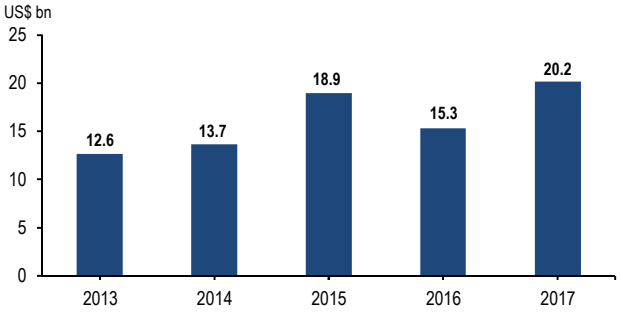
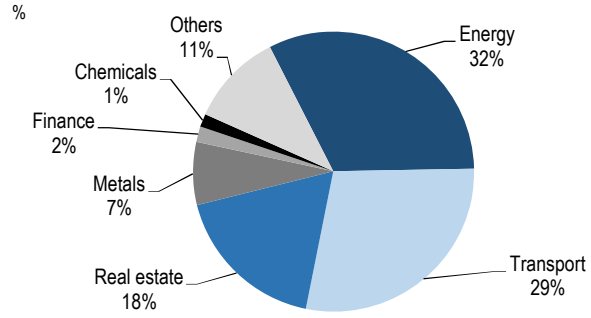
Figure 5: China's ODI flow to B&R countries



Source: Ministry of Commerce, J.P. Morgan

Figure 6: China B&R investment by sector, Jan-Nov 2018



Source: AEI, J.P. Morgan

Potential concerns and risks about BRI

The BRI program, to some extent, could be seen as a way for China to export its growth model to many of the developing economies involved. Infrastructure investment reduces trade costs and improves connectivity, paving the ground for deepening industrialization and enhancing the economies' growth potential. However, whether this model could be replicated successfully, and whether the related infrastructure investment projects would be economically viable in the medium term, heavily depends on the extent to which complementary institutional and macro policy reforms are carried out in the individual economies (as highlighted by the World Bank). Indeed, historical experience regarding **returns for China's overseas direct investment has been mixed at best**. While China's total stock of overseas direct investment expanded to $1,375bn (multiple of 12.7 times) in the decade through 2017 amid the government's support for Chinese overseas investment in strategic sectors including energy, resources, high-end manufacturing, etc., investment earnings inflow under the current account grew by a rather moderate scale to $158bn during the same period (multiple of 3 times). Besides, China's domestic experience of industrial over-capacity, rising leverage and local government debt problem, many of which are closely related to the aggressive investment programs implemented during the post-GFC period, serves as an important reminder of ensuring the economic viability of the BRI investment projects.

From the perspective of some BRI countries, there have been growing concerns about medium-term financial risks associated with the investment projects and the risk of debt distress. This is especially so given concerns that the lending practices and standards of Chinese financial institutions might cause unsustainable lending in the process of funding BRI projects, leading to potential debt problems and fiscal sustainability issues down the road. In addition, while Chinese financing tends to be welcomed by many developing countries under the BRI program, partly because such funding is seen to come with "less strings attached" compared with funding by the other conventional international organizations such as World Bank, there has been growing criticism for issues related to environmental standards, social and corruption problems. From a global perspective, with growing geopolitical tensions in recent years, there are increasing worries that China may use its economic influence to impact domestic politics of the BRI countries and to achieve its own agenda with regard to geopolitics, military and general foreign policy.

Malaysia: realigning BRI investments with macro objectives

Within the region, Malaysia has been a particularly notable participant in the BRI under the previous administration, and thus serves as a useful case study in how the BRI projects have been handled given the focus to reduce the country's indebtedness (Figure 6). In Malaysia's case, these concerns are not unfounded, for an AAA-rated country. Malaysia's debt to GDP of 68% is well above the rating average of 28%, with a large share reflecting government guarantees, which had increased noticeably since 2012 (Figures 7 and 8).

Following the surprise outcome of the May 2018 elections, which saw the installation of a new administration, the incoming government's concern about debt sustainability led to a closer scrutiny of the sovereign's debt obligations. Thus, there has been a broad review of infrastructure projects, which include some that fall under the BRI umbrella. So far, four notable projects have been postponed if not cancelled, accounting for 16% of GDP and of which 34% in notional project value is BRI related (Table 2). The point here is that the review does not just focus on BRI-related projects but rather on economic impact and sustainability of the projects.

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Table 2: Malaysia key infrastructure projects

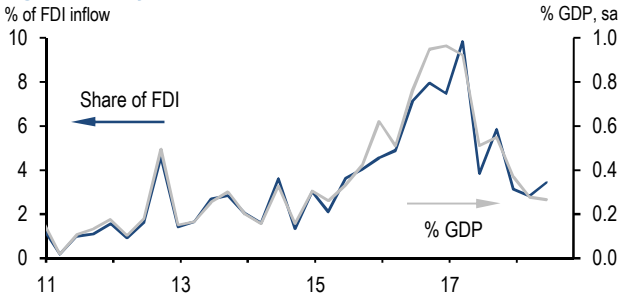
Projects in progress	US$bn	% GDP
Melaka Gateway	7.2	2.1
Kuala Linggi International Port	3.0	0.9
MY/CN Kuantan Industrial Park (MCKIP)	4.5	1.3
Robotic Future City, Johor	3.6	1.1
Samalaju Industrial Park Steel Complex	3.1	0.9
Sarawak methanol and derivatives plant	2.1	0.6
Digital Free Trade Zone (DFTZ)	0.2	0.1
MRT Phase 2	7.5	2.2
LRT Line 3	2.9	0.9
Klang Valley Double Track rail upgrade (Phase 2)	1.2	0.4
Total	**89.8**	**10.4**
Projects cancelled/deferred		
East Coast Rail Link (ECRL)	16.1	4.7
Sabah Gas Pipeline	2.2	0.6
KL-SG High Speed Rail	26.5	7.8
MRT Line 3	9.6	2.8
Total	**54.4**	**16.0**

Source: Newswires, shaded area denotes BRI related projects

Perhaps more notable are the BRI projects that remain on track. These include the Melaka Gateway, MCKIP and E-commerce hub, which collectively amount to $23.8bn, or 7% of GDP. The unifying thread of these projects is that they should provide positive economic dividends for both China's multi-national corporations and Malaysia's economy, and that they are not a drag on the government's fiscal position. In the case of MCKIP, it is primarily manufacturing-led, while Melaka Gateway is a mixed development project, which combines tourism, industrial and commercial elements. Both of which do not add to the government's debt burden as they are undertaken jointly by Chinese and Malaysian companies in the private sector.

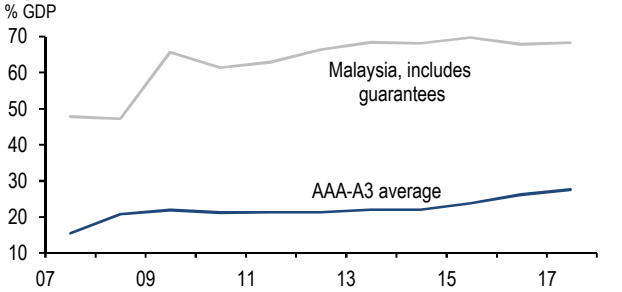
From a broader perspective, Malaysia's recent approach towards the BRI remains one of selective engagement, continuing with BRI projects that are congruent with its longer-term policy and macro objectives and cancelling those that are not. Thus, the BRI projects that fulfill these criteria remain broadly on track and one observation is that the BRI could materially boost the perceptions of goodwill if the projects complement the longer term development objectives. It appears that a necessary condition for success is an economic blueprint for development and how the BRI might complement such a plan. In the case of Malaysia, one of these objectives is the creation of a regional export hub for China's manufacturing sector, especially in context of escalating trade tariffs. Thus, it should be no surprise that the recent tensions have only increased the willingness of Malaysia to move forward with the MCKIP (Malaysia-China Kuantan Industrial Park), which provides a platform where Chinese companies can expand their production capacities along the Belt and Road countries, in order to get closer to their final markets. Meanwhile, Alibaba's E-Commerce and logistics hub aims to leverage Malaysia as a gateway into the ASEAN market, which benefits local SMEs too.

Figure 7: Malaysia FDI inflows from China



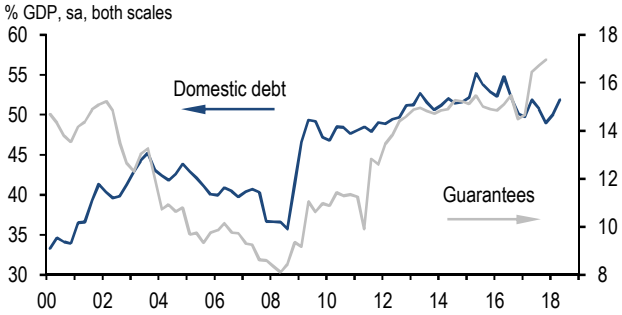
Source: DOS

Figure 8: Government debt



Source: Moody's and national sources

Figure 9: Malaysia government debt



Source: MOF

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The RMB challenge to USD hegemony

- **China's exchange rate regime evolution has entered a new phase of currency globalization, with the ambition to become at least a major, if not dominant global reserve currency.**
- **These developments are important for global investors seeking more exposure to China, as a core component to China's broader market development and global integration, and in international relations.**
- **But if history is any guide, the establishment of a major global currency—much less a challenge to USD hegemony—is not inevitable. History offers several recent examples of currencies that disappointed expectations and policy ambitions, including EUR and JPY. Meanwhile, the USD has so far bucked earlier expectations of waning reserve-currency-status**
- **The RMB's ascent towards global international and reserve currency status is very nascent. Internationalization has stalled after a big push earlier this decade. Shares of FX reserves are no higher than other marginal diversification currencies and its growth may be limited by its still relatively inaccessible and illiquid markets when compared to the core reserve currencies.**
- **The biggest hurdle may be the qualitative aspects of the RMB regime, including quality of institutions, inherent financial market stability, and capital account openness and regime flexibility.**

The long-term rise of the RMB towards global reserve currency status, in a way that might in the future counterbalance, if not challenge the USD, is a potentially significant trend to monitor and respond to. But like geological tectonic shifts, **the process is a long-term one, whose ultimate destination is unclear, and which will only transform the global monetary system landscape over a very long period of time**.

For now and the foreseeable future, and from a geopolitical and global monetary system perspective, the globalization of the RMB remains marginal and presents as many risks as opportunities to China. **The end of US dollar hegemony is probably still decades away, despite serious long-term US issues, and rapid RMB internationalization to-date.**

The beginning of the beginning: the rise of the RMB

The modern history of China's exchange rate regime might start as far back as the 2005 abandonment of the dollar peg, or even the 1994 unification of its multi-tiered exchange rates to facilitate current account convertibility.

But **two major developments in the past decade have signaled that China's exchange rate regime evolution has entered a new phase of currency globalization, with the ambition to become at least a major, if not dominant global reserve currency.** The first development was the creation of the offshore RMB market in 2010 through allowing and facilitating offshore RMB deliverability. The second was RMB's inclusion in the IMF's SDR basket, and the various reforms that facilitated it.

These most recent developments and the initiation of the path towards currency globalization is important at three main levels:

1. **For international investors and global market participants, the globalization of the RMB has offered exposure to the China economy and its growth story, which was previously difficult or impossible to access** directly through the ability to gain long currency exposure, as well as through growing direct asset exposure that the associated gradual opening of the capital account enabled.
2. **Ongoing exchange rate regime liberalization and evolution have been central to China's ongoing economic development and integration with the global economy and financial system.** It was a prerequisite and a facilitator for the above-mentioned capital account opening, which in turn bolstered China's own domestic financial system development. The flexibility gained from the continued de-anchoring from the USD on the domestic side bolsters the development and effectiveness of China's domestic monetary policy regime, and on the international side contributes to addressing global imbalance issues.
3. **At the geopolitical level, the ongoing RMB internationalization is a signal of the emergence of China's weight and influence in the global economy and increasingly financial system.** This also indicates China's future ambition in the realm of global finance, global development, and the reach of its influence generally.

The motivation and stakes for having a globalized and dominant reserve currency can be enumerated in ways more specific than simply vague notions of gaining global

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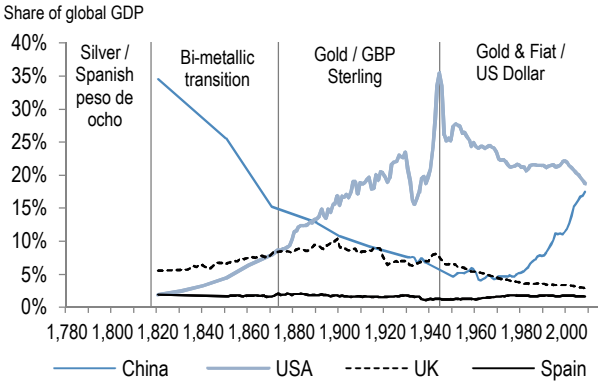
influence and recognition. **Many recent and current reforms have been motivated as much by pragmatic near-term objectives as by global geopolitical ambition**. Beyond the domestic financial and monetary system development benefits mentioned above, the push for RMB benchmarking and pricing of commodities, and RMB invoicing and settlement of goods and services transactions help reduce and shift away unnecessary pricing and foreign exchange volatility risk for globally dominant producers and consumers. But these are benefits that any relatively or regionally internationalized currency might offer.

The benefits further out, should RMB take or share hegemonic status with the USD for example, would include the "exorbitant privilege" that the US has been cited to possess ever since attaining a position of holding the hegemonic currency since the establishment of the Bretton Woods system in 1944. These privileges have traditionally been recognized to include the ability to borrow at lower costs, the ability to sustainably run larger current account deficits, and seigniorage income[1]. The leveraging of the global integration and dependence on the US financial system as a tool of geopolitics through the use of financial sanctions, for example, might also be deemed another such exorbitant privilege.

The assumption of at least a challenge to USD hegemony is reasonable, but not inevitable, and would be very long term

In recent years the idea that the USD's hegemonic reserve currency status was at its peak and its challenger would be the RMB has gained a sense of inevitability. This is given widespread expectations that China will eventually surpass the US in economic size (after having already surpassed the US as the largest trading nation in 2013), whether this happens in five to10 years as many believe, or more than that, as is our estimate (see Zhu). This is perhaps a reasonable expectation given the long arc of history where earlier global powers saw their hegemonic currency ultimately supplanted by a rising, newer global powers saw their hegemonic currency ultimately supplanted by a rising, newer global power: the UK before the US, and Spain before the UK[2] (Figure 1).

Figure 1: Evolution of hegemonic currencies appear to come with a long lag to economic weight ascendancy



Source: Angus Maddison, Statistics on World Population, GDP and Per Capital GDP 1-2008 AD, http://www.ggdc.net/maddison/oriindex.htm

However, the long arc of history (and more recent experiences) do not necessarily support the idea that economic weight alone will promise that the RMB will become a dominant (or hegemonic) reserve currency, and certainly not with any imminence:

- **First, there is the conventionally assumed inertia in global currency dominance.** This is to a great extent imputed from the history of the GBP's eclipse by the USD in the mid-1940s, which only happened 70 years after the US had eclipsed the UK in economic size, and 30 years after US had surpassed it in exports[3].
- **Size and market power alone are not sufficient to establish a dominant global currency.** Scholars on the topic have flagged Japan as a case study and cautionary tale of a failed state-driven effort to internationalize a currency into a truly global one[4], despite wielding and leveraging market dominance in traded goods (as China currently has). Reasons cited include financial volatility and banking system crises in the 1980s and 90s and the behavioral preference to price and invoice to the currency of final markets (i.e., USD) despite having dominant market power. These two considerations

[1] "Exorbitant Privilege" is in fact the title of a highly cited book by Barry Eichengreen, a noted scholar on the topic of reserve currencies and the history of the international monetary system, which discuss these benefits alongside a broader discussion of the future prospects for USD hegemony.

2 A curious footnote and historical parallel, was that Imperial China played a major role in the establishment of the Spanish silver dollar as a global currency given its hoarding of these "reserves" as a result of its large goods trade surplus; and the ultimate ceasing of demand for silver (ultimately in favor of opium) coincided with the end of the global era of the Spanish silver dollar.

3 This assumption of significant inertia has been challenged, e.g. by Chitu, Eichengree, Mehl (2012), but even they note that while the USD challenge to GBP in the 1920s may have succeeded for a time, the GBP regained its dominance shortly after, due to the US banking system collapse in the 1930s.

4 JPY's share of global FX reserves peaked merely at 11%, and JPY invoicing as a % of total Japan trade peaked early at 40% and 25% of exports and imports, respectively.

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could be relevant to assessing the RMB's future prospects as a global currency.

- **Even the limited progress of the EUR in its first 20 years of existence underscores the limits of inevitability**. Early in the life of the Eurozone project, there was a sense of inevitability that the EUR would challenge and at least coexist with the USD in an increasingly multipolar global monetary regime. While EUR did peak at 28% of global FX reserve allocation (in 2009) and remains the second largest reserve currency, it has not gained an appreciable share in the pricing of global commodities, for example, and has lost ground in the past decade as a currency of cross-border financing.

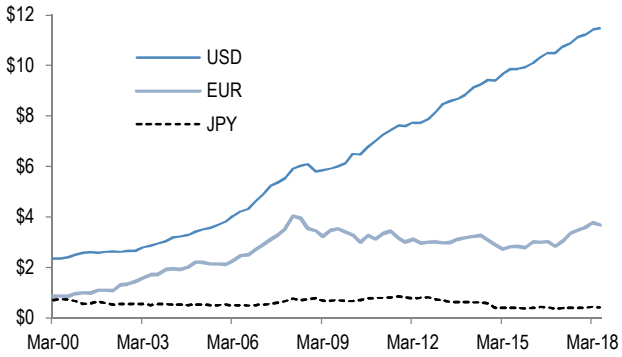
For the part of the incumbent hegemon (the USD), many have cited reasons why the dollar is vulnerable to a challenge for reserve currency hegemony. These include a policy turn-away from globalism, declining ability to deliver quality political and policy outcomes, the co-option of the USD system as a geopolitical tool and the increasingly precipitous fiscal outlook. **But it is important to remember that the potential loss of USD hegemony due to the US having been the epicenter of the 2008 global financial crisis did not play out as some had anticipated**. The trade-weighted USD spiked over the course of the crisis, and in the aftermath of the crisis, the USD's share of reserve portfolios rebounded while its share of global cross-border lending ballooned (Figure 2).

Tracking the RMB's long march towards global currency status

One of the major singular focal points of recent discussions around RMB globalization and potential future dominance were its inclusion into the IMF SDR basket. But as a distinct event it had minimal significance. It only matters in the course of conduct of the business of the IMF itself, is not used for measurement or denominating transactions anywhere else, and even its inclusion criteria—being a "freely usable" currency—is not a common benchmark of assessment other than in the bylaws of the IMF itself. Instead, SDR inclusion was important as a legitimizing signal, and also a catalyst of recent reforms and initiatives Beijing has taken around its exchange rate regime and capital account. Moreover, the requirements for having a major or dominant role in the global monetary system requires sufficient characteristics in a broad set of areas, corresponding to the broad set of functions currencies play in the global monetary system.

Figure 2: Back to uni-polar in terms of global financing currency as EUR lagging as a currency of cross-border finance

Total credit to non-bank borrowers by non-local currency of denomination. Total credit includes cross-border bank claims and FX-debt issuance ($ trillion)



Source: BIS global liquidity indicators

In the task of assessing the RMB's progress towards becoming a major and potentially dominant global currency, recent scholars generally point to a number of quantitative and qualitative indicators. We review three broad criteria below:

1. **Internationalization**: Reflecting the "medium of transaction" function of currencies, this measures the extent the RMB is used in global transactions, rather than merely domestic context. This is the focus of the initiative of RMB deliverability, cross-border trade settlement, and offshore RMB bond issuance initiatives of Beijing in the past decade. After a strong start in this area, progress has stalled across a number of indicators: 1) after a big push at the beginning of the decade, RMB trade settlement peaked at just over 30% of total Chinese trade and has since halved (Figure 3); 2) Similarly offshore CNH bond issuance grew under a big push and great interest but peaked in 2014 and last year issuance remained 50% these peak levels (Figure 4); 3) CNY's share of SWIFT turnover initially rapidly grew from a near-zero base, but has not gained market share over the past three years (Figure 5). The culprit for the seeming stall in internationalization in recent years might have cyclical or transitory causes (RMB devaluation fears, domestic financial market volatility, a cyclical slowdown, a slowdown in global trade, etc) that do not necessarily damn the prospect that the RMB is on a medium-term path towards major global reserve currency. But as David Dollar argued recently[5], the slowdown of internationalization could also be reflective of institutional regime weakness (which he argues is interrelated with the market volatility and RMB devaluation fears mentioned above). If so, then it suggests that the RMB's assent towards a major global reserve currency is not as straightforward and swift as some have in the past assumed, but instead is an

5 See David Dollar, Long-Term and Short-Term impediments to the RMB's Rise as a Reserve Currency, CATO Journal, Spring/Summer 2018.

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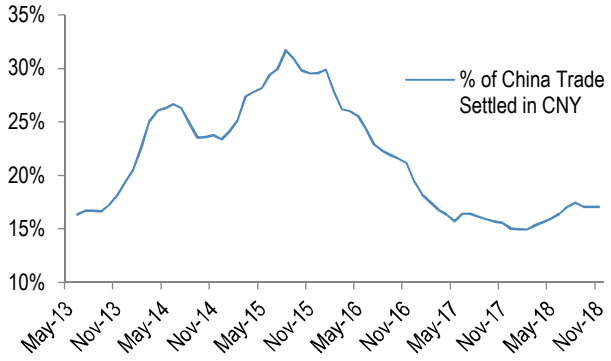
outcome that is deeply intertwined with other risks and complexities for China's development plans towards 2025, 2049, and beyond.

Figure 3: CNY settlement as a percent of China's total trade has fallen…

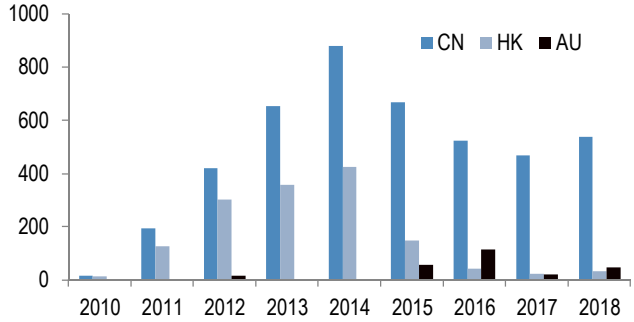
CNY-settled trade volume as a % of total China trade (LHS), rolling 6m avg.



Source: Bloomberg, J.P. Morgan

Figure 4: …while CNH-denominated bond issuance too seems to have levelled off

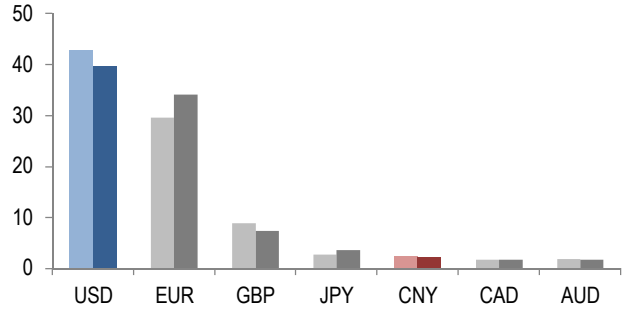
Bonds issued (mms) amongst top three issuing countries



Source: Bloomberg, J.P. Morgan

Figure 5: RMB continues to rank far behind its global peers, and has shown little in the way of growth since 2015

% of SWIFT settlements (LHS: 2015, RHS: Current)



Source: Bloomberg, J.P. Morgan

2. **Capital-account openness, financial market development and regime flexibility**: A seemingly straightforward prerequisite for a global currency is an exchange rate and capital account regime that is extremely open and flexible to maximize the incentives and usefulness of foreign holders of that currency. Together with RMB internationalization, capital account regime liberalization has been another focal area of Beijing policy. But measuring progress on this front is fraught with complexity. Indeed in a recent report on Chinese capital account liberalization published on the eve of RMB's SDR basket inclusion, we highlighted that PBoC was not yet aiming to achieve full capital account convertibility, but instead was liberalizing cautiously and incrementally via various managed inward and outward investment schemes (see *China: Liberalization of capital account gains momentum*, L. Oganes et al., 29 May 2015). There is also the question of the actual degree and the reliability of de facto convertibility, given the still actively managed nature of China's capital account, and the regime's tendency to apply macro-prudential measures counter-cyclically. One more visible sign of the slow pace of progress on this front is the reluctance of major index providers to include China into global indices more rapidly due to these concerns[6].

3. **Reserve currency demand and its required characteristics**: Perhaps an obvious indicator to track the RMB's progress towards major reserve currency is by its actual share of holdings in reserve currencies itself. This also shows a very nascent picture, with RMB's share of global reserves only growing from 1.1% at the time of its first disclosure at end-2016 to a mere 1.8% in the latest disclosure for end-September 2018. Indeed, it is at levels which make it indistinguishable to those currencies seemingly accumulated largely for mere diversification (e.g., AUD and CAD) that comprise 1.7% and 1.9% of global FX reserves respectively, despite outsized economic influence on the global stage (Figure 6). This is likely the case, given that RMB has yet to offer those characteristics generally recognized to be required of core FX reserve holdings: a large, deep, liquid and high quality bond market (Figures 7-8), and currencies that hold their value (if not appreciate) during times they are needed as BoP backstops (Figure 9).

[6] For example, see *Index Governance Consultation 2018*, p.18 on concerns over bond market accessibility, and *FTSE Index Inclusion of China A-Shares: China Opportunities Forum 2018 Takeaways* and *MSCI Consultation on Further Inclusion of China A-shares* on the slow pace of equity index inclusion.

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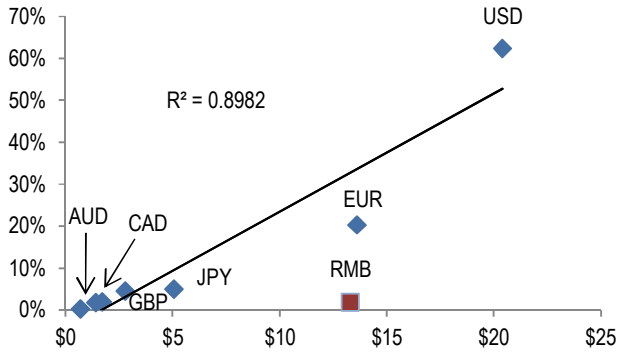
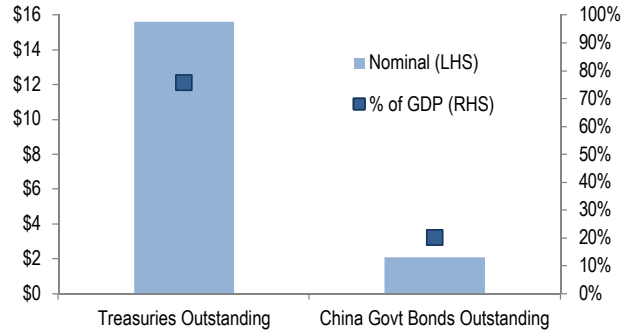
Figure 6: Benchmarked against global GDP, the pull factor into RMB allocation is much greater than the push factor out of USD
Y-axis, share of global FX reserves; X-axis: nominal GDP; best-fit line and R2 exclude RMB



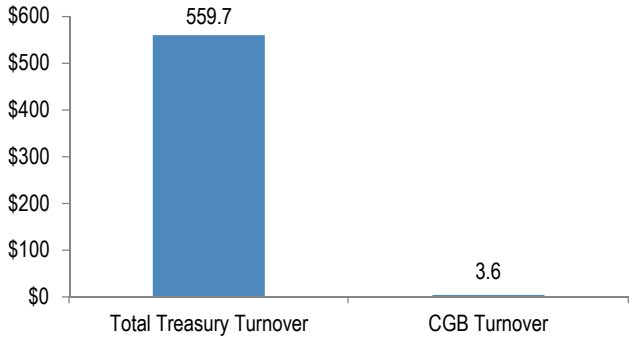
Source: J.P. Morgan, IMF

Figure 7: Depth in government bond markets is a prerequisite for reserve currency status…
Amount outstanding, Treasuries and China CGBs; Nominal (LHS) and % of GDP (RHS)



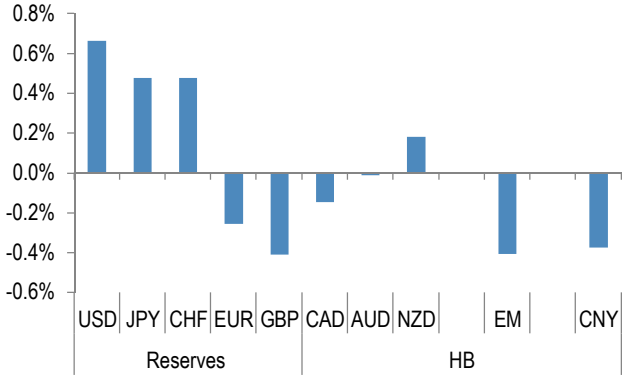
Source: J.P. Morgan

Figure 8: …as is liquidity in those markets
USD daily turnover of Treasuries and China CGBs (USD bns)



Source: SIFMA, J.P. Morgan

Figure 9: CNY does not behave like a "safe haven" currency that is required of core reserve assets
Average performance during months where global FX reserves were drawn down



Source: J.P. Morgan

Conclusion

If there is to be an inevitable challenge to USD primacy at some point further out, it can seemingly only be from China, given it is the only country with the size and trajectory to challenge the US. Overall the progress of the RMB attaining a status of global reserve currency in a way that might challenge USD's hegemonic dominance might best be described as "nascent". It certainly cannot yet offer a viable alternative to the dollar and in that way has limited ability to be used as a viable tool of geopolitical influence.

For now, instead of expecting to watch for the rise of the RMB as a tool and driver of growing Chinese economic and geopolitical influence, we believe it is more appropriate to consider the gradual ongoing globalization of the RMB to be integral to the overall development of the Chinese economic and financial regime, providing some necessary benefits, but also carrying the same sequencing challenges, execution and destabilization risks as other aspects of medium-term regime liberalization.

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Semiconductors and tech hardware

- **China has already achieved a high degree of localization in Consumer and Infra tech systems.**
- **Semiconductors remain a key area of focus of development but the pace remains slow.**
- **Digital infrastructure buildup, Cloud Computing, Software and AI are key areas of focus.**
- **By 2030, we expect China to be highly self-sufficient in tech, but recede in importance as a global tech manufacturing hub.**

Self-sufficiency in tech systems has risen sharply in the last decade

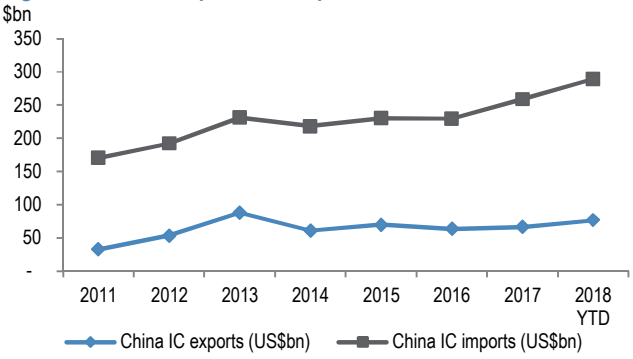
Growing national security concerns, increased importance of tech infrastructure and the need to upgrade homegrown tech supply chain to higher value added areas have prompted China to actively build self-sufficiency in its tech supply chain over the past decade. Amidst a supportive national policy backdrop and sizable domestic demand, China has made progress with some domestic players (e.g., Huawei, Lenovo and Xiaomi) rising to become leading global brands in both infrastructure and consumer tech. We believe China has already attained self-sufficiency in most consumer tech areas now, with semiconductors and key elements on infrastructure tech remaining as the biggest areas where China Tech has been lagging behind, given a high level of technology intensity, R&D requirements, lack of talent and access to IP.

Consumer tech
Chinese players have evolved from mere assemblers to brands and designers in many consumer tech verticals such as PC, smartphones and TV. Lenovo has become the number 1 PC vendor in 2018 after rounds of industry consolidation. In smartphones, Huawei, Xiaomi, Oppo and Vivo combined have taken up ~40%/~80% of global/China shipment in 9M18. Chinese players such as TCL, Xiaomi and Hisense are also rapidly gaining share in the global LCD TV market. Apple is probably the only overseas player with meaningful wallet share in the domestic consumer tech market in China.

Infrastructure tech
China is already able to fulfil most of its own infrastructure tech system demand with homegrown vendors including Lenovo, Huawei, Inspur and Sugon. Take servers as an example. Chinese vendors supplied ~65% of domestic demand in 2017, up from ~25% in 2010, according to Gartner. A few such as Huawei, Lenovo and Inspur have also expanded overseas. Similar self-sufficiency has also been achieved in other infrastructure tech products such as storage, networking, base-stations and broadband equipment. In addition, Chinese suppliers have also advanced to provide higher value add and leading edge offerings. China-based Innolight, for instance, is a leading supplier of advanced 400Gbps optic modules globally and works with Tier 1 Internet players (e.g., Google).

Semiconductors
Despite the progress in infrastructure and consumer tech, key components for many of these systems—especially semiconductors—remains an area where China is exceedingly reliant on imports and domestic players are still far behind peers in the US, Korea and Taiwan. As of 2018, China is still mostly relying on imported IC chips to fulfill its domestic demand, with $265bn of IC imports versus merely $67bn of IC exports in 11M2018.

Figure 1: China IC exports and imports



Source: Bloomberg. Note: 2018 data until Nov 2018.

Semiconductor localization a strategic focus since 2014

Given the sizable trade deficit from IC imports and the importance of semis in the tech supply chain, China has significantly stepped up its efforts to localize the semi supply chain from 2014. Former Premier Li Keqiang has particularly emphasized the IC industry in the Government Work Report in 2014 and in every year after that. Since then, the China government has offered multiple supportive measures to curate the local semi ecosystem, including preferential tax policies, R&D subsidies, as well as the set-up of the China National IC Industry Investment fund under the supervision of MIIT/MoF. In addition, we believe the recent ban on US companies exporting to ZTE (now reversed) and Fujian

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Jinhua have further strengthened the incentive for China to speed up the pace of semiconductor localization.

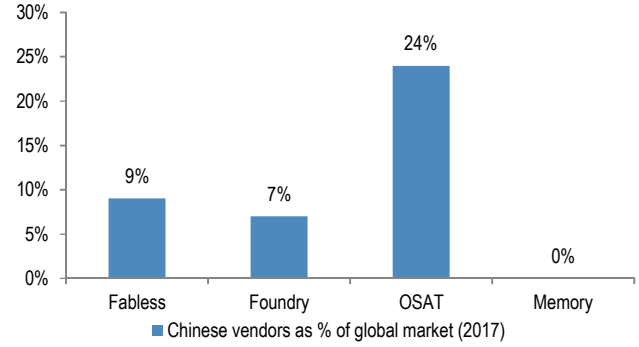
Coupled with the rise of large domestic brands, local technology development and M&A, China has achieved some progress in semiconductors. In semiconductor packaging—Chinese players (JCET, Huatian, Tongfu) are among the top 10 vendors globally—HiSilicon and UniSoC (formerly Spreadtrum) are among top 10 Fabless players.

Table 1: China semi supply chain players

Value Chain	Companies
Fabless	HiSilicon, UniSoC (Spreadtrum), Sanechips, Goodix, Silergy, CEC Huada
Foundry	SMIC, Hua Hong, Shanghai Huali
OSAT	JCET, Tianshui Huatian, Tongfu Microelectronics
Equipment	ASMPT, Naura, AMEC, ACM Research
Memory	YMTC (NAND), Fujian Jinhua, Hefei Changxin (DRAM)

Source: J.P. Morgan.

Figure 2: China market share in different parts of semi SC

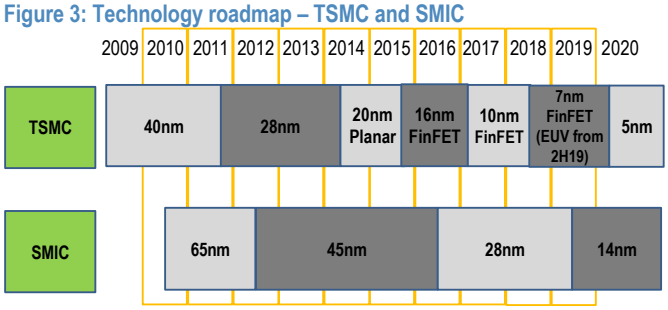


Source: Gartner, Company data. Note: Calculated based on USD revenue.

However, success in the Fabless ecosystem has been limited largely to HiSilicon (subsidiary of Huawei) and progress in the Foundry and Memory industries has been very slow. For instance, China's leading foundry SMIC is only developing its 14nm tech, but TSMC, the leading foundry, is already two generations ahead.

In addition, China's ambition of building a wholly domestic semiconductor ecosystem (from design tools, fabless all the way to foundry, memory and equipment/ materials) may take a long time, since building one part successfully may need support from other tier-1 international players in the ecosystem. For instance, a leading Fabless could be built only by relying on the global No.1 Foundry, TSMC. And a leading Foundry can be built only by relying on tier-1 equipment vendors in the US, the EU, or Japan.

Figure 3: Technology roadmap – TSMC and SMIC



Source: Company data, J.P. Morgan estimates.

Recent regulatory hurdles (tighter M&A norms and CIFIUS reviews in the US) and geopolitical tensions (potential ban on sensitive semiconductor equipment exports) could further delay the development of the local semi ecosystem in China.

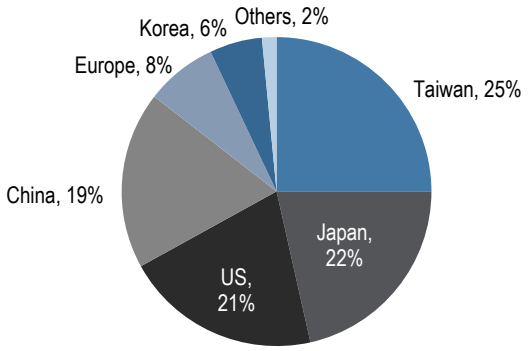
Focus on older technology to bring rich dividends: While the market focuses on leading edge semiconductor competition, we believe that Chinese fabless companies are making swift progress in raising market share in older technologies (legacy analog, connectivity, MCU kind of products) and should be able to take market share with limited technology/IP related entry barriers.

A slowdown in Moore's Law could open the window at the leading edge. Moore's Law, which dictates the pace of semiconductor technology development, has already been slowing. A further slowdown in the next decade could make it easier for Chinese companies to surmount the technology challenges and narrow the gap with leading companies in logic and memory technologies. However, we are not seeing the landscape change much in the next 5 years, since Chinese leading edge semiconductor companies are still hampered by the lack of talent and experience in relation to global peers.

Upgrading China's role in the tech hardware supply chain

China has meaningfully lifted its value added in the tech supply chain over the past few years, with the most notable example in the Apple supply chain. While China first started off as the production base of Taiwan ODMs, it has gradually evolved to penetrate into component supply, with the emergence of domestic players like AAC, Goertek and Luxshare. According to the 2018 Apple Supplier List, 19% of the top 200 Apple supply chain vendors are already domestic Chinese companies.

Figure 4: Top 200 Apple supply chain vendors in 2018



Source: Company data, J.P. Morgan.

We believe this is largely a positive for tech development in China, as these leading players can then utilize their scale and expertise to eventually develop homegrown tech innovations and solidify China's importance in the overall tech hardware supply chain.

Investing in the next frontiers in tech

Thanks to a stronger tech ecosystem, large domestic market and established Internet players like BAT, we believe China is already investing heavily in the next wave of technology development.

AI and Deep Learning – China racing ahead: China has been at the forefront of AI development with leading players like BAT and standalone AI players such as Sensetime, Megvii and Hikvision. The large scale of user data and supportive policy from the government (in use-cases such as public safety) has enabled the China AI ecosystem to evolve at a very quick pace.

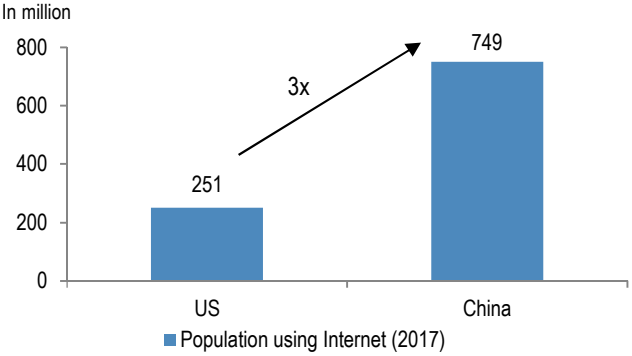
We believe that AI in China is likely to evolve as a standalone ecosystem, insulated from the rest of the world, much like China Internet, and should give rise to multiple big players. Over time, Chinese companies are also likely to move into other Emerging markets, leveraging off the strength of a very vibrant domestic AI ecosystem.

Software and Cloud computing – early days, but hyper growth: China has been a laggard on software adoption and cloud computing. However, with productivity improvements squarely in focus for most industries, we expect rapid adoption of cloud computing and enterprise software / SaaS models in China. The absence of big legacy systems could actually make the adoption curve steeper, given higher potential benefits and low switching costs. China has been a tough market for software vendors to monetize, but the changing user behavior (rise of subscription models, willingness to pay for value) augurs well for increased monetization in the future.

Renewed focus on infrastructure and semiconductors: From an AI and Cloud computing perspective, China is likely to be self-sufficient in data, algorithm and use-cases, but is still heavily reliant on international vendors on hardware (computing and memory chips). Recently we have seen a step up in investment activity with multiple large companies (Huawei, Alibaba, Baidu) all branching out into semiconductor development. Given the rising importance of semiconductors in differentiating user experience (Apple, Amazon and Google are all expanding in-house design as well), we believe that Chinese vendors are also likely to increase investments in self-developed chips over the next 5-10 years.

Digital infrastructure to see a big pick-up in the next 5-10 years: As China moves up the value curve and becomes a more sophisticated digital consumer; we believe that the level of investments in digital infrastructure should rise significantly. Currently China IT spending is a fraction of the US level, even though its GDP is already 60% of the US economy and its digital population footprint 3-4x the size of the US. We believe that spending in data centers, base stations, broadband, and Cloud Computing are likely to see a meaningful step-up in the next several years in China. As detailed in our *China Internet Infrastructure*, B. Feng and G. Hariharan, 11 Dec 2018 report, we believe this wave of growth would fuel the development of both IDC service providers and hardware suppliers in China, in particular the optic components vendors.

Figure 5: US and China population using Internet (2017)



Source: World Bank, J.P. Morgan.

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What could China tech ecosystem in 2025 look like?

Manufacturing and Components

We believe China will become less of a global tech manufacturing hub going forward, given concerns about escalating labor costs and tension between China and the US (see *Rising likelihood of supply chain relocation for Greater China downstream players*, G. Hariharan et al., 13 Nov 2018). Even if China and the US could eventually reach a settlement, we believe suppliers would still want to diversify their production bases, in order to de-risk their exposure if such an event arises again in the future.

On the flip side, we expect to see more China component suppliers to play a bigger role in the tech supply chain, as they extrapolate their experience in smartphone/tablets to supply components in other devices.

Semiconductors

If Moore's Law further slows down in 2020-2025, we see Chinese semiconductor players starting to successfully catch up with global peers and start catering more successfully to domestic semiconductor demand by 2025-2030. Given rising geopolitical tensions, we see less likelihood of China becoming a semi export hub in the medium to long term. The heavy involvement from large internet ecosystem vendors in China should also drive more localization of the fabless market.

Devices

Chinese players have already become the global leaders of most consumer tech products and some infrastructure tech in the past decade. However, we see some potential threats to their current position in future, given the escalating national security concerns and potential consumer backlash. While we have not seen the impact on consumer tech thus far, infrastructure tech products such as base-stations, servers and surveillance equipment have already been restricted or banned outright in multiple countries such as US.

Software and Cloud Computing

Even with a lot of discussion on opening up the domestic market, we find it hard to believe that Software/ Cloud Computing and AI ecosystems in China would become truly open and global. These are areas which are sensitive, with increasing concerns on data sovereignty and national security and hence and are unlikely to see much foreign participation.

China is starting at a very low level of adoption for Software, SaaS and Cloud computing, but we believe that the pace of adoption is likely to be extremely fast in the next four to five years. This would likely fuel the investment in the local digital infrastructure, benefiting data center spending, base station hardware, broadband and cloud computing hardware vendors, in our view.

Table 2: China vendor share of the total market

Product	Current market share (2017)	2025 market share (JPMe)
Consumer tech		
PC	22%	~30%
Smartphone	45%	50-60%
TV	26%	40-45%
Infrastructure Tech		
Server	21%	~30-35%
Semiconductors		
Fabless	9%	~20%
Foundry	7%	~15-20%
OSAT	24%	40-45%
Memory – NAND	1-2%	25%
Memory – DRAM	0%	5%
OLED	2%	20+%

Source: J.P. Morgan from multiple sources. Note: Consumer and infrastructure tech market share based on shipment. Semi market share based on USD revenue.

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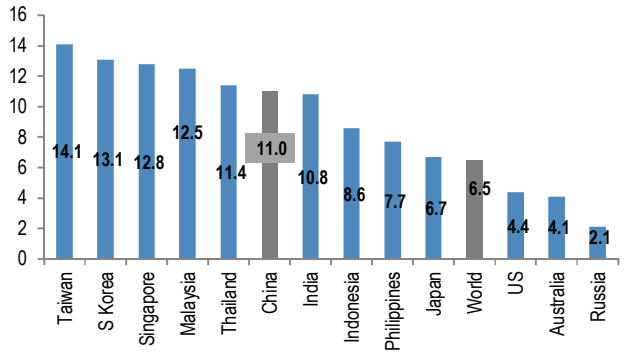
Industrial automation

- **China's ageing population and increasing wages should continue to compel manufacturing companies to spend more on automation.**
- **Increasing domestication of key parts/components and addressing the technological gap versus Tier 1 foreign brands are the key long-term objective.**
- **M&A and R&D should be the key focus going forward.**

Rising labor costs and an ageing population are driving the need for automation in China

Industrial Automation (IA) is a key growth sector in China **given its ageing population as China's median age will rise by 11 years over 2015-50 versus the global average of six years** (source: United Nations). This should result in a declining contribution from employment growth to overall GDP growth.

Figure 1: Median age increase over 2015-50



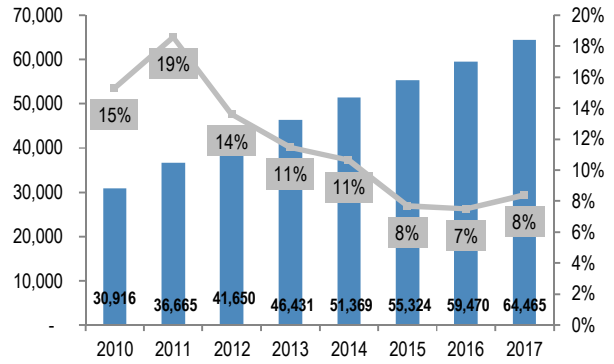
Source: United Nations World Population Ageing Report, 2015 and J.P. Morgan

Moreover, the average wage of employees in the manufacturing industry in urban areas has increased from Rmb30,916 in 2010 to Rmb64,465 in 2017 implying a CAGR of 11%. In other words, labor costs in the manufacturing industry have more than doubled. In the next four to five years, the MITI-V of Malaysia, India, Thailand, Indonesia, and Vietnam will be the top economies for low-cost manufacturing, according to a survey of industry CEOs conducted by Deloitte.

Hence, China will require additional means to enhance productivity to raise per capita GDP growth and increased automation will act as an enabler towards this.

Figure 2: Average wage of employees in manufacturing industry

CNY



Source: NBS, J.P. Morgan

Increased domestication is a key target of the 'Made in China 2025' policy

According to the 'Made in China 2025' policy document issued by the State Council in 2015, the government aims to improve the innovation capabilities of industry. By 2025, R&D expenses are targeted to reach 1.68% of the revenue of scale manufacturers; the value-added rate is targeted to increase 4% over that of 2015, and the **domestication rate of core components and key materials is targeted to reach 70%.**

According to the Development Plan of the Robots Industry issued in 2016 by MIIT, **China aims to achieve an annual industrial robots (IR) output by domestic brands of more than 400K by 2030 compared to 35K units in 2017**, with more than half of these being high-end articulated units. Under the same plan, the government aims to build 3-5 leading IR companies and to raise the market share of domestic firms to more than 50% by 2020 versus 25% in 2017.

Addressing the technological gap of domestic players versus foreign brands is the key challenge in the medium term

Foreign brands constitute 75% of the total IR market in China, which are primarily Japanese firms with three of the top four companies. The key driver behind the dominance of foreign brands is that Chinese companies do not have a presence in the key components required in the manufacturing of IR. Thus, they rely on imports as the corresponding technologies that are still held by a handful of advanced economies. Furthermore, brand visibility is low among Chinese firms, particularly in the automobile manufacturing and electronics industries, which require high precision, while Chinese domestic brands are still not highly recognized by the market. This sets a high barrier

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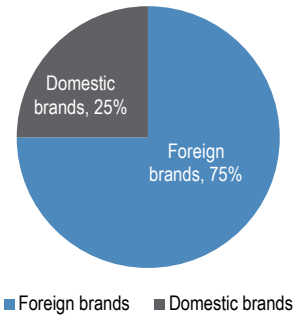
for domestic brands to enter the market for both robots and key component markets.

Figure 3: China Industrial Robots – Market share by brands



Source: IFR and J.P. Morgan

Controllers, reducers, and servos are key components of an IR. Generally speaking, controllers, reducers, and servos account for c20%, c30%, c25%, respectively, of the total costs of each robot, while the other c25% comes from equipment manufacturing and labor costs. **Major IR manufacturers choose to purchase key parts externally,** particularly for reducers which are dominated by Nebtesco (6268 JT; NC) and Harmonic Drive (6324 JT; NC).

However, **Chinese brands are significantly cheaper compared to foreign brands, and hence have high penetration in small and medium-sized enterprises.** In contrast, large manufacturing companies still prefer foreign brands due to their reliability.

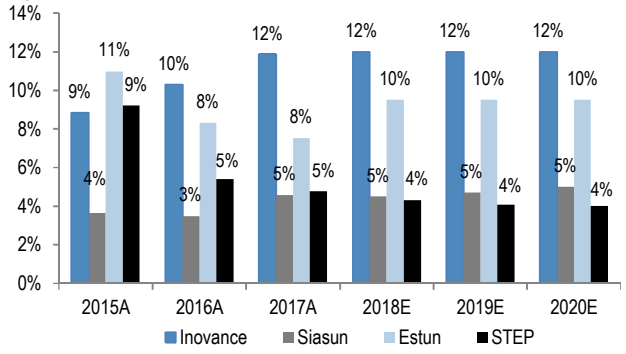
To gain access to technological capabilities, Chinese companies are looking at cross-border M&A opportunities, particularly in Japan and Germany. Moreover, in the automation value chain, downstream companies (such as system integrators) would be the best targets for Chinese companies to invest, where market consolidation would be highly beneficial for Chinese companies. We would highlight Midea's (000333 CH, OW) acquisition of KUKA (a German brand, which is among the top four brands globally) that would help Midea gain critical component manufacturing technologies. However, investment in foreign midstream companies, like Big-4 robot makers, would be difficult as they have built strong positions globally.

We are also seeing evidence of domestic brands increasingly buying components from domestic manufacturers whose quality is comparable to overseas brands. For example, in the case of reducers, there are two main types: 1) Harmonic reducers used in small-load robots, and 2) Rotate Vector (RV) reducers used in heavy-load robots. Japanese players currently dominate the overall markets for both types of reducers. However, if we only consider Chinese domestic robot manufacturers, we actually see that domestic suppliers have a majority market share for harmonic reducers with product quality being comparable. LeaderDrive (a privately-owned, non-listed Chinese manufacturer) is estimated to have a c60% market share in the supply of harmonic reducers to domestic brands with prices being around 30-40% cheaper than the same products produced by Harmonic Drive System.

Increasing R&D investment is also emerging as a key focus area for domestic firms to lower the quality gap versus foreign brands

Two Chinese IA companies that stand out in this regard are Estun (002747 CH, N) **and Inovance** (300124 CH, OW) **that consistently spend c10% of their revenue on R&D** compared to ~3-5%. Moreover, both Inovance and Estun intend to continue to focus on R&D to offer quality products to their clients, which are comparable to Tier 1 foreign brands and ahead of domestic peers. Estun's focus on gaining access to technology and vertical integration is evident in 80% of its cost of goods sold for an industrial robot being manufactured in-house.

Figure 4: R&D expenses as percent of revenue



Source: Company reports and J.P. Morgan estimates

We would also highlight that the policy support in the form of subsidies for the IA sector is also taking a back seat, especially after the recent rise in US-China tension. This is evident in subsidies trending below expectations since 2017 due to delays, and that some subsidies have been moved from the national to the local government level. Hence, integrated business model and strong R&D focus should separate the quality players from the rest of the domestic companies and help them compete with Tier 1 foreign brands.

In conclusion

Uncertainties related to trade war and concerns about economic growth are driving supply chain shifts and consequential capex cuts in China, particularly for the 3C sectors, including the Apple Supply Chain. That said, **our conversations highlight that the impact would likely be limited:** for supply chain shifts to be effective, both upstream and downstream would need to move at once which is unlikely at this stage. Moreover, any supply chain shifts would come with its share of costs as the companies intending to move out of China would need to return all the subsidies they have collected from the government, which we think would act as a hindrance.

The long-term structural drivers for the sector remain intact, particularly for the ex-auto/ex-3C traditional manufacturing sectors in China, while we expect policy support to step up for SMEs and corporate sectors.

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Fintech and consumer lending

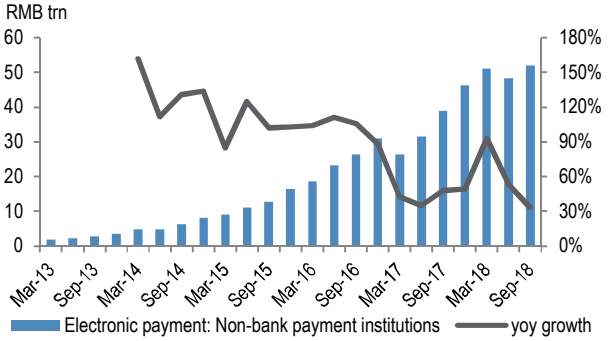
- **Fintech is transforming behavior on payment, consumption and financial management.**
- **Increasing competition from internet companies has forced banks to transform their business models. Over 90% of banking transactions are done electronically in China, even for SOE banks.**
- **A rise in Fintech increases household's access to credit and financial services. Household leverage should rise to 70% by 2025 from 52% in 2017 while their debt-service ratio should grow from 20% in 2017 to 25% by 2025. This may intensify concerns about China's debt problems.**
- **On the positive side, when people buy more and save less, this helps China transform its growth engine from export and investment to services.**

Fintech transforms life

Internet companies have revolutionized China's financial behavior. China now has 800 million "netizens", accounting for 58% of its population. It is not surprising that China is leading the development in Fintech, which in turn is transforming society. We see this as a **paradigm shift**, which will have a far-reaching impact over generations.

Third-party electronic payment transactions reached RMB151trn ($22trn) in the first nine months of 2018, up 56% y/y. Alipay and Tenpay, the two best-known payment companies, have 900 million and 820 million customers, respectively, and have not only changed China's payment habits, but also its consumption patterns and how people manage their wealth.

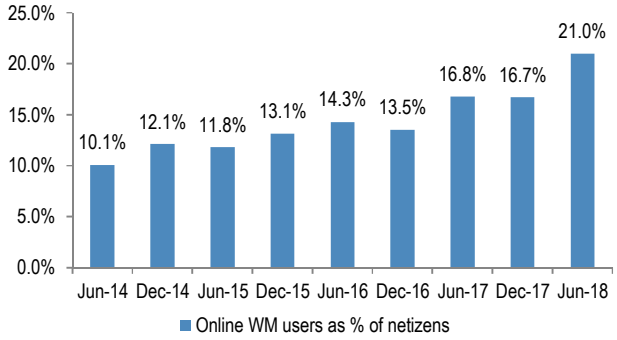
Figure 1: China's payment volume of non-bank payment institutions



Source: PBOC, CEIC.

Today, Chinese consumers not only order and pay for a wide range of services and goods online. They also look to the internet for tools to manage their wealth. According to the China Internet Network Information Center, a think tank under the Cyberspace Administration of China (government entity), there are now 169 million users of online wealth management services, up 34% over a year ago. This growth was faster than what could have been expected, given that regulators were tightening rules on wealth management business and online financial service providers in China (i.e., P2P) during this period. The number of wealth management service users has grown by 164% since June 2014. Fintech does not only increase the distribution channel for such products, it also changes how retail investors manage their money. For example, China Merchants Bank has started to offer online wealth management products (WMP), which are managed by robots through AI technology, to its generation Z customers. Hence, investors can change their portfolio duration and risk preference in real time.

Figure 2: Online wealth management service users as % of "netizens" in China



Source: CNNIC, WIND.

A forced transformation of the banking sector: Take China's four largest stated-owned banks (Big 4) that were once being viewed as unwilling to adapt, and thus potential laggards in the Fintech era. Their adaptation to technology has taken many by surprise. At the end of 2017, the Big 4 banks had 870 million mobile banking users, up 47% from 2015. Their electronic (mobile and online) banking transaction accounted for 94% of total transactions in 2016, and as a result we saw a boom in the banks' electronic transactions. Banking system electronic payments reached RMB1,924trn ($279trn) in the first nine months of 2018, up 5%y/y.

Banks such as China Merchants Bank, the leading retail bank in China, have taken a bolder step by providing services to order a meal or buy movie tickets from their mobile banking app. Banks are competing with Fintech

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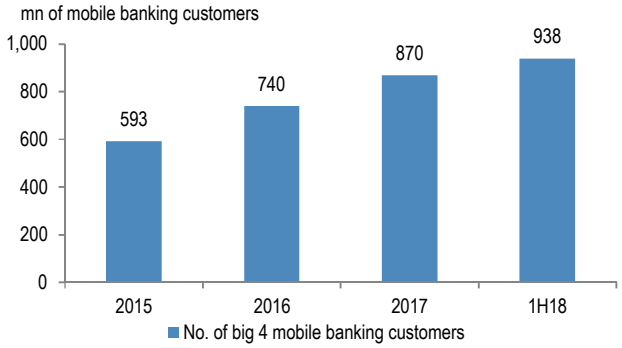
companies and among themselves to create an eco-system that integrates customers' daily life and their financial life. What does this entail for the banking system, China's economy and its people?

Figure 3: Aggregate number of mobile banking users of big 4 banks

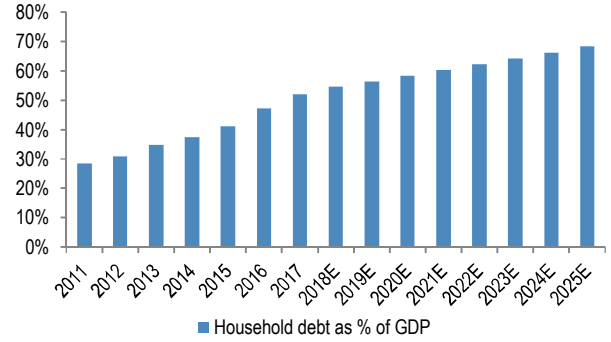


Source: Company data.

Embracing change – the economy

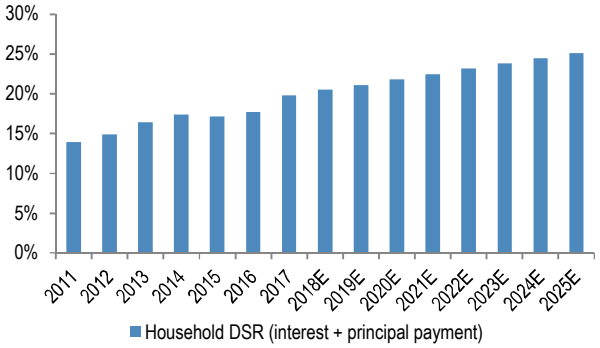
We expect household leverage to continue to rise. With retail credit becoming more accessible, through banks, or other online lenders, we estimate that household leverage will reach 70% by 2025, rising from 52% in 2017. On the positive side, the rise in household leverage helps to support economic growth while China is trying to de-leverage its corporate sector (corporate debt to GDP 164% 3Q18). On the negative side, this leads to a steady rise of China's total leverage, intensifying concerns about China's debt problem. Note that we expect China's household debt service ratio (DSR) to grow from 20% in 2017 to 25% by 2025.

Figure 4: China's household leverage



Source: PBOC, NBS, CEIC, J.P. Morgan estimates

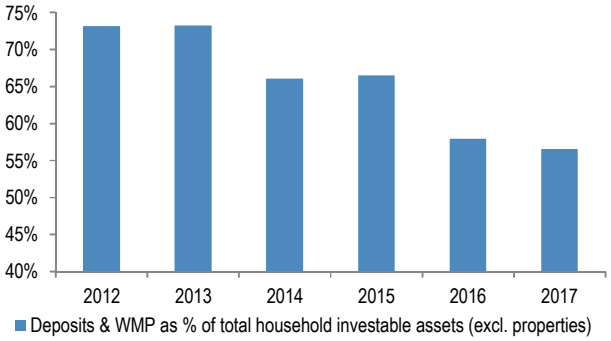
Figure 5: China's household debt service ratio (DSR)



Source: BIS, CEIC, J.P. Morgan. Note: Household debt service ratio is calculated by the BIS methodology, which includes interest and principal payment of household loans (bank, P2P, micro lenders), divided by the urban disposal income.

Re-distribution of China's household financial assets. Retail deposits and wealth management products issued by banks contributed ~57% of total household financial assets (excluding properties) in China in 2017, down from ~73% in 2012. Currently, banks' wealth management products are quasi-deposits which banks offer on a principal guaranteed basis, implicitly, or explicitly. This is going to change under the new regulation that was finalized in July 2018 (see *China banks,* K. Lei et al., 22 July 2018). WMP will change from being quasi-deposits to be more like mutual funds. In the Fintech age, it becomes easier for netizens to compare and shop for financial products online. We expect a continued decline of deposits and WMP in the mix of household financial assets.

Figure 6: China: Retail deposits and retail WMP as % of total household investable assets (excl. investment properties)



Source: Source: China Merchants Bank, Bain, J.P. Morgan estimates

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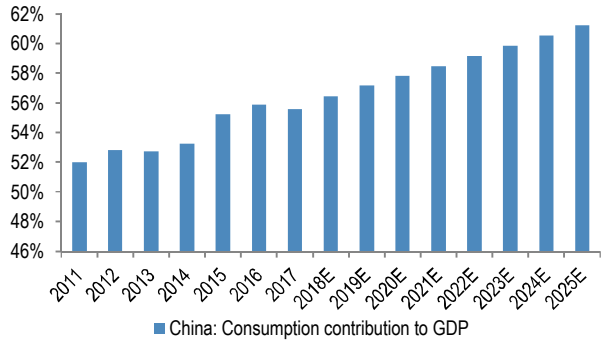
We expect a rising contribution from the service sector to GDP growth, particularly financial services. As it is easier for Chinese consumers to compare and purchase financial products (i.e., insurance, WMP and funds, etc.), we expect a surge in the sale of financial products in the next few years.

Figure 7: China: consumption contribution to GDP



Source: NBS, J.P. Morgan economics team

Impact on China's capital market: we see two major trends. For one, Chinese consumers will shift financial assets allocation from deposits (or quasi deposits) to investment products. In addition, regulators will continue to clamp down on shadow banking. As a result, we may see more institutional fund flows into China's capital markets, both equities and bonds. This could be a double-edged sword. On the positive side, this could help to further deleverage its heavily-indebted corporate sector. The downside is that households may reduce their saving ratio and become increasingly vulnerable to financial market volatility.

Embracing change – the banks

Technology lowers banks' credit risks on small-to-medium enterprise (SME) and retail lending. First, the rise in electronic transactions by banks and non-banks leads to a surge in data, which enable the growth in machine learning and big data analysis. This could be essential for analyzing credit risks and we expect large banks to develop the big data analyzing tools in-house. However, small banks may increasingly rely on third-party loan facilitators, such as Ant Financial, to help them improve their credit assessment system. Second, the rise of credit unions may improve China's credit scoring system. Improving credit scoring and the use of AI tools will reduce default risks in the system. Third, the use of Blockchain technology, such as linking SME borrowers' utilities bills and tax payment information, can be a powerful tool for lenders to monitor operation trends of borrowers on more real-time basis and to flag any potential credit risks.

Retail banking growth to accelerate further: Technologies such as Blockchain, AI and Big data analysis not only help banks to improve credit risk management skills, but also increase their operating efficiency, customers' user experience, and cross-selling analysis. This eventually will lower the cost of financial services and products. This echoes back to our previous comment that we expect China's household leverage and financial services consumption by retail customers to rise into 2025.

Banks are transforming from being lenders to becoming service providers. Net interest income accounts for 73% of listed China banks' revenue in 2017. This is significantly higher than the 65 % at US banks. We believe the combined impact of falling household savings rates, the rise in financial service consumption, the expansion of capital market and ongoing corporate deleveraging may eventually encourage banks to transform themselves from being lenders to becoming service providers. This requires a shift in their mindset. Banks which are able to service their clients better will be able to attract more transactions and data, which will eventually translate into lower funding costs, declining credit risks (with better assessment) and higher fee income, in our view.

Embracing change – people

More people are getting financial services
Improvements in convenience, efficiency and access to financial services are the key positives bestowed by the rise of Fintech. No matter how consumers decide to use online/mobile services of banks, or services by third-party providers, this will improve financial penetration ratios in China, particularly to its middle class of around 330 million people. Services will be more targeted to different segments of customers, thanks to the rise of big data analysis, which will help cross-selling. High-net-worth investors who prefer more complex financial products may still choose face-to-face interaction with their financial advisors. Nonetheless, regulations announced at the end of 2017 are trying to protect consumers' interest by squeezing out predatory behavior (i.e., high-yield lending) that are targeting low-income consumers. Therefore, we believe the fast growing middle class will be the key beneficiary of the Fintech transformation.

Chinese households may become more vulnerable to financial market volatility. The rise in big data analysis means that large financial firms are in a better position to cross-sell: They may even now know the financial preferences of their customers better than the customers themselves do. This will increase information asymmetry

between financial firms and their clients. Thus, clients may end up buying more financial products and increase the overall risk profile of their financial asset portfolios. This echoes back to the point that households may be more vulnerable to financial market volatility in the next decade.

Save less, buy more. With the rise in banks' retail credit, and the rise in consumption of financial services (i.e., online fund or WMP), we expect the next generation to have far less rigid ideas on financial planning than their parents did. Thus, we expect this generation to save less, and to consume more.

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Chinese Internet sector by 2025

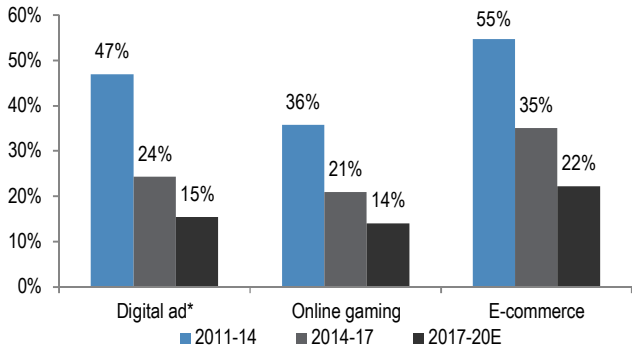
- **Growth of the existing three-pillar business model of China's Internet space is maturing, and new growth drivers will shift from consumer-oriented business models to business-oriented ones over the next five to10 years.**
- **AI development and industrial digitization will take place across most aspects of the economy, from consumption to supply-chain management, manufacturing and agriculture.**
- **Leading Chinese internet companies with world-class AI capabilities should benefit from these changes, influencing most areas of the economic system, and extending their exposure overseas.**

Growth of existing "three pillars" is normalizing

We believe China's internet space will go through major structural changes over the next five to10 years, and leading players may become even bigger and influence more aspects of the economy in China and overseas.

The high-growth stage of the existing three-pillar business model of China Internet—ads, gaming, and ecommerce—is normalizing due to higher penetration and a tighter regulatory environment. We forecast market growth for digital ads/online gaming/ecommerce to have decelerated to 15%/14%/22% during 2017-20E versus 24%/21%/35% in 2014-17 and 47%/36%/55% in 2011-14. There should be further deceleration into the next 5-10 years.

Figure 1: Growth of current three-pillar businesses is normalizing

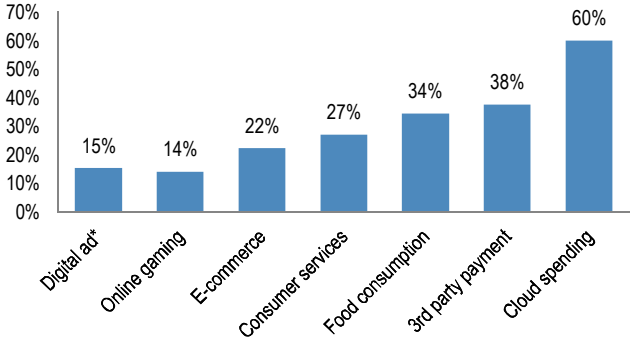


Source: J.P. Morgan estimates, iResearch, Analysys.

O2O/2B will become the new growth drivers

We expect the growth drivers of China's Internet space to switch from a pure online consumer market (2C) to Online to Offline (O2O) and services for business (2B), where online penetration remains low. Two key areas for O2O are consumer services and food consumption, where online penetration in 2017 was 15%/13% versus over 50% online penetration in the online ad market. As for the 2B space, online penetration of third party payments and cloud computing accounted for only 5%/4% of their total addressable markets in 2017. As a result, we project consumer services/food consumption/third-party payment/cloud spending to deliver 27%/34%/38%/60% pa growth in 2017-20E, respectively, clearly faster than the existing three-pillar businesses for China's Internet space.

Figure 2: 2017-20E CAGR: O2O/2B to outgrow 2C businesses



Source: J.P. Morgan estimates.

Extending the analysis to agriculture and manufacturing (from production to supply chain) and to general services, online penetration is even lower, and growth potential should be higher. However, for Internet companies to tap the upside in these markets, digitization of related activities and AI development will be critical to unleash market potential. We believe the leading Chinese Internet players possess strong advantages here that can revamp these traditional industries.

Large China Internet players may lead the globe in terms of AI development

Alibaba identified four key elements to AI development: **cloud computing power, use case, big data, and algorithm**. Cloud computing power and algorithm are investment driven. Their impact depends on how much is invested in them. For large organizations with capital these capabilities are expensive commodities.

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Use cases and big data, in contrast, are based on the size of the consumer market and they play a more important role in AI development than cloud computing and algorithm, in our view. Leading Chinese Internet companies have competitive advantages in use case and big data relative to their US peers because of: 1) one single market compared to multiple markets with different languages, cultural behavior, etc., 2) higher market share concentration (Alibaba has over 60% market share in China ecommerce market versus Amazon's 40%+ in the US), and 3) fewer concerns about data privacy from the general public. Hence, we believe large China Internet companies, particularly Tencent and Alibaba, are very likely to see substantial development in their AI capabilities, potentially exceeding that of US peers, over the next five to10 years.

How AI can drive Internet players' growth in the next 5-10 years

We believe AI will drive Tencent and Alibaba's growth in a three-layer approach:

First, Tencent and Alibaba's **core Internet businesses** will be enhanced by the development of AI, which can help generate more transactions and better advertising results despite slower growth of their user base. For example, AI has helped Alibaba to better capture consumers' demand, and match that with merchants' supply, so it can generate more transactions, offer higher ROI on advertisement, and lower inventory pressure on merchants. Tencent can better match its WeChat users to the relevant partners in its ecosystem for transactions or advertisements.

Second, Tencent and Alibaba's **existing AI related revenue models** (cloud, payment, and more broadly the infrastructure type of services) will benefit from applying their AI capabilities outside of their online ecosystems. More digitization of the offline markets and requirement for AI applications will increase the demand for cloud services (storage, computing, etc.). In the latest quarter, Alibaba's cloud related revenue contributed only 7% of the total and still incurred a loss. But we project it can contribute over 10% revenue and 7% EBITA by FY2025.

Third, China Internet companies' AI capabilities will be applied to **many offline areas that they have not penetrated** yet, such as autonomous driving, computer vision in surveillance, medical services, manufacturing, and agriculture. More advanced AI capabilities can create new services that Internet companies can provide.

In our view, these potential opportunities are not in the share prices, but the upside definitely exists if we take a five-to-10 year view. By then, most parts of people's daily life will be connected to the Internet one way or another, at home, in cars, at hospitals, in shopping malls, at work, and on farms, and Internet companies will provide relevant services that do not exist today.

Big Internet names can improve China's productivity with AI technologies

Looking more medium to long term and considering the broader picture of China's economy, one major difference that Chinese Internet players can make will be in manufacturing, where the Internet of Things (IoT) and AI development should boost productivity. According to AliCloud, digitization can improve manufacturing efficiency by 15-20%, and IoT adoption can double to triple SMEs' revenue growth. For one, remote monitoring of smart equipment can prevent unexpected shutdowns. The emerging C2M (Consumer to Manufacturers) model can direct manufacturers' product design to better fit consumers' demand. With both its consumer and manufacturing market size leading the globe, Chinese Internet players have a unique opportunity to connect the two sides and boost efficiency.

China Internet companies to increase overseas exposure across multiple fronts

Another major change we expect over the next five to10 years is that Chinese Internet companies will significantly increase their presence overseas, by leveraging their strength in capital and domestic know-how. Both Alibaba and Tencent have been aggressively pushing their online payment services overseas. Alibaba has also acquired Lazada, the leading ecommerce player in Southeast Asia. Even in the more advanced areas such as cloud computing, AliCloud guided to generate 50% revenue from overseas sometime in the future despite its small exposure now. If Chinese Internet companies can successfully extend their influence to most areas in the economic system in China, it is a matter of time for them to try to duplicate their business model to other countries, most likely starting in Southeast Asia, in our view.

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Transportation

- **High-Speed Railway ridership to continue to gain share in total railway passenger demand in China.**
- **Low MU density ratio and inter-city rail are emerging as a new driver and represent upside to MU demand.**

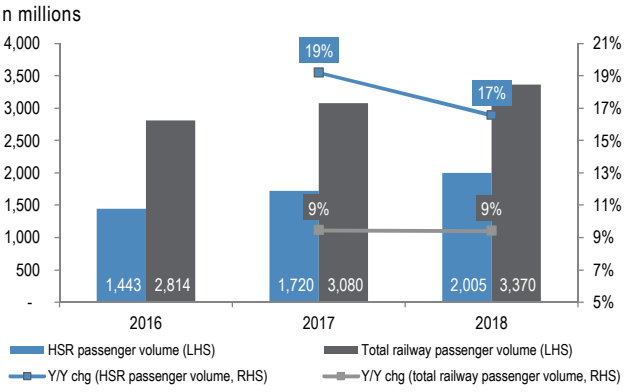
Multiple units (MU) demand to remain supportive

According to CRC, the railway regulator in China, high speed railway (HSR) new track completion amounted to 4,100km in FY18, beating the 3,500km guidance provided in January 2018. MU passenger volume rose 16.8%y/y to c2bn, accounting for c60% of railway passenger volume. We believe the upward trend for both HSR ridership and mileage should persist in the long term, driven by pent-up demand coming from existing tracks given China's low MU density and elevated new track completions, supporting MU demand.

HSR ridership to continue to grow helped by inter-city demand

High Speed Rail (HSR) travel has become the new norm in China since it was introduced in 2008. Given the relatively cheaper pricing and increased convenience resulting from the rapidly developing HSR network, more passengers, both leisure and business, have considered HSR travel as their first choice. According to CRC, overall passenger volume rose 9.4%y/y in 2018, but MU passenger volume rose 16.8% y/y (on top of 19.2% y/y in 2017) implying that load factors remain quite high. We expect HSR ridership to continue to gain share in the total railway passenger volume as Chinese travelers continue to prefer faster speed and better service quality, and are less likely to be satisfied by normal railway trips.

Figure 1: HSR passenger volume versus total railway passenger volume



Source: CRC and J.P. Morgan.

In addition, high-speed inter-city demand is emerging as a new driver, especially given China's regional integration strategic initiatives, such as the Beijing-Tianjin-Hebei and YRD integration plans. By 2020E, the government's 13th five-year plan aims to have 8,000km inter-city rail versus little progress now to connect smaller cities to tier-one cities, providing a positive growth driver to HSR ridership, and hence MU demand in the coming years.

Low MU density ratio in China also lends support to MU demand

According to NBS, railway length per capita in China is only 0.08, lower than for most global peers. MU density consistently remained at low levels (c0.90 units/km) over FY15-17, implying that recent MU and locomotive procurement was driven largely by new track completion, with limited focus on increasing the density of existing tracks despite high utilization rates. We also find that the share of HSR in total operating railway mileage has grown from less than 10% in 2013 to c20% in 2017 with an average growth rate of c2%. This could be a positive driver ahead, in our view, as the government orders more MUs to ease congestion on existing tracks.

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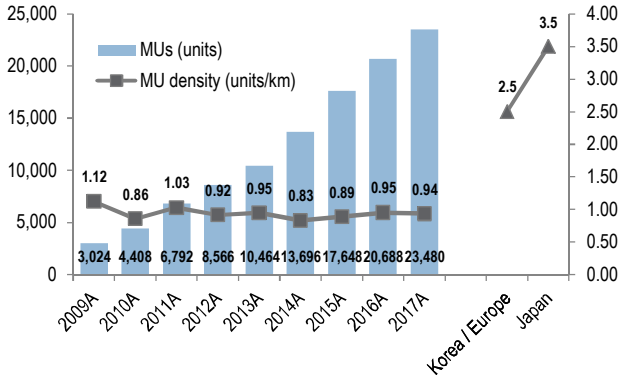
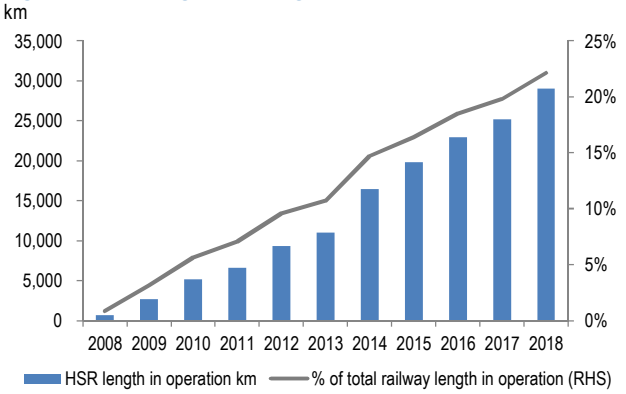
Figure 2: MU density



Source: NBS, J.P. Morgan

Figure 3: Increasing HSR Mileage in operation

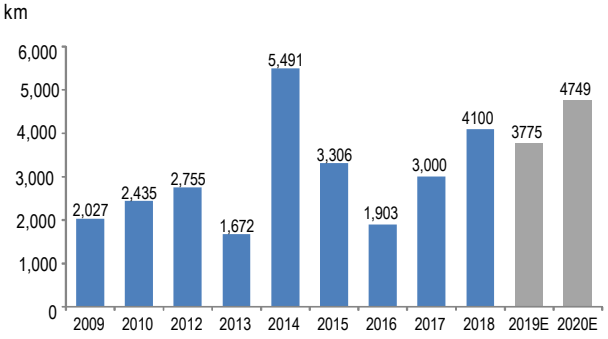


Source: Wind

If we count the mileage of HSR projects to be completed in 2019-20, new HSR mileage should be 3,800kms in 2019E, 600kms more than CRC's target of 3,200kms, which is exactly the difference between the target (3,500kms) and actual (4,100kms) in 2018. We could see a similar situation in 2019 when part of the new track completions in 2020 could be pulled forward to 2019, given significantly high new track completions of 4,700kms in 2020E, implying growth of 47%y/y based on CRC's target of 3,200kms in 2019E.

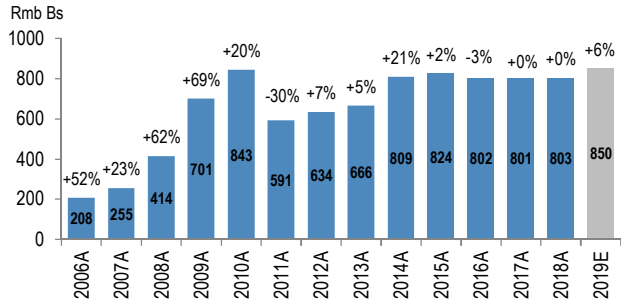
By 2025, the Chinese government aims to expand its HSR network to 38,000km through the 'Eight Vertical, Eight Horizontal' plan set in 2016, suggesting a c41% growth from the current c27,000km and calling for more MUs to be built and deployed. By 2030, China hopes to have 45,000km HSR in place, much more than all of the rest of world.

Figure 4: China HSR new track completion



Source: CRC, J.P. Morgan estimates

Figure 5: China's railway capex



Source: CRC, China Business Journal

C919 – opportunities beyond the horizon

COMAC, based in Shanghai, is developing a narrow-body passenger jet – C919 – that aims to compete with the mainstream models such as Boeing's B737 and Airbus' A320. The specifications disclosed by COMAC seem still a bit behind the latest variants of B737 and A320 in terms of range and seating capacity.

We do not think C919 itself can meaningfully challenge the market share of the incumbents. However, it may be an important stepping stone for more competitive models in the future.

Two units of the model have been built and are going through test flights. The model is yet to receive the US Federal Aviation Administration's Airworthiness Certificate but has received orders and letters of intent (LOIs) of >1,000 units from 29 clients as of the end of June 2018, according to Xinhua.

Most of the clients are Chinese airlines and leasing companies, except GE which supplies the engines to the model through CFM International, a 50-50 JV with Safran Aircraft Engines. The first delivery is planned for 2021 to China Eastern Airlines, according to Reuters.

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Table 1: C919 order book

Customer	Orders & LOIs	Date
Air China	20	15-Nov-10
China Eastern Airlines	20	15-Nov-10
China Southern Airlines, Guangzhou	20	15-Nov-10
GE Capital Aviation Services (GECAS)	20	15-Nov-10
Hainan Airlines, under Grand China Air	20	15-Nov-10
ICBC Leasing	45	19-Oct-11
Sichuan Airlines	20	21-Oct-11
BOCOMM Leasing	30	23-Nov-11
China Aircraft Leasing Company (CALC)	20	9-Dec-11
Bank of China – BOC Aviation	20	14-Feb-12
China Development Bank Leasing Company	10	29-Jun-12
Agricultural Bank of China Financial Leasing	45	2-Jul-12
China Construction Bank Financial Leasing	50	19-Sep-12
Joy Air	20	13-Nov-12
Hebei Airlines	20	13-Nov-12
Industrial Bank Co. Financial Leasing	20	29-Oct-13
China Merchants Bank Leasing	30	12-Nov-14
Hua Xia Bank Financial Leasing	20	30-Jan-15
Ping An Insurance Leasing	50	17-Jun-15
CITIC Group Financial Leasing	36	1-Nov-16
Shanghai Pudong Development Bank Financial Leasing Co	20	1-Nov-16
China Everbright Group Financial Leasing Co	30	13-Jun-17
China Nuclear E&C Group	40	19-Sep-17
Huabao Leasing	30	19-Sep-17
AVIC International Leasing	30	19-Sep-17
Agricultural Bank of China Financial Leasing	30	19-Sep-17
ICBC Leasing	55	5-Dec-17
Huarong Financial leasing	30	26-Feb-18
HNA Group	200	2-Jun-18
Total orders	**1,001**	

Source: COMAC, CARNOC, J.P. Morgan estimates.

The fuselage, wings, tail and other structural components are made in China, while the engines, onboard systems and equipment are imported, according to Professor Jun Huang quoted by China Science Daily and the BBC. Professor Huang estimates that the components made in China would initially account for 50% of the total costs and gradually rise to >90% after 2025.

According to our interviews with some listed companies, COMAC requires that the foreign suppliers have JVs with Chinese firms in order to be included in the project. The engines, avionics and critical electromechanical parts are made by foreign companies, and the Chinese companies are mostly just there to watch and learn the process.

Among the listed companies, Hongdu Aviation (600316 CH, NC) will build the fuselage of C919s which accounts for ~15% of each C919's costs, and JONHON Optronic will supply the integrated mounting racks for cables.

COMAC and Russia's United Aircraft Corp also set up a JV – China-Russia Commercial Aircraft International Corporation Limited (CRAIC) in 2016 to develop a new wide-body passenger jet - CR929. The project is at a preliminary stage with no concrete design yet.

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Chinese auto market

- **Unprecedented slowdown in 2018.**
- **Demand should stabilize this year, even as it will likely grow only 1%.**
- **We see capacity growing by only 12% 2017-20 across big international JVs and local OEMs.**
- **NEV demand is growing very fast, near 70% in 2018. We forecast it to grow 48% pa from 2017-2020 or 26% pa to 2025. This makes China the largest NEV market in the world.**

Unprecedented slowdown in 2018

China autos experienced unprecedented weakness in 2018, which sent the sector down 47%, through P/E multiple contractions (~30%) and lower earnings (~17%). We believe the weakness was driven by a combination of macro and micro sector-specific factors.

On the macro side, we believe the following factors have contributed to weak traffic and demand:

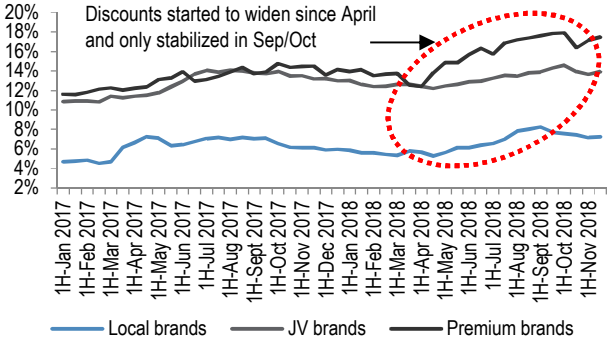
- **Reduction of import tariffs, announced in May:** Before that, local media had reported that China might reduce import tariffs for cars and parts in late April. The knee-jerk reaction from customers or potential car buyers was a "wait and see" strategy as they could buy at a lower price if tariffs were indeed cut. At the retail level, a store traffic fall was noticeable and the traffic did not resume to normal seasonal levels until the end of August/early September 2018. From April to September, the average discount in the sector widened by ~2% to 12.1% (Figure 1).
- **Escalation of US-China trade tensions**: We believe this has had a profound impact on consumer confidence and, hence, discretionary spending. A compounding factor to such headwinds is the sluggish A-share market in China, which was down 23% last year to its lowest level since 2015.
- **Negative side-effects related to the property market:** Intuitively, we might assume that strong property prices would create a wealth effect and boost car demand. However, we noticed that rising property prices in 2018, especially in lower tier cities, resulted in weaker affordability, due to lower income levels in central/western China—historically, the main engines of car demand at least in volume terms. Geographically, the weakness in the car market seems more obvious in lower tier cities versus tier one or two cities, where income levels are higher.

  Another potential impact on car demand related to the property market is settlements of reconstruction projects in lower-tiered cities as the Chinese government could tighten the cash reimbursement process of such property projects this year.
- **Investment adjustment in summer and high base effect in 2H17**: As store traffic slowed in April 2018, channel inventory began to build, eventually leading to investment adjustment, especially in August and September. Since then, many OEMs have either officially or unofficially lowered 2018 wholesale targets. These include Dongfeng-Honda, Dongfeng-PSA, Dongfeng-Renault, Dongfeng-Infiniti, Changan-Ford, BAIC-Hyundai, Guangzhou-FCA, Great Wall Motor and Geely Auto, to name a few. A high base in 2H17, along with inventory adjustment, contributed to sluggish growth in 2H18, in our view.

On the industry-specific side:

- We believe that the **expiry of purchase tax incentives** at end-2017 brought forward at least 1.0mn units of demand into 2016/17. In 2018, the purchase tax was moved its normal level of 10% (versus 7.5% in 2017 and 5% in 2016 and 4Q15).
- **SUVs no longer a growth engine**: China's SUV penetration currently stands at ~44% as of December 2018, much higher than the peaks (~37%) of other markets such as S. Korea, Taiwan and the USA. We believe SUVs have reached saturation point in China and will no longer grow as fast as in the past several years (Figure 2).
- China's passenger vehicle (PV) market slipped by 4% in 2018- the first time in history that annual growth is in negative territory.

Figure 1: Average discount of domestic-made models by segments



Source: China Auto Market.

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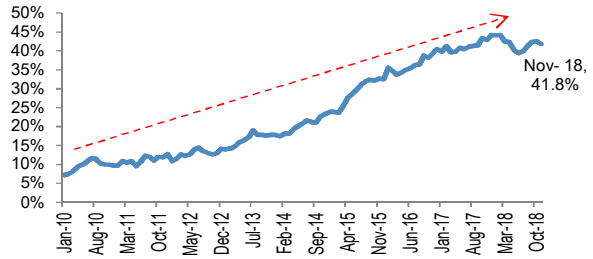
Figure 2: SUV penetration (as % of total PV sales)



Source: CAAM, J.P. Morgan.

Our expectations for 2019 and beyond

Despite unprecedented weakness in 2018, we project that 2019 will see moderate recovery of 1% growth in the PV market. Our confidence is based on the following:

- While yearly growth was weak in 2H18 (see *China Auto Driver,* N. Lai and R. Y Wen, 11 Dec. 2018), we notice sequential or m/m growth has broadly returned to seasonality since August/September. This follows a period in April-August during which sequential momentum was below the seasonal trend and price discounts widened as well. Assuming such seasonal trends can continue (as inventory adjustment has largely completed for now and the macro/micro factors that contributed to this year's weakness are mostly behind us), we project yearly growthto turn into positive territory again in March or April 2019. On top of the seasonal pattern, a lower base effect will kick in during April, which is helpful for yearly momentum.
- **On the policy side**, the Chinese government has responded to a weak economy by taking various fiscal and monetary measures in the past two quarters, such as the FAI initiative in the railway space and easing credit for SMEs. Normally, there is a time lag of around two quarters between policy implementation and its impact on the underlying economy or demand. We expect the policy response to revive the economy and hence improved consumption should be broad-based rather than targeted on one specific sector. We do not expect the Chinese government to lower the purchase tax again in 2019.

The following table and charts highlight our auto demand and growth forecast for 2019 and beyond. Longer term, we expect that the following will support car demand in China: 1) continued growth in household income, especially in lower-tier cities which are four to five years behind those in the eastern region of China; 2) rising auto financing penetration; 3) replacement of existing vehicles; 4) lower car prices, arguably driven by competition, especially on the content side (i.e., autonomous/ADAS and connectivity features). We project a ~2% CAGR toward 2025 to over 27mn units of PV or 32mn units of PV/CV, versus 24mn and 28mn units, respectively, this year.

Table 1: China auto demand forecast and analysis

Sales Unit ('000)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019E	2020E
Sedan	9,494	10,123	10,745	12,010	12,377	11,720	12,150	11,848	11,528	11,758	11,994
MPV	445	498	493	1,305	1,914	2,107	2,497	2,071	1,735	1,596	1,612
SUV	1,326	1,594	2,000	2,989	4,078	6,220	9,047	10,253	9,995	10,195	10,398
Crossover	2,492	2,258	2,257	1,625	1,332	1,099	684	547	453	385	377
Total PV	**13,758**	**14,472**	**15,495**	**17,929**	**19,701**	**21,146**	**24,377**	**24,718**	**23,710**	**23,933**	**24,381**
(yoy % change)	33%	5%	7%	16%	10%	7%	15%	1%	-4%	1%	2%
Bus	356	403	426	477	530	525	488	481	450	446	441
Truck	2,831	2,702	2,653	2,726	2,436	2,256	2,374	2,592	2,871	2,785	2,701
Tractor	355	258	191	263	279	250	388	583	483	512	538
Bus chassis	87	84	82	82	77	70	55	46	35	35	34
Truck chassis	675	585	460	507	469	349	346	458	532	537	543
Total CV	**4,304**	**4,033**	**3,811**	**4,055**	**3,791**	**3,451**	**3,651**	**4,160**	**4,371**	**4,314**	**4,257**
(yoy % change)	30%	-6%	-5%	6%	-7%	-9%	6%	14%	5%	-1%	-1%
Total vehicles	**18,062**	**18,505**	**19,306**	**21,984**	**23,492**	**24,598**	**28,028**	**28,878**	**28,081**	**28,248**	**28,638**
(yoy % change)	32%	2%	4%	14%	7%	5%	14%	3%	-3%	1%	1%

Source: CAAM, J.P. Morgan.

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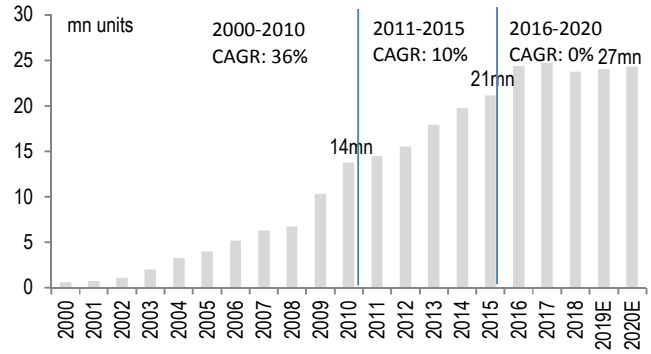
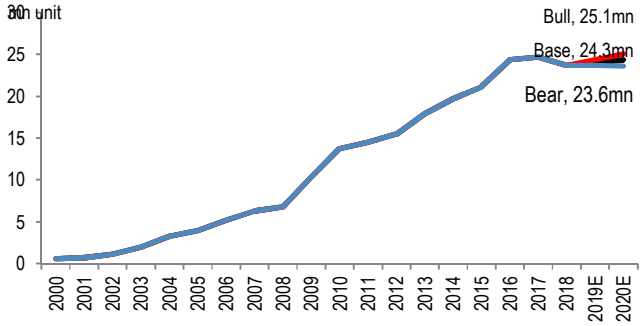
Figure 3: China PV demand and growth analysis



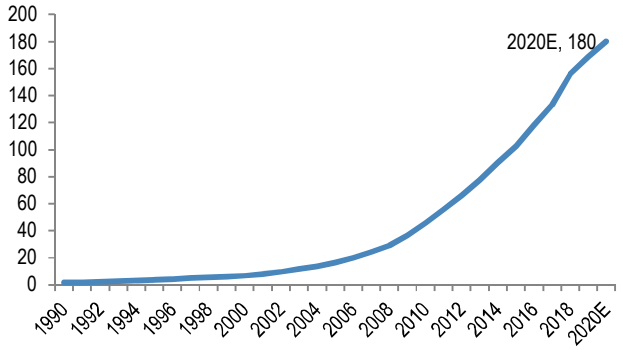
Source: CAAM, J.P. Morgan.

Figure 4: China PV demand forecast (Base versus Bull, or bear case in 2020)



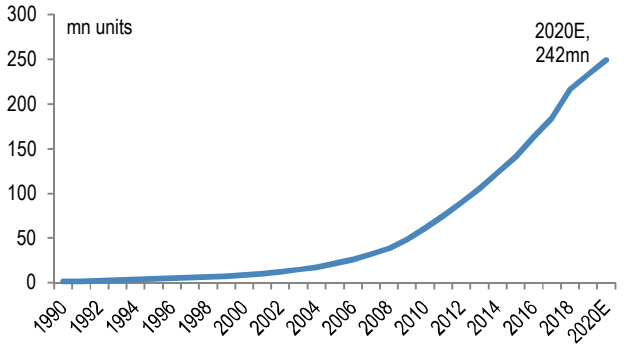
Source: CAAM, J.P. Morgan.

Figure 5: China PV market penetration or ownership analysis (measured by ownership per thousand people)



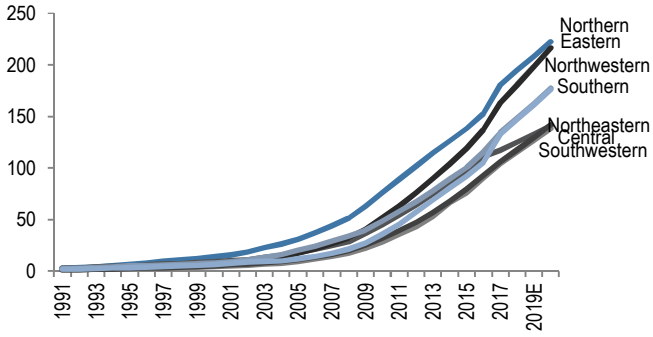
Source: CAAM, J.P. Morgan.

Figure 6: China PV car parc analysis and forecast



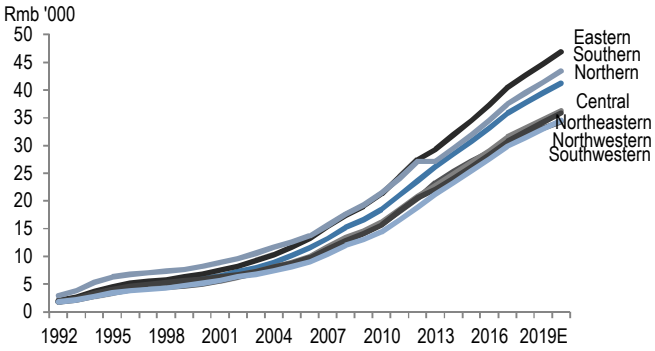
Source: CAAM, J.P. Morgan.

Figure 7: China PV penetration by region analysis



Source: CEIC, J.P. Morgan.

Figure 8: China income per capita by region analysis



Source: CEIC, J.P. Morgan.

The Chinese car market

In total across the big international JVs and local OEMs, we expect a total capacity addition of ~3.5m units from 2017-2020, which is ~12% of 2017 Chinese production. This capacity expansion would have to be absorbed by low-single-digit growth in the Chinese market in the time frame. Also as we highlight in the next few pages the Global OEMs are printing solid returns in the region with the exception possibly of PSA and Ford and are ready to face prolonged demand weakness in the Chinese market.

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Capacity expansion plans

Table 2: China: production and capacity expansion

	Production estimates (in million units)				Capacity additions	Capacity added	
	2017	2018e	2019e	2020e	2017-20	as a % of production	Comments
Volkswagen	**4.06**	**4.23**	**4.19**	**4.38**	**1.2**	**30%**	3 new plants in Qingdao, Tianjin and Shanghai across VW brand, Skoda and Audi to support SUV and NEV push. 1 expansion in Foshan.
FAW-VW	1.99	2.09	2.10	2.18	0.9		
SAIC-VW	2.07	2.14	2.10	2.20	0.3		
BMW	**0.396**	**0.495**	**0.518**	**0.525**	**0.220**	**56%**	Increase Shenyang plant capacity from 300k to 450k and then to 520k by early 2020.
Brilliance-BMW	0.396	0.495	0.518	0.525	0.220		
GWM-BMW	0.000	0.000	0.000	0.000			160k capacity with GWM from 2021 to produce electric Mini's and electric cars for GWM.
Daimler	**0.432**	**0.510**	**0.522**	**0.530**	**0.150**	**35%**	Second Beijing-based Mercedes-Benz production facility will produce new car models including BEVs
Beijing-Benz	0.432	0.510	0.522	0.530	0.150		
PSA	**0.382**	**0.310**	**0.368**	**0.377**	**0.015**	**4%**	A new one-ton pick-up to be launched with Changan by 2020 (co-developing a new vehicle platform)
PSA-Dongfeng	0.376	0.304	0.355	0.340			
PSA-Changan	0.006	0.006	0.014	0.037	0.015		200k capacity. JV for sale of DS brand cars
Renault	**0.075**	**0.061**	**0.083**	**0.144**	**0.030**	**40%**	
Renault-Dongfeng	0.075	0.061	0.072	0.124			Initial capacity of 150k, expandable to 300k
eGT (with Dongfeng)	0.000	0.000	0.012	0.017	0.03		Renault-Nissan alliance has announced plans to build electric cars in China in a new venture with Dongfeng Motor (owned 25% each by Nissan and Renault with Dongfeng owning 50%)
Renault-Brilliance	0.000	0.000	0.000	0.004			Renault-Brilliance JV to produce and sell LCVs under the Renault, Jinbei and Huasong brands (including three new electric LCVs within two years)
FCA	**0.211**	**0.128**	**0.133**	**0.157**			Localize production of Grand Commander (2018) and Grand Cherokee (2020) to better use capacity at Changsha
GAC-Fiat	0.211	0.128	0.133	0.157			Initial capacity of 150k, expandable to 300k
General Motors	**4.3**	**4.08**	**4.33**	**4.32**			
Ford*	**0.92**	**0.53**	**0.65**	**0.77**			
Total	**10.77**				**1.6**	**15%**	

Source: production estimates from IHS, J.P. Morgan. *Ford has JVs with Changan, Jiangling, Lio Ho and Zotye

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Table 3: China: production and capacity expansion

	Production/Sales estimates (in '000 units)				Capacity additions	Capacity added	Comments
	2017	2018e	2019e	2020e	2017-20	as a % of 2017 production	
SAIC							
Shanghai Volkswagen	2,070	2,140	2,100	2,200	400	19%	
SAIC GM-Wuling	2,150	2,135	2,147	2,157	-		
Shanghai GM	2,000	2,123	2,259	2,377	-		
SAIC Own brand	522	723	873	1,005	176	34%	120k capacity in Zhengzhou plant and 56k capacity in India to produce MG models
DFM							
Dongfeng Nissan	1,416	1,497	1,579	1,675	300	21%	Changzhou plant
Dongfeng PSA	378	382	393	403	-		
Dongfeng Honda	714	687	711	743	120	17%	
Dongfeng Renault	72	76	83	92	-		
BAIC							
Beijing Hyundai	792	800	832	875	-		
Beijing Benz	432	510	522	530	150	35%	
Beijing Auto	223	173	183	191	-		
GAC							
GAC Honda	705	646	689	739	240	34%	
GAC Toyota	442	535	626	667	100	23%	
GAC Fiat	205	120	153	168	-		
GAC Own brand	509	517	540	555	420	83%	
FAW							
FAW Toyota	689	753	838	890	-		
Brilliance BMW	396	495	518	525	220	56%	
Changan							
Changan Ford	828	415	443	477	-		
Changan Mazda	192	180	197	203	-		
Changan Suzuki	84	46	47	43	-		
Changan PSA	6	5	4	4	-		
Changan own brand	1,215	987	1,021	1,022	-		
Great Wall	1,070	951	956	976	80	7%	
Geely (incl. Lynk brand)	1,247	1,559	1,865	2,090	400	32%	
BYD	418	523	689	860	-		
Total	**21,673**				**2,606**	**12%**	

Source: Company, J.P. Morgan.

OEM profitability: Who has the best base from which to face a slowdown

The data below speak for itself and reflects the current earnings forecast of the Global J.P. Morgan Autos team. First we would point out the strong relevance of the Chinese car market for most of the Global OEMs accounting to about 20% of earnings when the operations are competitively run in the region.

In other instances such as Renault have been ramping up the operations in the region for the past few years and still it is not a relevant contribution to earnings. In the case of PSA and Ford, both OEMs are restructuring heavily the operations to find the optimal cost structure to drive the business.

Overall we would highlight from the tables below the OEMs with the highest EBIT margin or profitability will be in best form to weather a potential prolonged volume downturn in the region.

Table 4: International OEMs – China financials

%	Ebit margin (%)				Eq. contribution
	2017	2018e	2019e	2020e	as a % of 17' EPS
Volkswagen	14%	13%	13%	14%	28%
BMW	11%	12%	12%	11%	20%
Daimler	16%	16%	15%	15%	20%
PSA Group	1.1%	0%	0%	0%	2%
General Motors	11.6%	11.7%	11.1%	10.7%	20%
Toyota	8.4%	8.3%	8.3%	8.3%	4%
Honda	10.2%	9.8%	9.7%	9.6%	17%
Nissan	9.5%	9.5%	9.0%	9.0%	15%

Source: J.P. Morgan estimates.

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Table 5: Local OEMs: profitability

	Net profit margin (%)			
	2017	2018e	2019e	2020e
SAIC				
Shanghai Volkswagen	10%	11%	10%	11%
SAIC GM-Wuling	5%	5%	5%	5%
Shanghai GM	7%	7%	7%	7%
SAIC Own brand	-5%	-1%	0%	0%
DFM				
Dongfeng Nissan	8%	8%	8%	8%
Dongfeng PSA	0%	2%	2%	2%
Dongfeng Honda	12%	12%	12%	12%
Dongfeng Renault	1%	4%	4%	4%
BAIC				
Beijing Hyundai	-2%	1%	2%	2%
Beijing Auto Own brand	-37%	-44%	-37%	-31%
GAC				
GAC Honda	5%	5%	5%	5%
GAC Toyota	9%	10%	11%	11%
GAC Fiat	6%	8%	8%	8%
GAC Own brand	7%	8%	7%	8%
FAW				
FAW Toyota	7%	7%	7%	7%
Brilliance				
Brilliance BMW	9%	8%	9%	9%
Changan				
Changan Ford	11%	3%	5%	7%
Changan Mazda	11%	10%	10%	11%
Changan Suzuki	-1%	-2%	-2%	-2%
Changan PSA	-126%	-110%	-106%	-104%
Changan Own brand	0%	0%	0%	0%
Great Wall	**5%**	**6%**	**6%**	**7%**
Geely (incl. Lynk business as equity income)	**11%**	**12%**	**13%**	**13%**
BYD	**4%**	**2%**	**3%**	**3%**

Source: Company, J.P. Morgan.

OEMs already restructuring in China

Despite the recent fears of a slowdown in car demand in the Chinese car market we find that some OEMs are already tackling the cost base, restructuring and adapting the product cycle to the heavily weighted SUV segment.

Table 6: Restructuring in China

Volkswagen

- In 2000, VW had a 50% market share in China (in association with its 2 JVs – SAIC and FAW). By 2005, that share dropped to 16% as new players entered the market.
- VW undertook a rigorous restructuring program (the Olympic plan) involving re-branding, product streamlining, cost cutting and higher capacity utilization, aiming to increase annual vehicle sales from 571k to 850-900k units by 2008. The company delivered this target in 2008, reaching 1m in annual sales.
- The group also launched the Strategy 2018 plan in 2008, which aimed to increase annual sales from 1m to 2m as well enlarging its fleet by adding or renewing at least four models per year by 2018, which the company has delivered comfortably.
- YTD 2018, VW has sold 2.8m vehicles in China and the region now contributes ~30% to VW's PBT

PSA

- PSA has renewed its product offensive in China, after it pulled back from the market in 2015. The company has revamped its China strategy under current CEO Carlos Tavares's "Push to Pass" Plan.
- In June 2017, Groupe PSA changed its economic and commercial business model with respect to the network and partners of the two joint ventures Dongfeng and ChangAn. As part of this change, Groupe PSA signed an agreement with ChangAn Automobile to boost DS brand development in China and Asia Pacific with one launch per year from 2018.
- The company currently offers more than 20 models in China across its 3 brands (Peugeot, Citroen and DS) and will be rolling out 3 new SUVs in the Chinese market by 2020, despite having >40% of its sales from SUVs currently.

GM

- GM China has in recent years been executing on a program referred to internally as “Cost Down, Efficiency Up”, in which it has managed to offset to a greater degree than the industry overall the pressures to margin emanating from slowing industry volume growth and softer y/y industry pricing for carryover product. Sources of savings include supplier pricing, supply chain localization, and higher manufacturing throughput, in addition to initiatives to drive mix higher, such as growing Cadillac.

Ford

- Ford recently appointed new leadership of its China operation, which is now led by former Chery CEO Anning Chen. Management aim to repair relations with the company’s JV partner and plans a product onslaught which should see roughly 80% of its product refreshed from the first half of 2018 to the back half of 2019, upon which it will have gone from the oldest product portfolio to the youngest among major OEMs. Ford announced on its 3Q18 earnings call that it would in future report Ford China results as a standalone business unit.

Source: J.P. Morgan.

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View of NEV Chinese market FY19 and longer term

We detail below the proactive approach the Chinese government has been taking to incentivize NEV demand, support the roll-out of charging infrastructure and guarantee battery capacity in the region.

NEV and its supply chain the only bright spot

Contrary to the stagnant ICE (internal combustion engine) auto market, China's NEV demand (including both BEV and PHEV but excluding HEV, based on the Chinese government's subsidy policy requirement) has been growing substantially—at near 70% YTD. **Longer term, we forecast NEV will grow at a 48% CAGR from 2017-2020 or 26% a CAGR toward 2025.** This essentially makes **China the largest NEV market globally** and presents a major opportunity for global OEMs.

Fundamentally, we believe China's NEV market will be led by the following drivers:

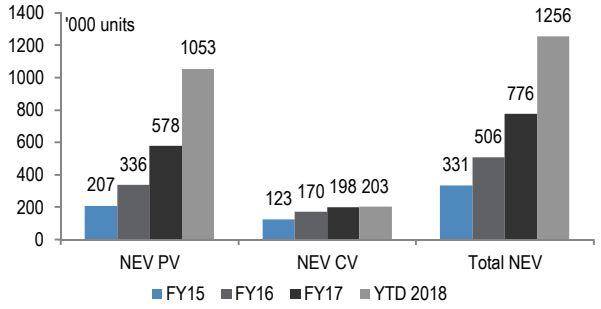
- **Price parity seen in 2H18**: With a renewed subsidy policy in favor of EVs with longer range and higher (battery) energy density, we are seeing certain models in the market in 2H18 for which customers are essentially paying the same amount of money for either the EV, or ICE versions, after taking into account the higher EV subsidy or 10% purchase tax credit (for the ICE version). One example is BYD's "Yuan" crossover model. After the subsidy, customers are paying less than Rmb100k for its EV version, a similar price to the ICE version after considering the credit on the 10% purchase tax (as there is no such tax for NEV cars in China).
- The significance of price parity, in our view, is that the "addressable market" or target buyer of the underlying EV model is essentially broadened to cities *without* purchase restriction. Historically, buyers of NEVs in China have mostly come from tier-1 and certain tier-2 cities where car purchase quotas or restrictions are in place.
- **Possible cost parity for A-segment car from 2020/2021**: Battery prices have been falling rapidly in the past 2 years, but driven over 40% by subsidy cuts and technology improvement. At the moment, battery prices at pack level (including VAT) are around Rmb1,100-1,200 per kwh. Our expectation is that battery prices will drop further to ~Rmb800 per kwh by 2020 or 2021, at which level OEMs might achieve so-called cost-parity for A-segment or compact EVs that do not require a big battery pack (around/below 40kwh). This is important in China considering around 60% of EVs are small compact cars. For B or C-segment EVs that are equipped with ~70kwh battery, we believe cost-parity might be achieved in 2023 or so.
- **Government-led infrastructure rollout**: China, thus far, is the only country globally where charging infrastructure and network has been rolled out and led by the government. The target in 2020 is 4.5mn units of charging posts, plus 12k units of charging stations nationwide.

With all these in mind, we project China's NEV sales (including BEV and PHEV but not HEV) will top 2.5mn units in 2020, well above the government's target of 2.0mn units.

We are also positive on battery demand in China

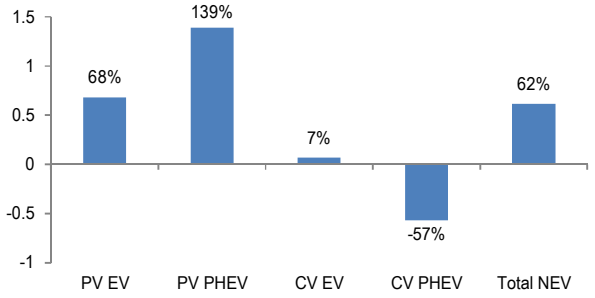
Thanks to robust NEV demand, we forecast China's NEV battery market will exhibit similar growth momentum in coming years, from 36GWh in 2017 to 96GWh by 2020 (or a 38% CAGR) and further topping 190GWh (23% CAGR) by 2025.

Figure 9: China NEV sales (units), 2015-2017 and year to Nov-18



Source: CAAM, J.P. Morgan.

Figure 10: China NEV sales yoy growth by types (year to Nov-18)



Source: CAAM, J.P. Morgan

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Table 7: China NEV market forecast and analysis

	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E	2025E
China auto sales (PV + CV) ('000 units)	**24,598**	**28,028**	**28,878**	**28,081**	**28,248**	**28,638**	**29,211**	**29,795**	**30,391**	**30,998**	**31,618**
yoy %	5%	14%	3%	-3%	1%	1%	2%	2%	2%	2%	2%
Annual NEV sales ('000 units)	**345**	**588**	**897**	**1,456**	**2,112**	**2,958**	**3,645**	**4,305**	**4,829**	**5,333**	**5,818**
EV	247	409	652	984	1,381	1,923	2,405	2,818	3,164	3,466	3,723
PHEV	84	98	125	271	430	599	717	860	945	1,039	1,142
HEV	14	81	120	201	301	436	523	627	721	829	953
EV+PHEV	331	507	777	1,255	1,811	2,522	3,122	3,678	4,108	4,504	4,865
NEV penetration (EV, PHEV, HEV)	**1%**	**2%**	**3%**	**5%**	**7%**	**10%**	**12%**	**14%**	**16%**	**17%**	**18%**
EV	1%	1%	2%	4%	5%	7%	8%	9%	10%	11%	12%
PHEV	0.3%	0.3%	0.4%	1%	2%	2%	2%	3%	3%	3%	4%
HEV	0.1%	0.3%	0.4%	1%	1%	2%	2%	2%	2%	3%	3%
EV+PHEV	**1%**	**2%**	**3%**	4%	6%	9%	11%	12%	14%	15%	15%
NEV sales growth (yoy%)	**263%**	**70%**	**53%**	**62%**	**45%**	**40%**	**23%**	**18%**	**12%**	**10%**	**9%**
EV	449%	65%	59%	51%	40%	39%	25%	17%	12%	10%	7%
PHEV	181%	17%	28%	117%	59%	39%	20%	20%	10%	10%	10%
HEV	-31%	468%	49%	68%	50%	45%	20%	20%	15%	15%	15%
EV+PHEV	**343%**	**53%**	**53%**	62%	44%	39%	24%	18%	12%	10%	8%
Cumulative NEV fleet size (incl. HEV)	**485**	**1,071**	**1,965**	**3,416**	**5,514**	**8,423**	**11,961**	**16,069**	**20,557**	**25,339**	**30,315**
Cumulative NEV fleet size (excl. HEV)	**451**	**956**	**1,730**	**2,981**	**4,780**	**7,257**	**10,284**	**13,788**	**17,599**	**21,625**	**25,764**

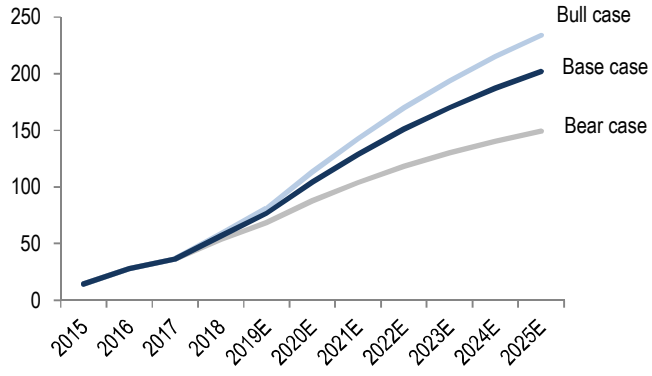
Source: CAAM, J.P.Morgan.

Table 8: China's NEV battery demand analysis and forecast (measured by GWh)

Battery demand by segment	2015	2016	2017	2018	2019E	2020E	2021E	2022E	2023E	2024E	2025E
EV - PV	3	8	15	30	47	68	89	108	124	138	150
EV - CV	9	17	18	22	23	27	28	30	31	33	34
PHEV - PV	1	1	2	4	7	9	11	13	15	16	18
PHEV - CV	1	1	1	0	0	0	0	0	0	0	0
Total EV + PHEV	**14**	**28**	**36**	**57**	**77**	**105**	**129**	**151**	**170**	**187**	**202**

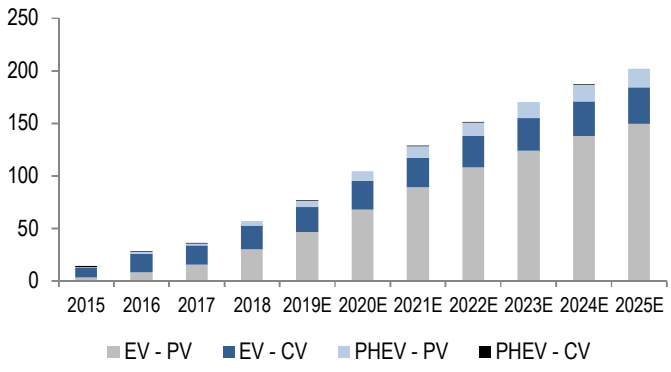
Source: Gaogong Lithium, J.P. Morgan.

Figure 11: China NEV battery demand forecast (by GWh)



Source: Gaogong Lithium, J.P. Morgan.

Figure 12: China NEV battery demand by segment analysis (by GWh)



Source: Gaogong Lithium, J.P. Morgan.

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Below is a summary of the key NEV product launches across OEMs under coverage, which supports the Chinese government's sales targets.

Table 9: European and US OEMs: Pure electric product launches in China

	2018	2019e	2020e	2021e
Audi		e-tron SUV	e-tron Sportback	e-tron GT eQ3 eQ4 E5
BMW		New i3	iX3	iNext Mini-E i4
Daimler		EQC		EQA EQB EQS
VW Brand			ID ID Crozz	ID Lounge
Skoda				Vision E Vision E Coupe
Renault		K-Ze		
Peugeot			DS3 Crossback	
General Motors	Buick Velite 6 BEV Baojun E200 BEV Cadillac CT6 HEV	Buick Elite 5 HEV Buick Velite 6 HEV Baojun D-SUV HEV	Buick Bolt BEV Cadillac XT6 HEV Chevrolet Cavalier HEV	
Ford**	Ford Mondeo HEV	Zotye-Ford B-SUV BEV	Explorer HEV D-SUV HEV Kuga HEV Maverick HEV Lincoln Aviator HEV Zotye-Ford B-Sedan BEV Zotye-Ford E-200 BEV	

Source: J.P. Morgan. *Buick has said an all-electric car could be on sale a year after the Buick Velite PHEV goes on sales in 2019. ** No specific product disclosure – have a 50-50 JV with Anhui Zotye Automotive to produce electric cars for ride-hailing services – we take the 3 model assumptions from IHS

Table 10: BEV + PHEV product launches in China

	2018	2019e
Geely	Lynk&Co sedan PHEV Vision X1 SUV EV Emgrand GT PHEV Lynk&Co crossover PHEV Emgrand GS EV/ HEV VF11 HEV	
Great Wall	Wey VV7 PHEV	
BYD	Qin PHEV e5 DM PHEV Qin Pro EV/ PHEV Tang PHEV Yuan BEV Song Max PHEV Tang EV	
GAC-Toyota	Camry HEV Levin PHEV C-HR HEV IX4 EV	
GAC-Honda	Accord HEV Everus EV Acura CDX SUV HEV New Vezel PHEV	Odyssey HEV
GAC-FCA	Jeep Cherokee SUV PHEV Yuejie SUV PHEV	Jeep Cherokee PHEV Grand Commander PHEV
GAC-Mitsubishi	Qizhi SUV PHEV	
Own brand Trumpchi	GA6 PHEV GA8 PHEV	
Dongfeng-Nissan	Xuanyi EV Sylphy Zero Emission	
Dongfeng-Honda	XR-V SUV BEV/HEV	
Dongfeng-Kia	K5 PHEV KX3 EV	K3 PHEV
Dongfeng Own brand	S550 BEV MPV New Liuqi SUV BEV Fengguang 580 PHEV Fengshen AX5 EV Fengshen AX7 EV/PHEV	Fengxing X5 PHEV
Beijing- Hyundai	Sonata PHEV (New model)	Elantra PHEV Sonata HEV Encino (Kona) EV Lafesta EV
Beijing- Benz	E300 eL PHEV GLC 350e PHEV SUV	EQC EV
Own brand	BJ80 PHEV SU	
Brilliance BMW	New 5-series PHEV	New 3-series PHEV
SAIC (SVW)	Lavida BEV VW Tiguan PHEV	VW Passat PHEV Lavida EV
SAIC (SGM)	Buick sedan PHEV Buick Velite 6 PHEV	Buick Velite 6 EV Chevrolet new BEV/PHEV Buick new BEV/PHEV
SAIC-GM-Wuling	Baojun Mini BEV Baojun 730 HEV	
SAIC Own brand	Roewe compact EV sedan Roewe 360 HEV Roewe Marvel X MG ZS EV SUV Roewe eRX3 PHEV	MG ZS PHEV MG ZS EV
Changan-JMC	CS75 SUV HEV S330 BEV SUV S330 BEV SUV	
Changan-own brand	Eado EV CS75 PHEV CS75 SUV HEV C-HR HEV	Niou II EV

Source: J.P. Morgan.

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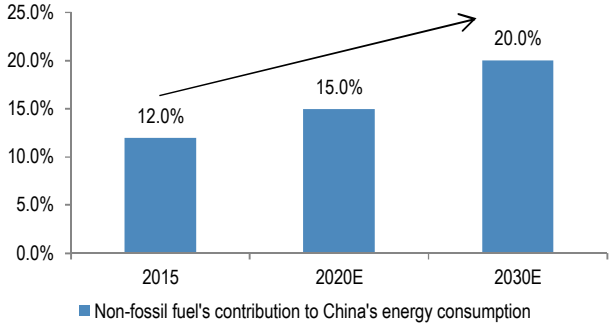
New energy, clean energy development

- **China will rely on solar PV (photovoltaics) and wind power to shift away from fossil fuel.**
- **Currently, renewable power development is constrained by costs. Development will accelerate when grid parity is reached during 2021-2025.**
- **China's upstream solar PV (LONGi, GCL-Poly) and wind turbine (Goldwind) makers have access to the domestic market, and hence, scale advantage.**
- **These companies are already or have the potential to become the top global suppliers by 2025.**

Lifting non-fossil fuel in China's primary energy consumption mix

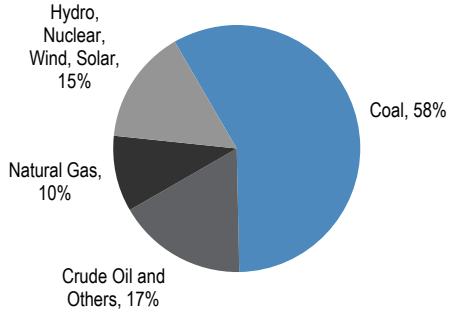
China targets non-fossil fuel to account for around 15% of its primary energy consumption by 2020, and rise to around 20% by 2030. Increasing non-fossil fuel mix will help reduce China's reliance on coal—a relatively dirty fuel. Coal accounts for ~64%/60% of China's primary consumption in 2015/17, respectively. The country is targeting to reduce this to 58% by 2020. Achieving the non-fossil fuel mix target can alleviate pollution and achieve sustainable development.

Figure 1: China's 2020 target for non-fossil fuel



Source: NDRC, State Council

Figure 2: China primary energy mix by fuel type – 2020 target

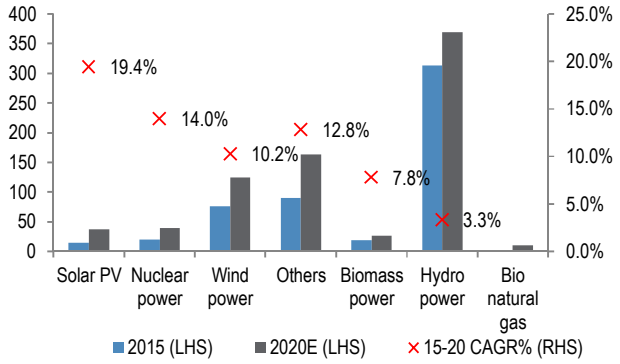


Source: State Council

China needs to develop wind and solar power to achieve its energy target

The major forms of non-fossil fuel energy are power produced by non-fossil fuels (solar PV, nuclear, wind, hydro and biomass) and bio natural gas. From 2016-2020, energy generated by solar PV, nuclear and wind power should grow strongly, by 10-20% per annum (pa), as per our estimates. During 2021-2025, we expect China to continue to rely on solar PV and wind power to increase its non-fossil fuel mix. Consistently, the development of nuclear power will decelerate. China has drastically slowed its new nuclear project approvals since the Fukushima incident in 2011. This will decelerate the commissioning of new nuclear power projects during 2021-2025, in our view.

Figure 3: Energy generation by non-fossil fuel (mn TCE)



Source: NDRC, State Council, J.P. Morgan estimates

Table 1: Growth profile comparison (16-20 versus 21-25)

	Growth profile	
Type	**16-20**	**21-25**
Solar PV	19.4% CAGR	Continue to be strong. China will develop solar and wind power to further increase non-fossil fuel to its primary energy consumption mix
Wind	10.2% CAGR	
Nuclear	14.0% CAGR	Slow down. Project approvals have already decelerated
Hydro	3.3% CAGR	Continue to be slow. Most feasible sites have been developed and high base

Source: NDRC, State Council, J.P. Morgan estimates

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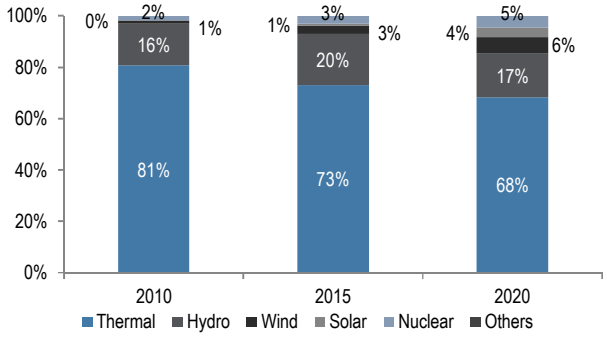
Solar PV and wind power: According to China's 13th Five Year Plan on energy development (2016-2020), the country targets to raise its solar PV/wind power capacity from 2015's 129/43GW to 210/105GW by 2020. Regarding such targets, solar PV and wind power's energy generation will grow by a 19% and 10% pa respectively during 2016-2020. Both solar PV and wind power development are tracking ahead of plan as of 2017 and consistently, we believe that the Chinese government may raise its 2020 target soon. As we head towards 2021-2025, we think that energy generation growth of solar PV and wind power will continue at a rate of over 10% pa.

Nuclear power: During 2016-20, energy generated by nuclear power should grow by 14% pa, by our estimates, thanks to an increase in nuclear power capacity from 27GW in 2015 to 52GW in 2020. However, the growth should slow down during 2021-2025. Since the 2011 Fukushima accident in Japan, approvals for new nuclear project have slowed considerably. The Chinese government has cautiously reviewed applications, especially since the industry transitioned from Gen. II nuclear power technology to Gen. III. Gen. III units have higher safety thresholds than previous generations. Given the long construction cycle of nuclear projects of >6 years (since first concrete pour) or >10 years (since approval), operation commencement during the 2016-2020 was not severely impacted. However, we should see a slowdown in the beginnings of nuclear operation during 2021-2025.

Hydropower: Hydropower is not only clean, but also economical. Power tariffs for hydro power plants in China are usually lower than the benchmark coal-fired tariffs due to hydro power's lower cost. Hydropower is also the biggest non-fossil fuel contributor to China's energy needs at 19% of total power generation mix in 2017. Despite these advantages, it will likely grow more slowly than wind, solar and nuclear power during 2016-2020 and beyond because most feasible sites for hydro development have already been identified and explored.

Figure 4: China power generation mix by fuel type

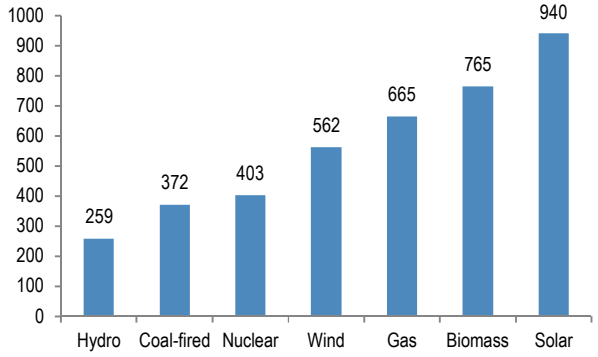


Source: CEC, WIND, J.P. Morgan estimates

Accelerating growth when grid-parity is reached during 2021-2025

The cost of solar and wind power generation is currently higher than that of coal-fired power. Hence, the Chinese government promotes solar and wind power generation by allowing the operators to receive feed-in tariffs, which are 50-150% higher than the coal-fired benchmark tariff. The difference between the coal-fired benchmark tariff and feed-in tariff is subsidized and paid for by the government's Renewable Energy Development Fund.

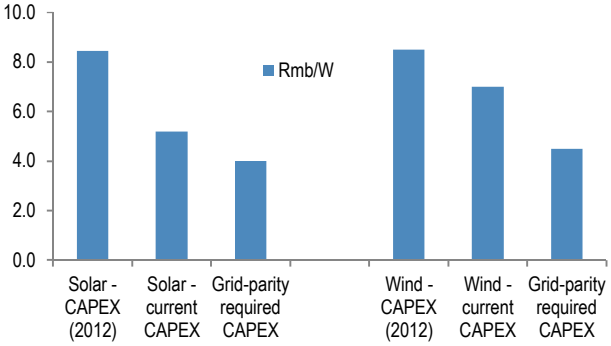
Figure 5: Avg. on-grid tariff of different fuel type (2017, RMB/MWh)



Source: CEIC, J.P. Morgan

The cost of generating solar and wind power will be reduced to the same level of coal-fired power generation, hence, reaching grid parity by 2025, as per our estimates. We expect unit CAPEX (hence generation cost) of solar PV and wind power projects to trend down as technology and efficiency improve. By the end of 2021, we expect solar PV to achieve grid-parity. Wind power will achieve grid-parity towards 2022/2023. We expect a surge in installation once grid parity is reached.

Figure 6: Unit CAPEX of solar PV and wind power project



Source: GCL NE, Longyuan, Huaneng RE, J.P. Morgan estimates.
Note: Renewable resources and coal-fired tariffs vary by location. Even at current CAPEX, there are handfuls of grid-parity projects. The above scenario defines grid-parity as being achieved widely in the country.

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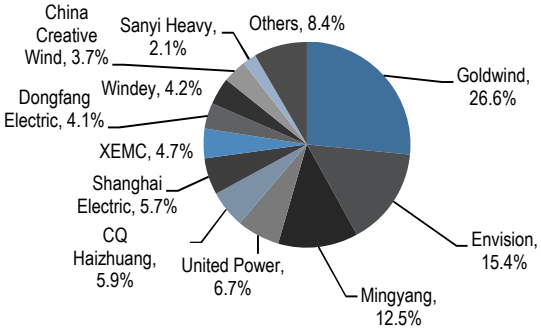
Who are the players along the solar/wind power value chain?

Chinese solar manufacturers produced 52% and 73% of the world's polysilicon and modules, respectively, in 2017. We expect their dominance to endure over the medium term due to low power costs (polysilicon production is power intensive) and scale advantage (thus lower cost). However, wind turbine manufacturers have yet to achieve strong export sales because developed countries already have established players and transportation costs for wind turbine are higher than those of solar modules. In the medium term, we think Chinese wind turbine players will start to export more (to Asian countries first) on the back of their cost advantage.

Upstream wind turbine manufacturer: Goldwind-H (2208 HK) is the largest wind turbine generator (WTG) manufacturer by market share in China, and third globally. It also has a good reputation on its product quality. The company should benefit from acceleration in wind power installation when grid-parity is reached in the medium term.

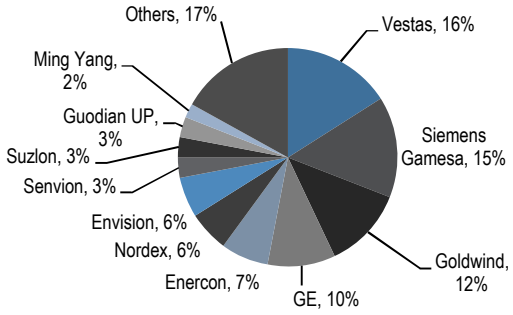
Figure 7: PRC domestic WTG market shares (2017)



Source: CWEA, BNEF

Export opportunity: While Goldwind had a global market share of 12% in 2017, the company primarily sold its products domestically. In the medium term (2021-2025), we think that Goldwind will start to export more of its products overseas, on the back of its scale and costs advantages, we expect it to become a top two global leader by then.

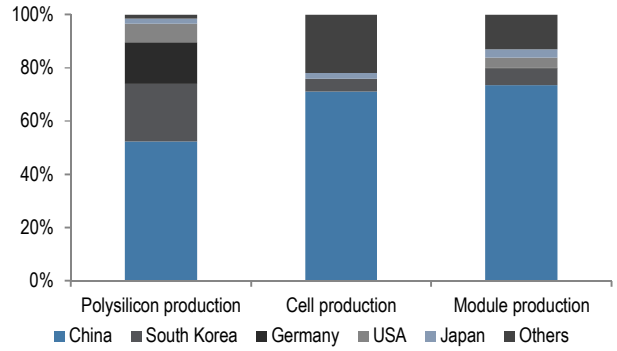
Figure 8: Global WTG market shares (2017)



Source: BNEF

Upstream solar PV manufacturers: China has a large market share in the global solar power manufacturing sector. In 2017, China produced 52% and 73% of the world's polysilicon and solar modules, respectively. China's solar manufacturing sector has been picking up market share in recent years, due to cheap electricity prices, access to cheap financing, supportive government policies and scale advantage. We expect China continue to dominate in the upstream solar PV space during 2021-2025.

Figure 9: Production of major solar PV components by country (2017)



Source: BNEF

LONGi (601012 CH) and GCL-Poly (3800 HK) are the market leaders in mono-SI wafer and multi-SI wafer, respectively. Both companies will benefit from acceleration in China's solar installation when grid-parity is reached in the medium term. Mono-SI technology (LONGi is the leader) has efficiency and cost advantage over the current mainstream technology, multi-SI. We expect mono-SI to further gain market share in the next 12-months and in the medium-term, further benefitting LONGi.

Downstream operators: The three largest listed wind farm operators by installed capacity are Longyuan (916 HK), Huaneng RE (958 HK) and Datang RE (1798 HK).

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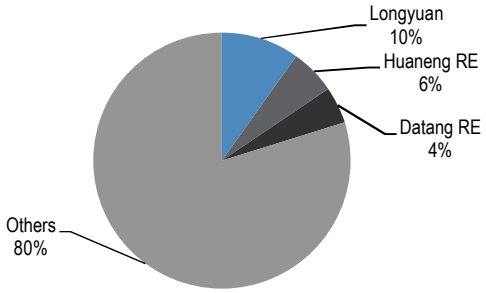
They are the flagship listed companies focusing on wind power development for their respective IPP (independent power producer) group parents. All of them have SOE (State-Owned Enterprise) backgrounds. At times, their parent company also holds sizable wind farm assets. For example, Longyuan's parent company has similar amount of wind farm asset as Longyuan. The three listed companies have a combined market share of ~20% in 2017.

Figure 10: Market shares of wind farm operators (2017)



Source: CEWA, Longyuan, Huaneng RE, Datang RE, J.P. Morgan

These companies have good growth opportunities as China increases the proportion of this non-fossil fuel in its primary energy consumption mix. Renewable power project has the following characteristics—heavy capex, long payback period and low opex. Thus, its return profile is sensitive to the cost of financing. In addition to operation and development experiences, these companies have access to cheap financing due to their SOE background. They are well positioned to benefit from China's shift in energy mix in the medium term, in our view.

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Telecommunications: Next-generation networks

- **Telecommunications infrastructure lays the foundation for the Made in China 2025 plan.**
- **5G is expected to drive a significant economic contribution between 2020 and 2030.**
- **Operators face both challenges (capex) and opportunities (B2B and IoT) in the 5G era.**

Telecommunications infrastructure lays the foundation for China's manufacturing ambition

The Made in China 2025 announcement by the State Council in 2015 called for the readiness of telecommunications network infrastructure that can provide low latency, high reliability and wide coverage, to support the development of the Industrial Internet. Specifically, it mentions fiber networks in manufacturing areas, mobile network, 5G and wireless LAN. This was reiterated with more details in the "Smart Manufacturing Development Plan (2016-2020)" notice jointly released by the Ministry of Finance and MIIT in 2016. Most recently, the "Industrial Internet Development Action Plan (2018-2020)" notice details the near-term requirements for building a preliminary network that supports Industrial Internet by 2020:

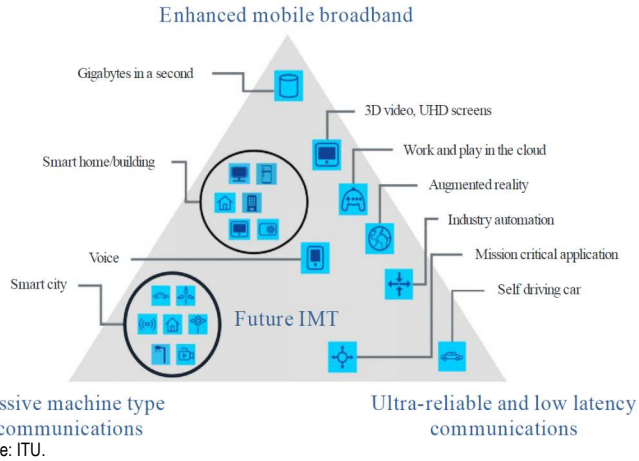
- Upgrade existing or construct new external networks with low latency, large bandwidth, wide coverage, and customizability, for Industrial Internet enterprises. Build some testbeds based on new technology such as 5G, NB-IoT (Narrowband Internet of Things), SDN (Software-defined networking) and NFV (Network function virtualization).
- Support industrial companies to build new or transform their existing internal networks, and deploy new Industrial Internet technologies in key industries. Finish the internal network transformation of more than 100 enterprises in key industries. Build testbeds for PON and low power consumption industrial wireless network technology.
- Implement the application of Industrial Internet IPv6 (Internet protocol version 6). Complete the upgrade of network nodes to IPv6 for enterprise external networks.
- Continue to lower the charges on dedicated line services for SMEs, and deploy new dedicated line technologies that provide high efficiency, flexibility and safety. Reduce industrial enterprises' network costs.

5G to play a key role in the economy in the medium-to-long term

Among all the network building tasks that operators are obliged to, 5G will be the main focus for the next five years or so. There are three major use cases of 5G, and two of them are critical to the Made in China 2025 plan and the "fourth industrial revolution" conversations.

- **Enhanced Mobile Broadband (eMBB)** addresses the human-centric use cases for access to multi-media content, services and data, with faster data rates and an increasingly seamless user experience.
- **Ultra-reliable and low latency communications (URLLC)**. This use case has stringent requirements for capabilities such as throughput, latency and availability. Some examples include wireless control of industrial manufacturing or production processes, remote medical surgery, distribution automation in a smart grid, self-driving cars and transportation safety, etc.
- **Massive machine type communications (mMTC)**: This use case is characterized by a very large number of connected devices typically transmitting a relatively low volume of non-delay-sensitive data. This will be applied to IoT and Smart City, etc.

Figure 1: Usage scenarios of 5G for 2020 and beyond



Source: ITU.

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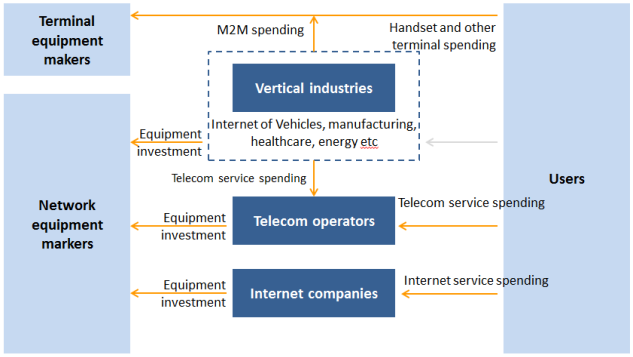
In addition, the network slicing function of 5G, which relies on SDN and NFV technologies, enables telecom networks to be able to address the different needs of companies in various vertical markets in an efficient and customizable way.

The "Whitepaper on 5G's Economic and Social Impact", published by China Academy of Telecommunications of Research of MIIT (CAICT) in 2017, estimates that:

- **5G could produce a direct economic output of Rmb3.3trn and Rmb6.3trn, and indirect output of Rmb6.3trn and Rmb10.6trn, by 2025 and 2030 respectively.** These mainly include revenue forecasts in three areas, 1) telecom operator's service revenues from consumers and vertical industries; 2) Internet companies' revenues from online videos and games services etc; and 3) network equipment vendors' revenues from operators, Internet companies and vertical companies' network investment, and terminal equipment revenues such as handsets and M2M (machine to machine) terminals used in industries.

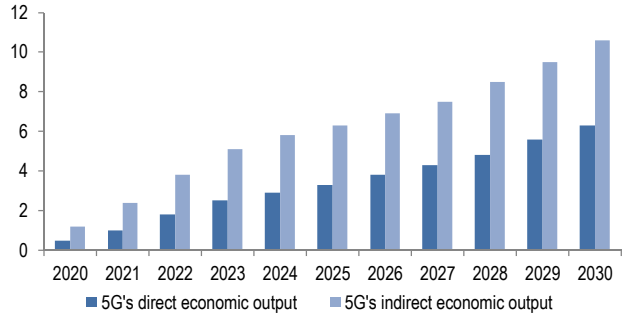
Figure 2: Illustration of 5G value chain



Source: CAICT.

Figure 3: Forecasts of 5G-related economic output

Rmb trillion

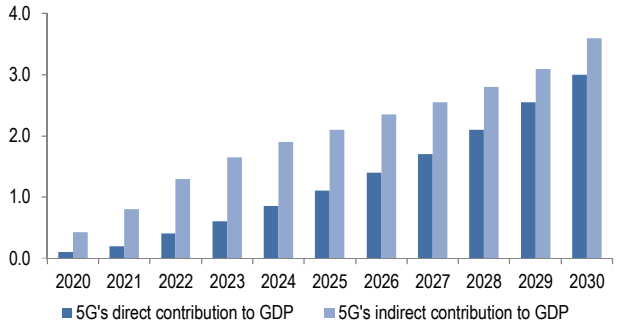


Source: CAICT.

- **5G should directly contribute 3% and 6% of China's GDP growth, and contribute 6% and 7% indirectly, in 2025 and 2030 respectively.** In the early stage of the 5G era, network equipment and terminal equipment spending will play the biggest role. Then the main driver will shift to terminal equipment spending, as well as 5G telecom service usage, by consumers and vertical industries. In the late stage, information and internet services based on 5G will be the largest contributor.

Figure 4: Forecasts of 5G's GDP contribution

Rmb trillion



Source: CAICT.

Challenges and opportunities ahead for telecom operators

As state-owned enterprises, the three operators, namely China Mobile, China Unicom and China Telecom, share the responsibility to provide affordable universal network access services in the country. Their responsibilities have increased over the past decade, as China has been trying to make services faster, cheaper and available to more people, as part of its effort to build itself as a world-leading cyberpower and to drive the economy.

- **More affordable telecom services**: The government has intervened in price setting in recent years, urging operators to cut prices and sometimes explicitly setting targets, such as a 30% price cut for mobile and fixed broadband services and a 15% reduction in SME dedicated line charges etc. The mandatory required removals of certain inter-province charges also occurred. Price cuts do not necessarily mean less revenue, as customers tend to use more when service is cheaper. In fact, the rate of price decline for both mobile and fixed broadband services has far surpassed the government's requirement, driven by intense competition.

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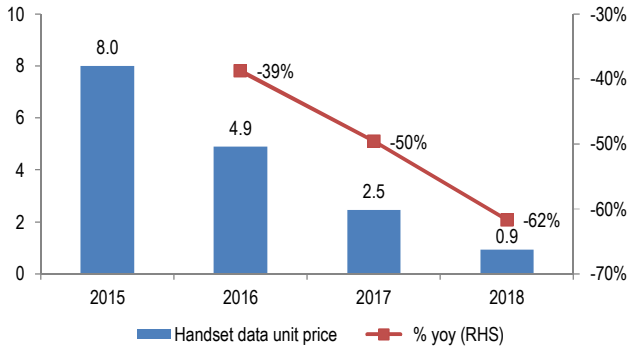
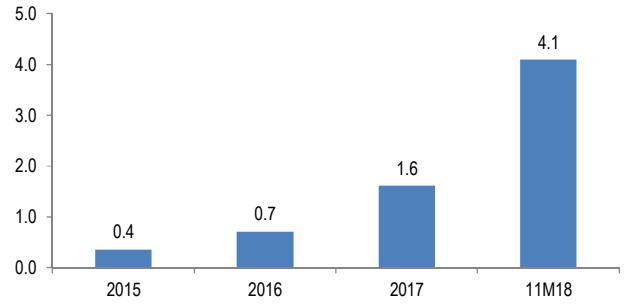
Figure 5: Mobile data price trend in recent years
(Rmb cents/MB)



Source: Company and J.P. Morgan estimates.

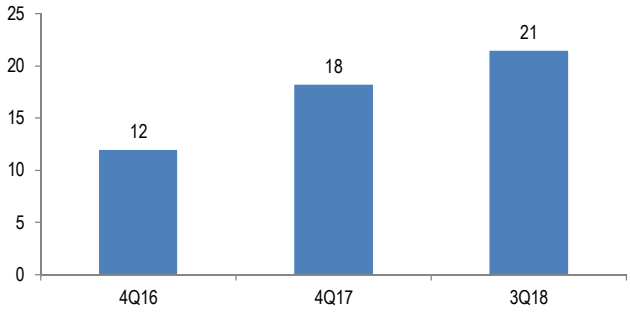
Figure 6: Average monthly data usage per mobile data user in China
(GB)



Source: MIIT and J.P. Morgan estimates.

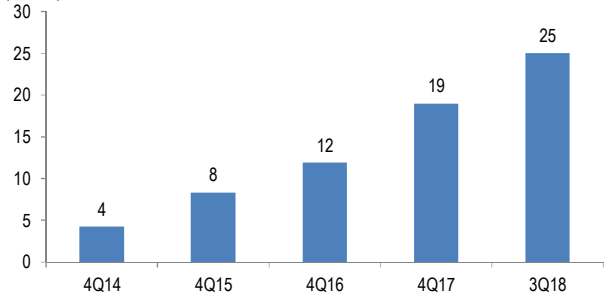
- **Robust telecom network rollout**: As of mid-2018, 4G networks covered 99% of the country's population, and over 95% of towns had access to fiber broadband network. The speed of both mobile and fixed broadband services has improved notably in recent years as well, with nearly half of fixed broadband customers using 100Mbps or faster service.

Figure 7: Average 4G download speed in China (Mbps)
(Mbit/s)



Source: Broadband development alliance and J.P. Morgan estimates.

Figure 8: Average fixed broadband speed in China (Mbps)
(Mbit/s)



Source: Broadband development alliance and J.P. Morgan estimates.

Concerns about operators' potential reckless 5G capex have arisen in recent years. It is widely believed that 5G network deployments will be more costly than earlier generations of mobile technology, as higher frequencies of 5G spectrum require higher density of networks. Apparently the Chinese government has high hopes for China to become a leading 5G player. It has been pushing ahead an ambitious timetable, aiming at commercial trials by 2019 year-end and a commercial launch in 2020. It is worth noting that China has decided to adopt the standalone (SA) version of 5G network, which could cost more in the early stage, but will be able to perform more 5G functions than the non-standalone version (NSA). Many overseas operators are choosing NSA as an interim cost-saving solution, in light of the low visibility of 5G monetization opportunities; although eventually they will still need to build SA 5G networks to meet the needs of URLLC and mMTC use cases.

Despite the potential capex risk in the next five years, operators are also presented with medium-to-long term opportunities to generate new revenue streams and to transform their business models. So far, operators have been mainly engaged in providing network connectivity services to consumers (B2C). In the future, the 5G use cases can be realized to provide solutions in the B2B, B2B2X and IoT market segments.

The Chinese operators have in recent years shifted their focus to develop new businesses, including non-consumer facing ones such as IDC, cloud, NB-IoT and big data, amid a slow-down in traditional services. For example, China Unicom expects the revenue contribution from Industrial Internet services, which include the aforementioned businesses, to rise from 7% in 1H17 to 15% in 2020. In the meantime, operators have started various initiatives to explore 5G monetization opportunities in vertical markets, with a focus on areas such as transportation, auto, manufacturing, energy, utilities, media and entertainment, smart city, healthcare, agriculture, finance, education etc.

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China's health care outlook

- **China's spending on health care will continue to outpace GDP growth as its current spending is well below global levels (6.2% of 2016 GDP).**
- **Government focus is shifting to effective therapies with clear indications that will continue to promote policies that boost innovation.**
- **Central procurement program initiated in 4Q18 leads to higher 1H19 pricing risk for suppliers of generic drugs.**
- **Best opportunities in China health care include biotech innovators, contract research and manufacturing for biotech and innovative pharmaceutical companies.**

Innovative drugs go mainstream

The MSCI Health Care index is down 50% since the June peak (underperforming MSCI China by 15%). We believe that much of the negative news since June impacts mostly on older generic drugs and does not detract from the attraction of the overall health care industry in China. There is still tremendous pent-up demand for biological drugs in China. In 2017, monoclonal antibody (mAb) sales in China were Rmb11.8bn (or less than US$1.8bn) compared with $104bn globally.

Key structural drivers

1) Biosimilars boost from patent expires: 2014 to 2020; 2) Expansion of the government's reimbursement program should enhance affordability; 3) Heavy investment in R&D to boost the long-term growth outlook; 4) Quality consistency evaluation to encourage import substitution and industry consolidation; 5) Funding shortfall leads to downward pressure on drug prices.

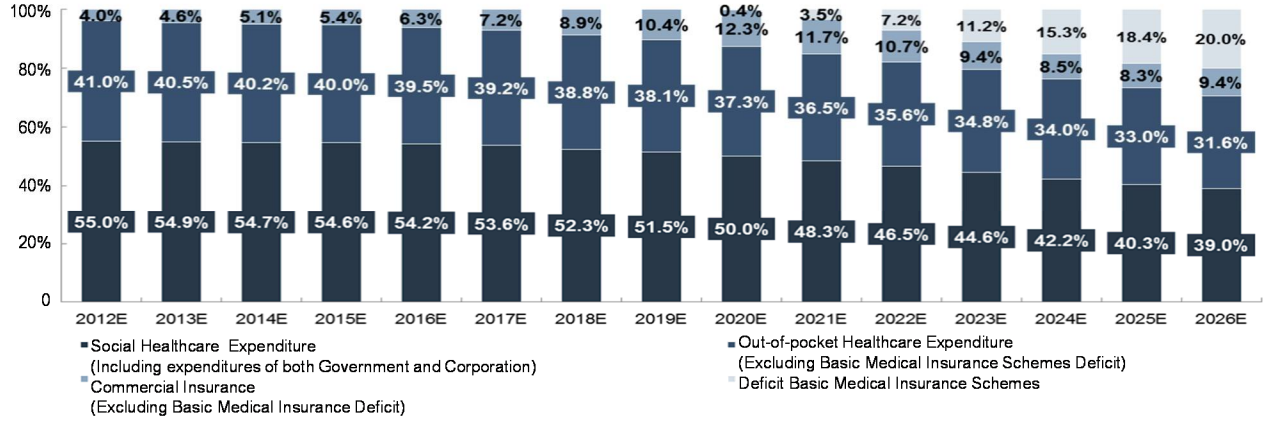
Impact of central procurement program

- On September 11, 2018, the State Medical Insurance Administration announced the details of the pilot program for the centralized drug procurement system and will be implemented in 11 cities in China.
- The pilot program consists of 31 drugs that have seen generic candidates passed the consistency evaluation in China. Companies that win the bid will directly contract 60-70% drug purchase volume in the 11 pilot cities public hospital market.
- The tender for China's trial central procurement program was conducted on December 6, 2018. While there were some large drops of over 90%, the average decline was ~45%, which was in line with our expectations.

Our views:

- We believe this pilot program is part of the overall drive by the government to lower the burden of drug costs for public medical insurance and provide patients with more affordable medication.
- There are risks to price declines for older generic drugs in order to release funds for reimbursing innovative biologics ones. We believe that price pressures will also apply to biological drugs, but are unlikely to be severe for a few years.
- We need to see how the trail CP program progress over the next three to four months before we can see sentiment improve for companies that have a large proportion of sales from generic drugs.

Figure 1: The growth of basic medical insurance expenditure is expected to outpace that of revenue



Source: Frost & Sullivan

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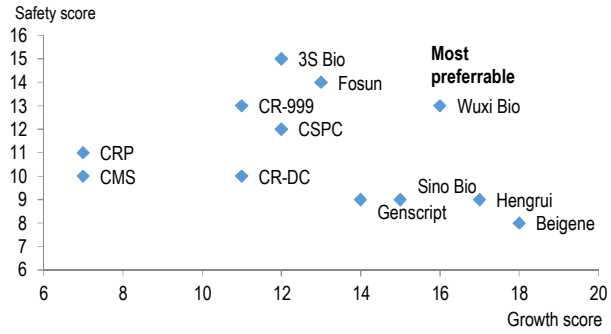
Healthcare Framework

We show below selected healthcare companies as measured by growth potential and safety factors. Top subsectors: innovative biotech, branded FTM biosimilar developers and CDMO.

Figure 2: Drug makers and long-term growth and safety scores



Source: J.P. Morgan

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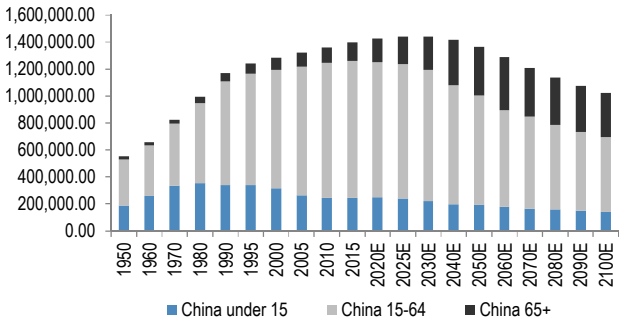
China Insurance

- **An aging society will boost the structural demand for protection, health and individual pension.**
- **Life Insurance: the core profit source would shift from investment spread margin to mortality/morbidity fee margin.**
- **Car insurance, which accounts for 75%+ of total revenue, should have a lower business contribution. Strong innovation on product channel to emerge.**
- **Balance sheet: Following IFRS 17 accounting and a stricter solvency standard, insurers will largely reduce equity and non-standard assets.**

Demographics: Big impact for major insurance customers

The birth rate in China has continued to stay at low levels in recent years, at 1.2-1.3, despite the relaxation of the one-child policy to two-child policy. Our economists expect the birth rate will rise modestly to 1.6 by 2030, but China's total population may still well peak at around 1.5 billion in 2027 before it starts to decline. That said, the ageing population in China remains a key challenge. According to the UN, the share of 65+ rose from 5.7% of the population in 1990 to 9.7% in 2015. This share is expected to rise further to 17.1% by 2030. With this change in demographics, a parallel change in customer profile can be expected with more demand for protection and health insurance products and longer-term annuity products to cater to the needs of an aging society. The private health insurance, long-term care for older people, and individual annuities are expected to become a dominant business in the sector.

Figure 1: China: Demographics trend forecast
in thousand

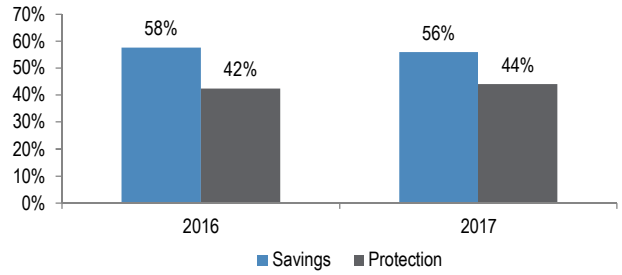


Source: UN World Population Prospects (the 2017 Revision).

Life Insurance: Structural improvement

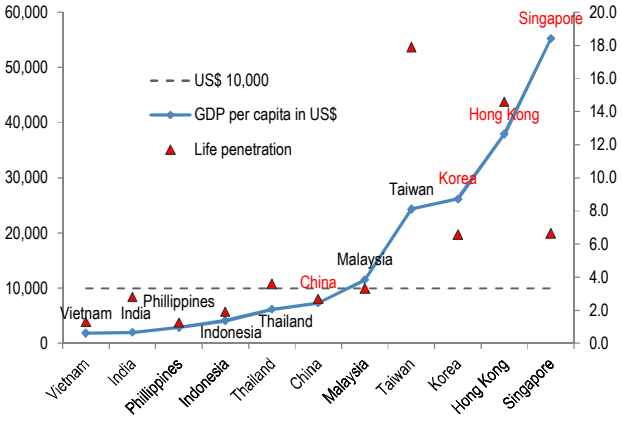
Presently China's life insurance industry is heavily dominated by savings-type insurance products (for China's major insurers ~50-60%+ are savings type products). However, with the worsening demographics and with rising income levels, it is reasonable to expect a significant shift in the product mix of China's life insurers to more profitable and longer-term protection and health insurance based products rather than lower margin savings products.

Figure 2: China major life insurers: product mix
%



Source: Company reports and J.P. Morgan estimates.

Figure 3: Asia: GDP per capita in 2017 (constant 2010 US$)
%



Source: Company reports and J.P. Morgan estimates.

Broadly speaking, the protection and health insurance business generally moves into a hyper-growth stage once the country's GDP per capita exceeds $10K as households then start to actively seek better medical services and family protection.

As of 2017, out of total 31 provinces in China, eight had a GDP per capita of more than $10K. More provinces are expected to cross this level medium term, thus supporting the structural growth in China's life insurance industry.

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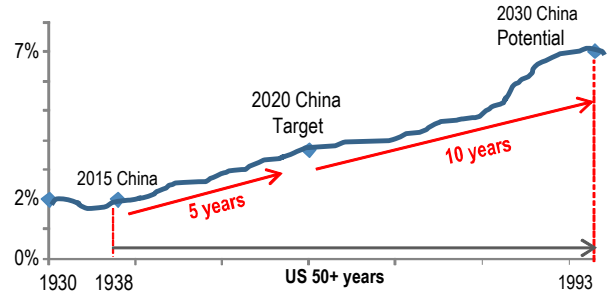
Table 1: China: Gross regional product per capita at province level
US$

	2016	2017
Shanghai	27,297	31,825
Beijing	26,327	31,658
Tianjin	24,674	27,219
Jiangsu	13,707	16,442
Zhejiang	11,982	14,064
Fujian	10,609	12,692
Guangdong	10,417	12,367
Shandong	9,707	11,163
Inner Mongo	10,655	9,786
Hubei	7,908	9,510
Chongqing	7,458	8,841
Shaanxi	7,244	8,777
Jilin	7,849	8,649
Liaoning	7,254	8,423
Ningxia	6,726	7,786

Source: National bureau of Statistics China, J.P. Morgan estimates.

With the increasing level of household income and a shift in insurance consumption, life penetration level should increase from 2.7% last year to ~7-8% in 2035.

Figure 4: China potential and US Historical Penetration Rates
%



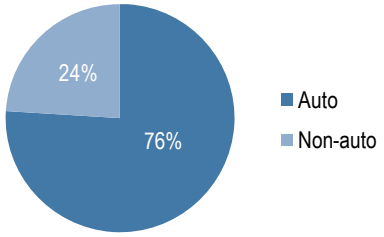
Source: AIA Group FY16 PPT.

Similar to Korea's life insurance market, with the increasing share of protection products, earnings quality of China's life insurers should improve as the earnings base shifts from spread margin to mortality and morbidity margin This then should lead to decoupling from the macro environment and eventually to more stable earnings profile (less volatility in earnings).

Non-Life Insurance: Diversification of product mix

China's non-life insurers are highly dependent on auto insurance as their dominant product (~75%+ contribution from auto insurance). The auto combined ratio for major non-life insurers is in the range of 96-99%. Although presently profitable, with full pricing liberalization in auto insurance, the increasing competition will eventually bring down the profitability of China's non-life insurers.

Figure 5: China major non-life insurers' product mix (2017)
%

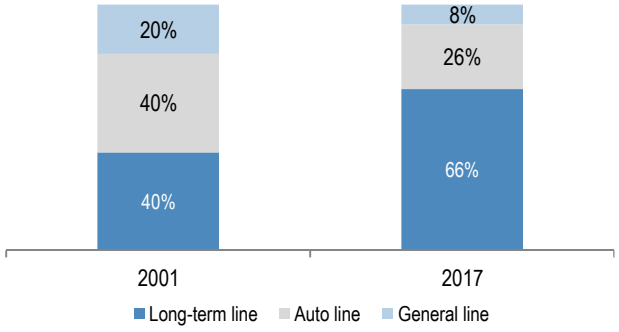


Source: Company reports.

Additionally, similar to Korea's non-life insurers, we expect top-line growth to be fueled largely by homeowners insurance as this might become mandatory by regulation. Also, future mandatory government schemes such as indemnity public health insurance might provide additional growth opportunities in non-auto segment.

Hence, in the medium term we expect diversification in non-life insurers' product mix. We expect auto insurance contribution to gradually decrease to <50% from currently ~75%+. Also, with better risk selection, the profitability of non-life insurers is expected to increase.

Figure 6: Korea non-life insurers' product mix shift
%



Source: General Insurance Association of Korea.

Capital and regulation: Favorable risk-reward on B/S

With an improving portion of capital intensive protection business, China's insurers are expected to need more capital to strengthen their balance sheets. Post the adoption of C-ROSS (China Risk Oriented Solvency System) in 2016, every Chinese life and non-life insurers started to report their solvency ratio on a quarterly basis with detailed breakdown by risk. Although at present the calculation methodology (or capital charge) on each risk looks generous compared to EU Solvency II, Singapore's RBC 2, or Korea's RBC framework, China's solvency

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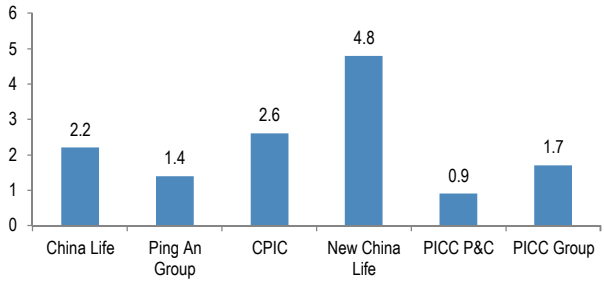
capital framework is scheduled to strengthen further benchmarking EU Solvency II. Hence, the industry's risk-based capital disclosure is expected to get more credibility analysing insurers' capital position, going forward.

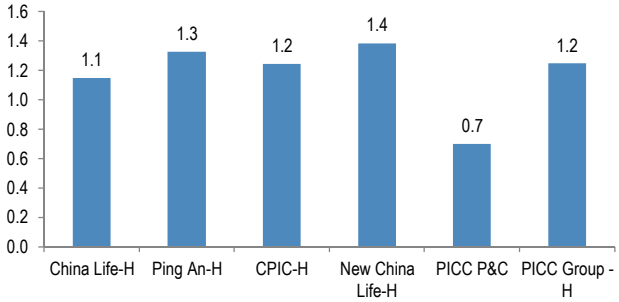
Figure 7: China insurers: Risky asset exposure



Source: J.P. Morgan estimates as of 1H18.

That said, similar to European insurers post the EU Solvency II framework, China's insurers are expected to lower their exposure to equity and risky assets—currently, China's insurers have ~15%+ exposure to equity. The fundamental shift in product mix to regular premium products should provide insurers with stable cash flow from back book with higher visibility on earnings. Hence, this should lower the overall beta of the insurance sector. On average, China's major insurers have a beta of 1.2 based on the past two years' weekly data.

Figure 8: China's major insurers' beta (weekly basis for past two years)



Source: Bloomberg, J.P. Morgan estimates.

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Real Estate – A maturing industry without much innovation

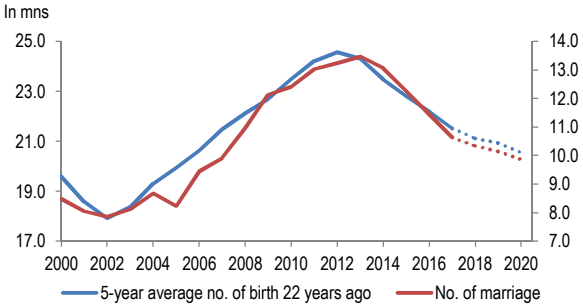
- **Real Estate is a rather old industry with relatively little innovation. Hence, the business model and nature of residential, retail and office will likely remain similar over the next 5-10 years. Changes will be more on the market dynamics, the difference in performance in each sub-segment, and also how market players behave.**
- **For 2010-2020, the whole boom of the residential market is effectively a shift of debt from the government to households, and by 2025, we think the process will be mostly finished. By then the household debt as a percentage of GDP, which mainly comprises mortgages, should catch up with the developed market level, and the total residential sales market should be gradually shrinking due to demographics, eventually to about 60-70% of current market size.**
- **As funding costs continues to trend down, developers will be more active in reinvesting capital into long-term rental properties including retail malls, offices, industrial buildings and rental home. More landlords will arise, and we also expect the China-REIT market to gradually open up. Within the investment space, apart from home builders, there will be some world-leading landlords/REITs with >$2bn annual rental income that will become investable.**

Residential: Stepping into normalization

China residential demand is mainly driven by household formation, and by our analysis, about 47% of household formation is from urban marriage, and 53% from urbanization. Looking to 2025, we expect total household formation to drop from 12.6 million households in 2018 to 10.8 million in 2025. With an annual home price growth that is in line with nominal GDP, the total residential sales market will shrink from Rmb12 trillion in 2018 to Rmb10 trillion in 2025E.

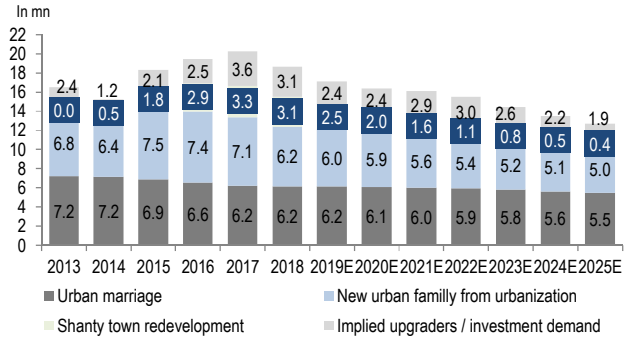
By 2025, we expect about 25% of the population to be covered by government-subsidized housing market, and property tax could be enacted as well. Hence, speculative demand should shrink to only 5-10% of total demand. Property policy should not be as active as it is today, and the over market demand/supply will imitate a similar cyclical pattern seen in developed markets.

Figure 1: China number of births versus number of marriages with 22-year lag



Source: NBS, CEIC, J.P. Morgan estimates.

Figure 2: China household formation breakdown



Source: NBS, CEIC, J.P. Morgan estimates.

Newly urbanized households will still seek lower-quality more affordable homes. Therefore, we expect about half of the market will remain as mass market, which is affordable for most of the population. The other half of the primary sales market should mainly serve the upgrading demand. Thus, developers with the ability to build luxury products will gain a larger market share and sustainably develop for the wealthier population.

We expect the top 10 developers' market share will reach ~80-90% in top tier cities, mainly due to the capital intensive nature and two to three developers remaining active in the lower tier cities. On average, the total market size in top tier cities will be at Rmb5-6 trillion, and Rmb5-6 trillion for lower tier cities, roughly a half-half split.

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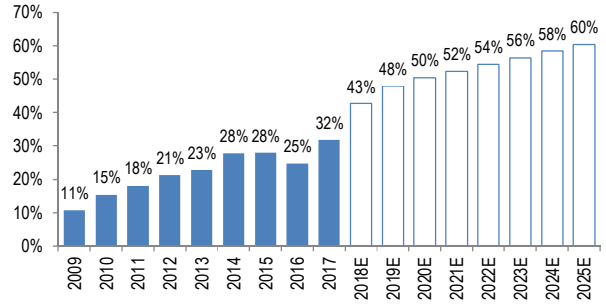
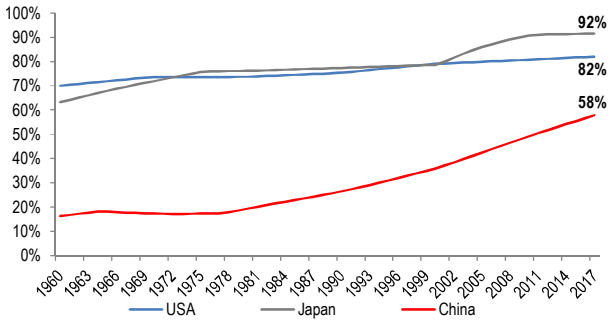
Figure 3: Top 20 developers' market share trend



Source: Company data, CRIC, NBS, J.P. Morgan estimates.

China residential development is likely to remain the largest in the world, mainly driven by the fact that the urbanization trend in China may not end until 2030-2035. China has a developed part (top tier cities) where the population size is comparable to that of the entire US. Meanwhile, China also has another developing part, which is still seeing active home buying activity, as those lower-tier cities become more urbanized.

Figure 4: China urbanization rate, versus the US and Japan



Source: NBS, CEIC

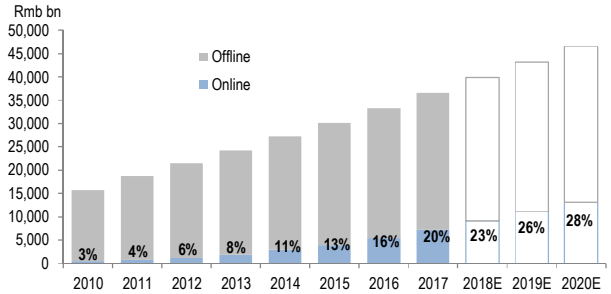
Retail: Good operators to gain more market share

Chinese households are the biggest spenders in the global luxury market, and according to Fortune Character Group, about half of the global luxury market is contributed by Chinese. However, a big part of this spending took place outside China (>60%). With the potential enactment of tariff reductions, the government will gradually bring back such luxury spending, and we expect some spending will come back to China onshore, with reference to US and Japan (~80% of luxury spending is from domestic demand). Hence, luxury spending will likely remain an important market in China, and there will continue to be demand for luxury shopping malls. However, we believe cities with a population of >10 million can accommodate at most three to four of such luxury malls, and the rest will be regional malls servicing populations within a 4 km radius.

By 2025, we think shopping malls will continue to maintain a big proportion (~40-60%) of tenants from experience-type tenants, including F&B, cinemas, children's playgrounds, and ice-rinks in order to distinguish themselves from the competition with e-commerce. There will be further integration between online and offline shopping, and online retailers could be opening more offline outlets to tap the offline-only demand. Offline landlords will also engage more online retailers' big-data in picking their tenant mix, ensuring the mix can serve the spending pattern of the surrounding area better. In the end, footfall is the ultra-determinant of how much rent the landlord can receive, so essentially landlords with a good track record and reputation will attract more capable retailers, and will see market share gains to increase further via M&A as well.

As a result of the above, the occupancy cost for China could be structurally lower than that of other developed markets, mainly because retail space is more over-supplied and e-commerce penetration is higher. We expect China's overall occupancy cost to be at low-teens and better operators can achieve mid to high teens. Considering a total retail market size of ~Rmb37 trillion, 80% is done offline, at 10% average occupancy cost, the total market size of the retail landlord market will be around Rmb3 trillion.

Figure 5: China retail sales (split by online and offline)



Source: iResearch, NBS, J.P. Morgan estimates.

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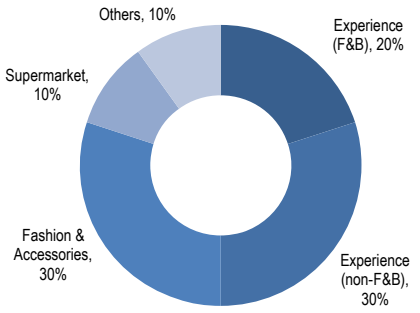
Figure 6: Typical tenant mix of a Chinese shopping mall



Source: J.P. Morgan

Office: Structural over-supply will continue

Office demand comes mainly from the tertiary industry, so the trend of office demand into 2025 largely depends on how quickly the tertiary industry can pick up. By our estimates, the tertiary industry GDP growth for 2018-25 will slow down along with the weakening overall GDP growth (albeit at a slower pace), and this could be a benchmark to the future office market demand.

In terms of supply, over the years we observed the Chinese government has intentionally maintained a slightly over-supplied environment for the office market, with a purpose to ensure that office rents do not go too high as this will otherwise impact competitiveness. Hence, we think office rents will just track inflation, but there will not be any massive increase in the next five to10 years.

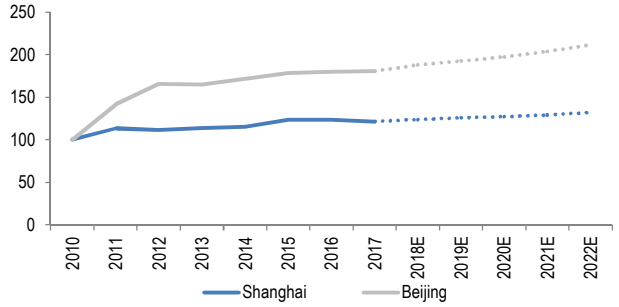
Apart from tier-1 cities, which will see more demand from financial institutions, tier-2 cities should soon become a regional hub for local businesses. We think 10-15 provincial capitals will be able to develop a decent demand for office space over the next five to10 years, but due to the already oversupplied environment the office market will just normalize and not see a supercycle. Vacancy rate may stay high at >10% over an extended period even into 2025, in our view.

Shared office space will take up some role in the overall office market, but we think it is unlikely to deviate from global trends to much as the economy will be more driven by large corporates than today. MNCs are likely to rent their own space in bulk, and shared office space will still be targeting smaller companies. Shared office operators may provide more consultancy services to MNCs on how they should arrange the office, but they are unlikely to replace landlords to provide the offices.

Figure 7: China office floor space sold (5-year average) versus China tertiary GDP Y/Y growth

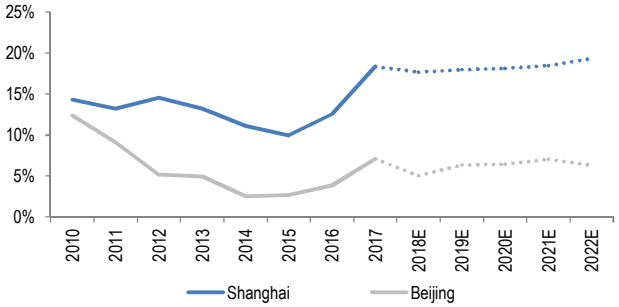
Source: NBS, CEIC, J.P. Morgan estimates.

Figure 8: Shanghai and Beijing – office net effective rent (2010=100)



Source: JLL

Figure 9: Shanghai and Beijing – office vacancy rate



Source: JLL

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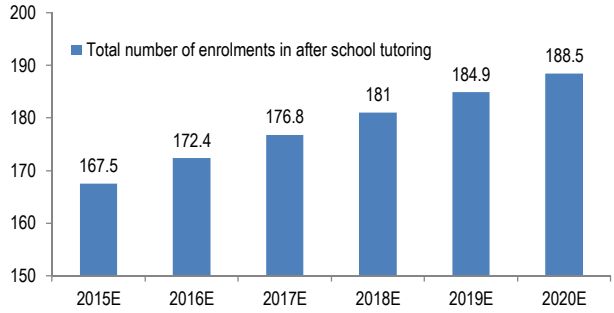
China's education outlook

- **2018 was a year of tighter regulations and stricter enforcement by the government.**
- **Compulsory education (Grade 1 to 9) is the most regulated sub-segment with many uncertainties over the legality of private participation and profit generation.**
- **After school K-12 tutorial is still our favorite despite a series of new regulations in 2018.**
- **We prefer the leading tutorial operators (TAL and EDU) and also the top post-secondary school consolidator (China Education Group).**

Tutorial segment is still our favorite

Despite a series of tighter regulations released throughout the year, K-12 after school tutorials remains the least regulated part of the education sector, in our view. In 2018, the government was determined to enforce new regulations forcing many small tutorial operators to suspend operations in order for their learning centers to comply with new rules and obtain proper operating and teaching licenses. We believe that any requirements for tutorial operators to be properly licensed benefits the market leaders like TAL and EDU more than their 'mom and pop' rivals. The key new regulations are that tutorial operators need to get operating and teaching licensing for the learning centers before they can start to enroll students; class size is limited (minimum 3sqm per student in each learning center); classes should be finished before 8:30 pm; and parents should not pay more than three months prepayment before the course commences.

Figure 1: total number of enrolments in after school tutorials projection



Source: TAL presentation.

Risks to full-time K-12 schools

On August 10, 2018 the Ministry of Justice of the PRC announced the new draft amendment to the Promotion Law of Private Education. In the month following the announcement, China education stocks fell by over 35% on average (30% underperformance to HSCEI). We believe this concern was unnecessary and the reaction seemed quite severe for something that is 1) not yet implemented and subject to change with a 5-10 year transition period; 2) may not impact all schools (i.e., likely just impact compulsory education); and 3) can be countered by schools electing to change from "not for profit" to "for profit" status. The key new regulations are: **Paragraph No 5 –** Grade 1-9 schools (elementary school and middle school) are not allowed to elect "for profit" status. **Paragraph No.12 –** Prohibition of M&A related to "not for profit" schools by an education group**.** **Paragraph No. 45 –** Related party transactions in the "not for profit" schools will be subject to supervision.

Post-secondary consolidation

We see an opportunity for the post-secondary education space to see accelerating consolidation following the recent regulatory changes. The new regulations on the private education sector banned public universities from using government funds to operate for-profit schools, essentially forcing out the public universities and increasing the number of affiliated independent colleges available for acquisition in the next five years. We believe the regulation changes should boost M&A activity within the private higher education market, which could benefit private higher education companies like China Education Group (839 HK), in particular as it is actively seeking acquisition targets and is an industry leader.

More controls over Kindergarten

One of the key surprises for 2018 was the tougher regulations on private kindergartens, which came at the same time that the government is encouraging all parents to enroll their children in kindergarten (migration from a luxury option to more of a prerequisite for primary school).

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Global Equity Research
J.P. Morgan Perspectives
31 January 2019

J.P.Morgan

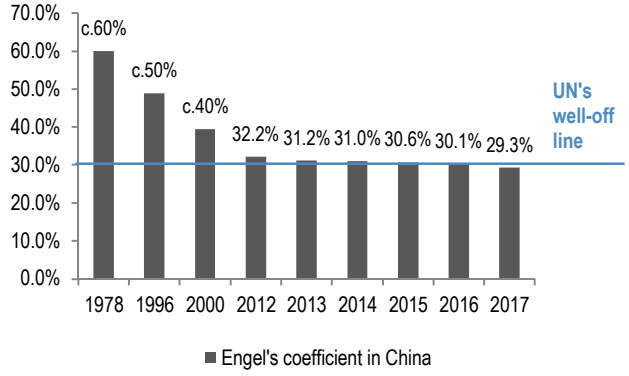
The rising experience economy

- **China consumers value experiences over ownership.**
- **China is well-off, with the Engel coefficients falling below 30% for the first time in 2017.**
- **Spending on leisure, i.e., sports, travel, dining out, etc., has been growing steadily.**

Experiences over ownership

We have observed that Chinese consumers now prefer experiences to ownership, as evidenced by rapid growth of spending in sportswear, travel, daily social activities like cafe visiting, and dining out. With the Engel coefficient, a measure of income contribution to basic needs (Source: NBS), trending lower to 29% in 2017 which is the first time below the 30% well-off line set by the United Nations, Chinese consumers are now finding themselves meeting their basic daily needs more easily, and therefore having the luxury to seek quality experiences. Consumer satisfaction no longer just comes from ownership, but also from the experiences associated with spending money.

Figure 1: China's Engel coefficient fell below 30% for the first time; 30% level is the well-off line set by United Nations

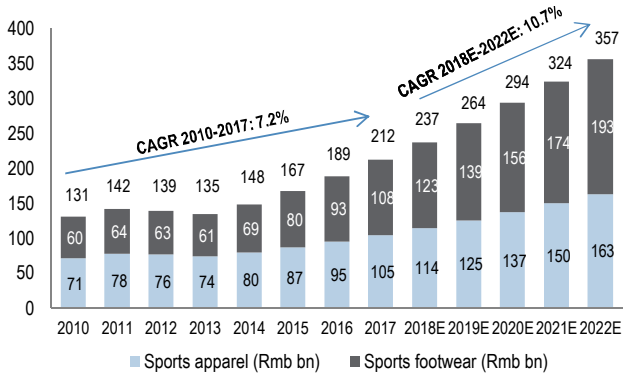


Source: National Bureau of Statistics, J.P. Morgan.

Sportswear

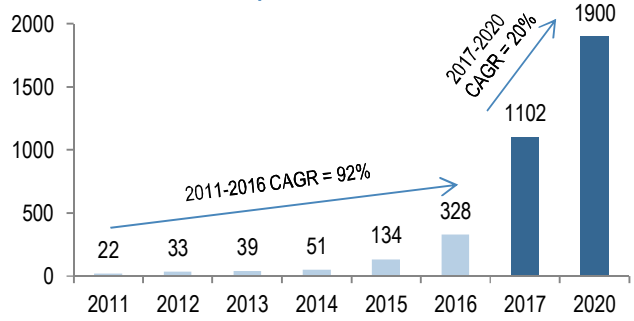
We have witnessed increasing popularity of participating in sports in China, as the younger generation seeks healthy lifestyles. The sportswear market reached Rmb212bn in 2017, and is expected by Euromonitor to grow at c11% pa over 2018E-2022 (versus 7% pa during 2010-2017). We use marathons as a proxy given that running is one of the most accessible sports. In 2017, there were 1,102 marathons in China, and this will likely grow to 1,900 by 2020, representing a 20% CAGR.

Figure 2: China sportswear market sees steady development



Source: Euromonitor, J.P. Morgan

Figure 3: We have witnessed increasing popularity of participating in sports in China – the number of marathons organized in mainland China is an example

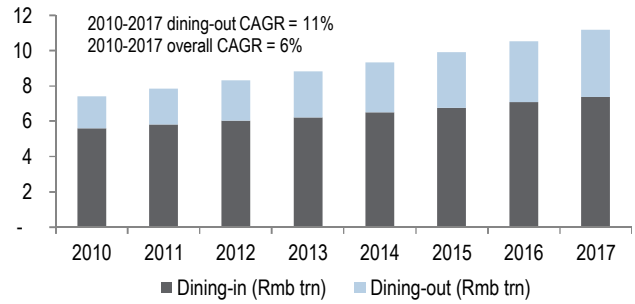


Source: Chinese Athletic Association, J.P. Morgan. Note: 2011-2016 are registered events; 2017-2020 includes all scales of marathon events

Dining out

Chinese consumers now dine out more often than they did in the past, as restaurants now offer a wide range of cuisines. Spending on dining out in China during 2010-2017 rose at a CAGR of c11%, compared to 6% of overall spending on food.

Figure 4: Spending on dining-out saw a higher CAGR compared to overall spending on food



Source: Kantar, J.P. Morgan estimates.

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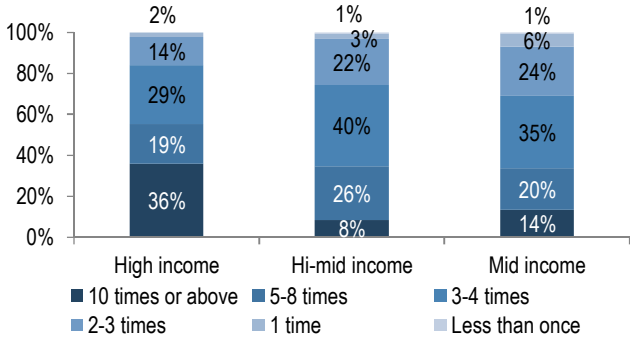
Travel

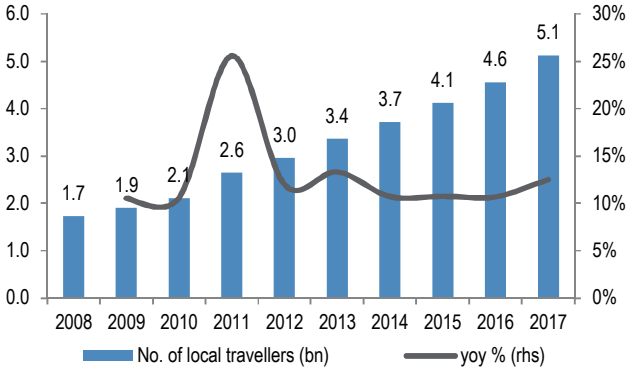
Travel can offer unique experiences that consumers are not able to get at home and help build meaningful relationships on the road. The number of Chinese travelers reached 5.1 billion in 2017, which is three times the level in 2008. More than 93% of mid-income Chinese consumers (annual personal income of Rmb150,000-200,000, or family income of Rmb300,000-400,000) travel twice or more each year.

Figure 5: More than 90% of middle-and-above income groups will travel more than once per year



Source: iResearch, J.P. Morgan. Note: High income = Annual personal income >300K OR family income >500K; Hi-mid income = Annual personal income 200-300K OR family income 400-500K; Mid-income = Annual personal income 150-200K OR family income 300-400K

Figure 6: Robust yoy growth of the number of travelers

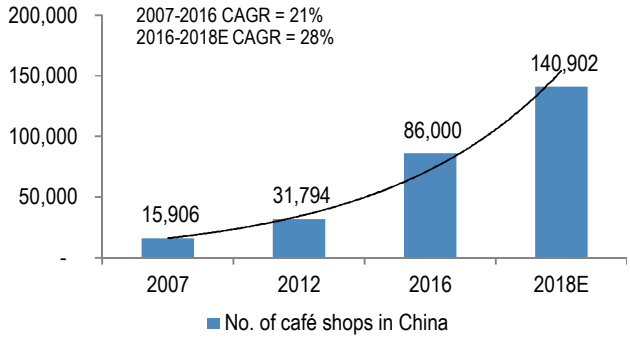


Source: CNTA, J.P. Morgan.

Cafés

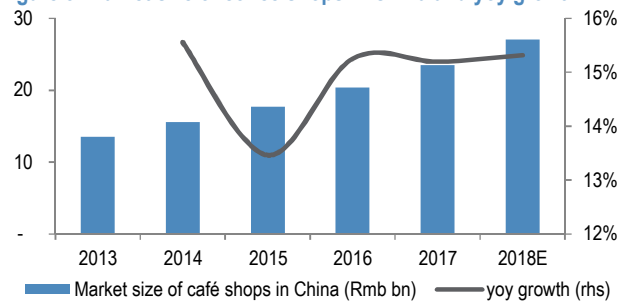
Consumers drink coffee at cafés, and also connect with friends and coworkers there, which can bring a sense of belonging and acceptance among social groups. As a result, the number of cafés in China is expected to reach 140,902 in 2018 (source: CBNData), representing a 28% CAGR during 2016-2018 (versus 21% during 2007-2016). The market size of café shops in China is expected to reach Rmb27bn in 2018, double the size of around five years ago.

Figure 7: No. of coffee shops in China is seeing accelerating growth



Source: CBNData

Figure 8: Market size of coffee shops in China and yoy growth



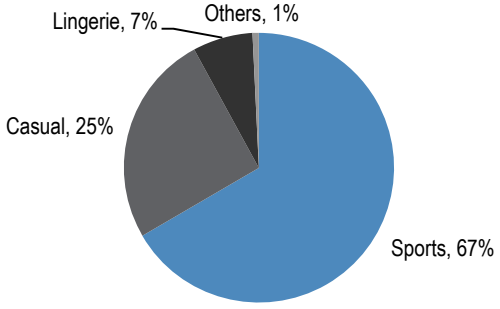
Source: CBNData

Who will be the beneficiaries?

Shenzhou, Li Ning and Anta are at the sweet spots in the sportswear sector, in our view

Among textiles players, **Shenzhou** should be the key beneficiary with 67% sales from sportswear. Leading domestic sportswear players, **Li Ning** and **Anta,** are set to gain further market share in the fast-growing sportswear market in China (please refer to our initiation report China Consumer Discretionary Qian Yao et al., 23 Oct. 2018).

Figure 9: Shenzhou, among the textiles players, should be the key beneficiary with 67% sales from sportswear



Source: J.P. Morgan, Company data.

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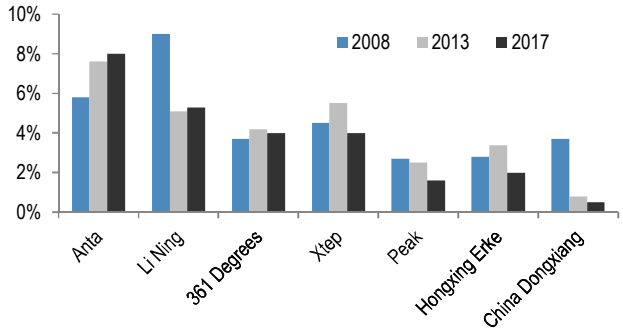
Figure 10: Leading domestics players, Anta and Li Ning, are set to gain further market share in the fast growing sportswear market



Source: J.P. Morgan, Euromonitor.

Unique shopping experience to drive traffic and sales growth

Brands that provide a more pleasant shopping experience, such as **HLA Corp** and **Peacebird**, are set to attract more traffic, earn higher store efficiency, and have accelerating sales growth. HLA Corp opened a café under its AEX brand, which extends the brand experience to feed the younger generations' needs and further showcase the brands' styles. Peacebird, together with Tmall, opened a smart store in Hangzhou, utilizing the smart technologies to provide smart retail experience.

We believe retailers such as Sun Art, Yonghui and Rainbow, which have enhanced the shopping experience by the O2O integration and new/upgraded store formats will also benefit from the trend. Sun Art partnered with Alibaba to offer 30-minute delivery for its online orders, and started a joint venture "He Xiao Ma" to penetrate lower tier cites, which in our view can strengthen customer experience. Yonghui's "Super Species" supermarkets contain catering areas and offer cooking service also fit into the new lifestyle of urban population. Rainbow introduced themed area in some of their shopping malls for kids, sports, etc. All of such initiatives are aimed to improve the shopping experience, which has successfully helped drive the traffic.

Condiment, catering, home appliance and home furnishing benefit as well

For other consumer sectors, we believe condiments, catering, home appliance, and home furnishing sectors are also riding such a trend. For condiment and catering, consumers' tastes have changed quickly, driving restaurants to renew their menus more frequently or launch more brand/flavor choices. XiabuXiabu has developed high-end brand Cou Cou and Yum China launched Taco Bell to cater for a wider consumer base. We believe such a trend will also benefit Haitian and Angel Yeast thanks to rising demand for upgraded condiments (please refer to our *Haitian Flavoring & Food*, K. Yin et al. and *Angel Yeast Co*, K. Yin et al., 2 Oct. 2018 initiation reports).

For home appliance and furnishings, we also see a strong replacement demand for upgraded products given rising awareness of experience and improved affordability, driving stronger growth in quality of products, instead of quantity of goods previously. We believe custom-made home furnishings players like Suofeiya and Oppein will be beneficiaries of this trend (please refer to out *China Home Furnishings* G. Hsu et al., 17 Oct. 2018 initiation report).

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Global Emerging Markets Research
J.P. Morgan Perspectives
31 January 2019

J.P.Morgan

China's evolving role in regional supply chains

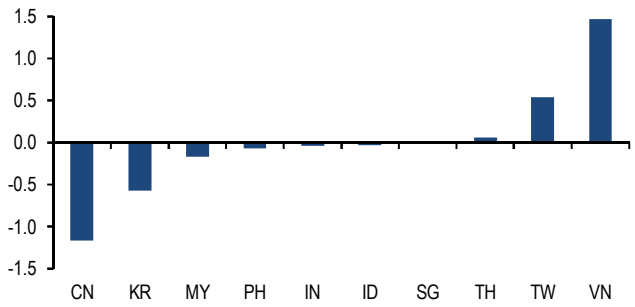
- **EM Asia's trade supply chain has entered a new phase, distinct from China's rise following WTO accession.**
- **Rising production costs and past CNY appreciation have prompted a rare decline in China's regional export share.**
- **Lower-cost production centers like Vietnam have picked up the slack.**
- **US-China trade tensions could speed up the supply chain adjustment.**
- **The reshuffle implies a redistribution of external surpluses across EM Asia via trade and FDI flows.**
- **China's current account could flip to a deficit by 2020.**

EM Asia's supply chain shuffle

China's accession to the World Trade Organization (WTO) prompted a significant shift in trade links across EM Asia beginning in the early 2000s. This shift underpinned almost a decade of rising intra-regional trade, allowing China to emerge as the dominant regional exporter, bolstering its current account surplus.

Amid rising domestic production costs and past CNY appreciation, export market share has shifted from China toward lower-cost centers of production like Vietnam. As a result, China's share of regional exports has declined for the first time in a decade (Figure 1).

Figure 1: EM Asia export shares
%-pt change in share of EM Asia total exports, latest since Dec '14

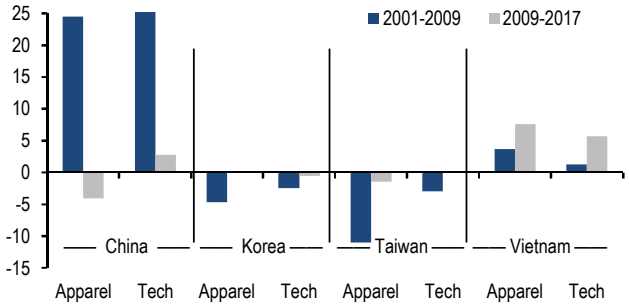


Source: National statistics authorities, J.P. Morgan

The redistribution has implications for both winners and losers across EM Asia's trade supply chain. For China, it suggests an ongoing moderation in its regional export share and a continued narrowing in the current account surplus, building on the trend of recent years. With merchandise imports also expected to increase amid US-China trade friction, and a structural widening in the services deficit, China's current account balance could fall into deficit by 2020.

The decline in China's export share reflects the interplay of several factors. These include CNY appreciation—both against the USD and in real terms; rising domestic production costs in the form of labor, land, and environmental protection costs; and policy support for higher value-added exports, implying that China has lost share to lower-cost production bases. Indeed, Vietnam's almost 6%-pt increase in the region's tech export market forms a counterpoint to the more modest rise in China, as well as declines across much of the rest of EM Asia. In short, **Vietnam has emerged as a new assembly and production base for tech and lower value-added exports** (Figure 2).

Figure 2: EM Asia regional export shares
%-pt change in share of EM Asia total exports



Source: National statistics authorities, J.P. Morgan

For high value-added exporters, the trend looks more mixed. Taiwan's export sector has performed comparatively well in the latest round of supply chain reshuffling, but Korea has played a significant role in offshoring production to lower-cost centers of production. Its current account surplus is expected to narrow this year, though at a modest pace. Finally, the increase in export share for lower-cost manufacturing economies like Vietnam implies both continued steady growth in foreign direct investment (FDI) inflows, and larger external surpluses that are fueling a rise in real effective exchange rates.

To a large extent, the redistribution of export market share reflects shifts in relative production costs. Unit labor costs have accelerated in China over the past decade, as have average nominal wages. This dynamic is prompting a redistribution of FDI inflows toward lower-cost

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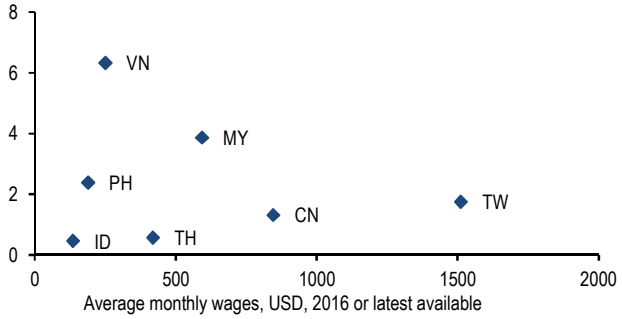
manufacturers, with Vietnam the stand-out recipient of regional direct investment as a share of GDP (Figure 3). On the flip side, FDI into China has slowed. After peaking at $290bn in 2013, inflows fell steadily to $168bn last year, partly reflecting declining returns on domestic investment (see "China's big fall in productivity," H. Zhu, 22 Aug. 2014). Even FDI in the tech sector may have peaked as early as 2008-09 (Figure 4).

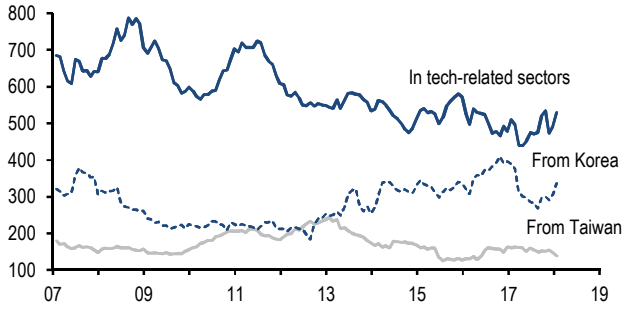
Intensification of US-China trade conflict since early last year will likely speed up the region's supply chain adjustment. Indeed, the latest trade data from Korea, Taiwan and China suggest regional supply chain re-shuffles may have picked up momentum, as manufacturers seek to avoid higher US tariffs on China, leading to a significant decline in China's processing imports from the region, as well as notable slowing in Korea and Taiwan's exports to China.

Figure 3: EM Asia average wages and foreign direct investment
Gross FDI, % of GDP, latest four quarters



Source: ILO, National statistics authorities, J.P. Morgan

Figure 4: China's inward FDI
US$ million, 12mma

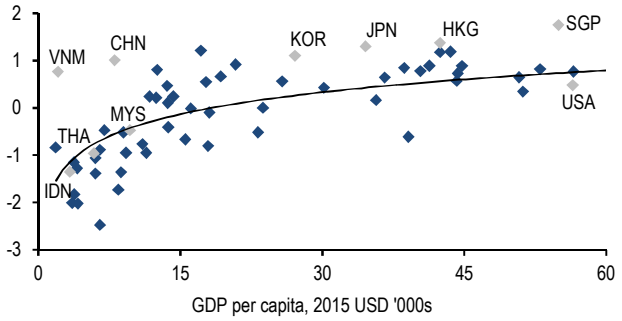


Source: Ministry of Commerce, J.P. Morgan

Vietnam's front-row seat

FDI flows into Southeast Asia have accelerated, particularly to Vietnam. Korean investment in ASEAN more than tripled during the decade through 2016, largely destined for Vietnam. While foreign-funded firms accounted for 43% of China's exports last year, they made up 72% of Vietnamese exports. Korean investment in Vietnam now represents close to 20% of the total stock of foreign direct investment in the economy. The combination of Vietnam's young and large work force, alongside relatively low wage costs, has underpinned a rapid rise in FDI inflows. Global educational performance, as measured by the OECD's Program for International Student Assessment (PISA) rankings, is around one standard deviation above the global mean—significantly higher than other economies with income levels similar to Vietnam's (Figure 5).

Figure 5: Global educational performance and GDP per capita
2015 PISA score, standard deviations from global mean



Source: OECD, World Bank, J.P. Morgan. PISA score is simple avg. of mathematics, reading, and science

Expecting narrower surpluses in China

For China, the evolving regional supply chain suggests an ongoing moderation in its regional export share, and a continued narrowing of the current account surplus. China's current account surplus already has declined from a 2.4% of GDP average during 2011-15 to 1.4% in 2017 (we estimate further narrowing to 0.3% in 2018), reflecting the service account deficit that will likely continue to widen, led by outbound tourism. On the flip side, Vietnam's rising export share implies both a continued steady rise in foreign direct investment inflows, and larger trade surpluses.

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Global Equity Research
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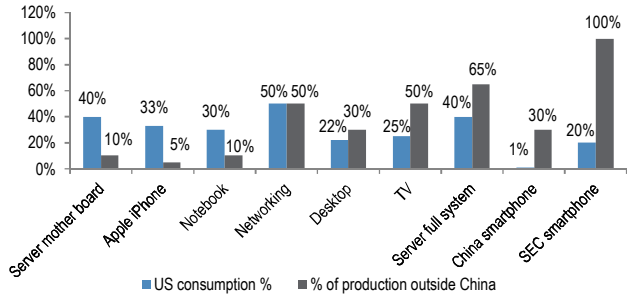
Supply chain shifts underway

- **US-China tensions have triggered relocation of the supply chain and this is likely to prompt a permanent shift out of China.**
- **Tech supply chain is the most affected, with Taiwan/China IT sectors and US vendors with large China-centric production (such as Apple) most significantly impacted, while Korea and Japan are largely immune.**
- **Economies with large working-age populations, relatively low-cost wage structures, and high skill levels or infrastructure capacity are emerging as relative winners, benefiting the ASEAN countries in particular.**
- **Supply chain, rather than the consumer, is likely to bear 70-80% of the cost in the next 18 months.**
- **Apple supply chain slow to move, unlikely to see severe dislocation unless tariffs become extremely punitive.**

Asian Tech supply chain most impacted

Technology sector has the largest exposure to China-based production with significant exposure to China-based manufacturing, with smartphones, servers and notebooks being the most reliant (Figure 1).

Figure 1: US market consumption versus % of production from non-China areas



Source: J.P. Morgan estimates.

Which parts of the supply chain are already moving?

Final assembly and EMS vendors are directly under the firing line from tariffs and are already starting to move some of the capacity away from China in 4Q18 already. Some sub-components like camera modules, as well as IC packaging are also starting to move.

From a product category perspective, more low volume but high value categories, such as networking, server, and industrial technology products, are already starting to move. Servers and networking have already been undergoing some changes in 2H18 with additional relocation expected in the first half of 2019, such as in industrial tech and automobile products. The industrial tech product category is already seeing some diversification, and in many cases, are either moving to Mexico, pulling a little bit of capacity back to Taiwan, or moving to ASEAN.

Sporadic moves in consumer electronics: Some of the consumer electronics supply chains had started moving out of China into lower cost locations, but many have adopted a wait and watch approach after the Sino-US détente in early December 2018.

Apple supply chain unlikely to move

Due to the sheer scale of operators and laborers required, it seems unlikely that the Apple supply chain will move unless tariffs are onerous (25% of all Apple products shipped from China to the US) or an alternate manufacturing location emerges that could support 20-30% of the volume. By our estimates, iPhone manufacturing employs approximately one million operators in China with extremely seasonal demand pattern for skilled labor. Such labor supply is extremely difficult to replicate elsewhere in the world, in our view.

In many cases, vendors, including Chinese ones are now already deciding on long-term and permanent diversification plans for their supply chains, which are likely to be implemented independent of whether trade tariffs continue or not.

Supply chain likely to bear most of the initial costs: While supply chain is optimistic about customers sharing relocation costs, we are more skeptical. We believe that the supply chain is likely to absorb 70-80% of the cost in the next 18 months. We are more cautious on the downstream tech supply chain given the escalated relocation costs in the next 18 months with no immediate benefits. Korea and Japan tech supply chain is a lot more immune to this issue.

Strategic M&A are likely to increase, while downstream tech capex could rise. We expect more strategic M&A as companies look to add a more non-China manufacturing footprint. With relocation likelihood rising, downstream tech capex could also rise (despite poor end demand) and could also lead to adoption of higher automation.

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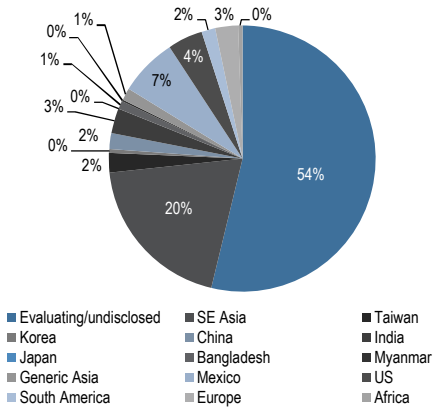
ASEAN emerges as the key beneficiary

The Taiwan tech supply chain, especially from a Greater China and Taiwan perspective, is planning to move around 10-20% capacity over the next couple of years. Some companies are pulling manufacturing of downstream products back to Taiwan. However, labor, space, and energy are key constraints. Near-shore locations such as Mexico are under exploration. For more consumer-centric products where the volume is higher and cost is more sensitive, ASEAN is a key beneficiary of supply chain shifts.

Taking a broader approach and using Big Data analytics over IT, industrials and discretionary sectors, we found that there were over 850 companies that have talked about supply chain shifts in their earnings calls in 2018 and we use our text mining code on >2,600 transcripts. The key conclusion of the analysis is that Southeast (SE) Asia comes out as an overall beneficiary of supply chain adjustments. Among companies that have mentioned the relocation geography, SE Asia features in >40% of the instances. This is further ahead of other near shore locations in our finding. Within SE Asia, Vietnam is the biggest beneficiary with around 46% of sub region mentions followed by Thailand and Malaysia (c.10% each). The fewest mentions we found were for the Philippines.

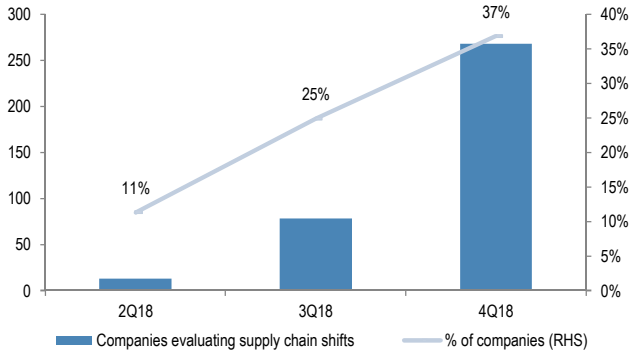
Figure 2: Breakdown of relocation destinations being considered



Source: J.P. Morgan, company transcripts.

The next question we answer is on timing and when do we see an increase in activity in SE Asia. We find a sharp increase in companies evaluating supply in supply chains (268 companies' versus 78 in 3Q18). With companies indicating two to three quarters to shift the supply chain, SE Asia could see increased activity in the next two quarters of 2019.

Figure 3: Sharp increase in companies evaluating supply chain shifts



Source: J.P. Morgan, company transcripts

We find that the proportion of companies that are currently talking about shifting supply chain is still relatively low. Of the c.850 companies analyzed, only a third are evaluating shifting supply chains. As of now, the majority are absorbing the impact of tariff increases or lower demand either through operational impacts (margin pressure) or passing it on to the supply chain or to customers. If trade tensions were to escalate, we think a higher proportion of companies would be evaluating a shift in supply chain.

Table 1: Companies in early stages of evaluating shifts in supply chains

Number of unique companies	**857**
Limited or no impact	284
Evaluating impact/too early to say	288
Risk only from escalation or through macro risks	140
Operational impact (e.g., margin pressure) and/or cost pass-through (customers and suppliers)	475
Positive impact	33
Shifting or evaluating shift in shift supply chain	292
Total companies that are impacted or could be impacted	735
Not yet evaluating supply chain adjustment though impacted or could be impacted	**443**
Limited or no impact	33%
Evaluating impact/too early to say	34%
Risk only from escalation or through macro risks	16%
Operational impact (e.g., margin pressure) and/or cost pass-through (customers and suppliers)	55%
Positive impact	4%
Shifting or evaluating shift in shift supply chain	34%
Total companies that are impacted or could be impacted	86%
% impacted/potentially impacted but not relocating	**60%**

Source: J.P. Morgan, company transcripts

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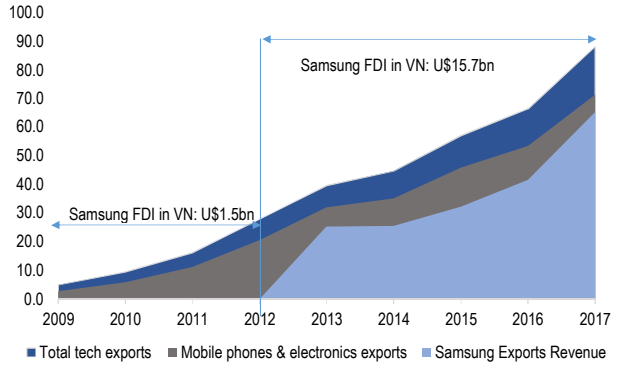
Samsung exemplifies feasibility of large-scale relocation to ASEAN

Vietnam has been benefiting from global manufacturers' shifting/branching out their factories from China. The number of FDI projects in Vietnam has grown significantly, with the most noticeable increase in Chinese, Korean, Japanese and Singapore companies investing in Vietnam

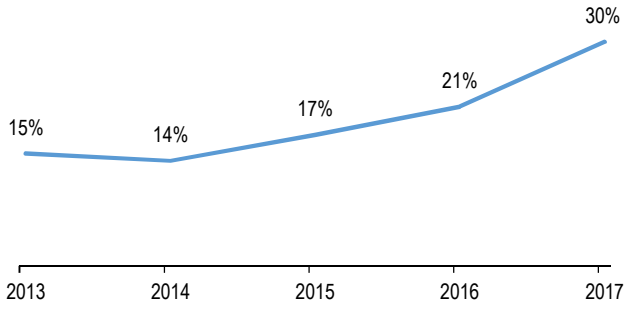
Today, Samsung Electronics has greater flexibility than Apple for its higher-end products to be completed in Vietnam / Korea than China. Vietnam is the second-biggest exporter of smartphones in the world because of Samsung. Samsung accounts for c25% of the country's total exports. Vietnam GDP grew 6.8% in 2017 driven by the processing and manufacturing sector, which expanded by 14.5%. Samsung accounted for 5.4% out of 14.5% manufacturing sector growth.

Figure 4: Vietnam tech exports and Samsung's contribution



Source: Vietnam customs, Ministry of Planning & Investment

Figure 5: Samsung Vietnam revenue relative to country GDP



Source: National Statistics & Samsung financial reports FY13-17

ASEAN implications – Vietnam key beneficiary, followed by Thailand

Sector-wise, we note four key themes that capture the early signs of trade-war benefits: 1) Industrial park developers are seeing higher occupancy rates; 2) Seaports are thriving on increasing import/export activities; 3) Electricity consumption is picking up, and 4) Vietnam exports to the US have continued to post strong growth year to date, particularly in segments that fall under the list of US tariffs towards China.

Thailand should benefit from the relocation of export oriented low-end tech to the US. Thailand ranks No. 21 among the US' top trade partners YTD. Electrical machinery, machinery and equipment, vehicles, rubber tires and printers account for a majority of the nonagricultural US imports from Thailand. With China imposing tariffs on the US auto sector, it may turn to Thailand for support. Thailand auto industry is the largest in SE Asia. Recently, Thailand has witnessed an increase in FDI inflows from China across industries.

Malaysia is a marginal winner of the potential supply shift amidst the US-China trade war. Malaysia's Central Bank is of the view that Malaysian exports in the near term will benefit from the trade war based on the substitution of China imports from the US, but may be affected if global growth is disrupted. US imports from Malaysia account for US$32.7bn in 10M18.

The auto industry and plantation sectors are potential beneficiaries. Malaysia auto industry is the third largest in Southeast Asia with more than 25 vehicle producers and over 800 component manufacturers. Local and foreign companies could increase output to support shipments to China. For plantations, we expect near-term negative for palm oil, a substitute for soybean, but longer-term structural positive on China's efforts to reduce reliance on soybean.

Despite the deferment of two large China infrastructure projects in Malaysia, the new Pakatan Harapan government is committed to attracting Chinese investments. There are ongoing investments into the Malaysia-China Kuantan Industrial Park (MCKIP - an industrial park in the East Coast of Malaysia), which is likely to see a pick-up in investments, though it is still in the early days to gauge the impact of a pick-up in China investments.

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Singapore can be a key beneficiary of increasing intraregional trade, but headwinds from overall trade slowdown remain. It is a preferred destination for value-add and high-tech supply chains. Singapore's financing and structuring expertise may also help it secure a big chunk of financing demand for projects within the region. Singapore may be a relatively comfortable source for financing for both Chinese and US conglomerates, looking to diversify supply chains.

Philippines: the automotive sector could potentially benefit from the trade war. The Philippines is pushing an automotive resurgence program where the government aims to develop the country as a regional automotive manufacturing hub.

We expect modest direct impact on the Philippines from the US-China trade war due to the Philippines' limited trade linkage. Should an escalation of the trade tension turn into something more permanent and lead to a diversification of supply chain, we think there will be small pockets of benefits for the Philippines.

Indonesia: Impact of major shifts in supply chains is near neutral. The cost effective wage structure, young and expanding workforce, albeit low-skilled make Indonesia more attractive for lower value added manufacturing activities. China FDI into Indonesia is US$3.4bn in 2017.

Areas of interest are hydropower plant development, facility to convert coal into dimethyl ether, smelter projects, airports and various other infrastructure projects. Indonesia, one of the largest producers of palm oil, should benefit as China seeks cheaper substitute of soy beans imports from the US. The government is also planning to tap more Chinese tourists.

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Global Equity Research
J.P. Morgan Perspectives
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J.P.Morgan

Global tech and the China challenge

- **China's focus on semiconductor technologies represents both threats and opportunities for the global semiconductor supply chain.**
- **The biggest threat to global semiconductor companies over the next five to10 years is in memory, low- to mid-end logic and analog and heterogeneous computing and acceleration.**
- **Less threat in general purpose compute and high-performance analog.**
- **Leading global semiconductor equipment companies to benefit from a multiyear investment cycle in China.**
- **IT companies, including Apple, plan to continue to invest in China, both in retail and R&D.**
- **US networking equipment hardware companies remains excluded from China, and vice versa.**
- **Software companies will stay out of China until IP is provided by China.**

Over the next 5-10 years, we expect China-based semiconductor companies to make the most progress, thus representing the biggest threat to global competitors in areas such as memory (DRAM and NAND), low- to mid-end logic and analog and newer applications in heterogeneous computing, including artificial intelligence and other accelerated workloads. We base our view on the types and amount of investments made in the past several years, including acquisitions and attempted acquisitions, and culminating in new factory buildouts in 2018 (especially in memory). We see comparatively less risk over the medium term for global suppliers of high-performance analog (HPA), general purpose high-end compute (CPU and GPU), and high-performance system-on-chip (SoC) technologies, where we expect China to represent more of an opportunity than a threat.

From an equipment perspective, with an expectation that over the next 5-10 years the industry will continue marching down the path of Moore's Law, with increasing complexity and where advanced manufacturing becomes even more challenging than it is today, we expect the current global market leaders will remain the leaders in the future. As such, we do not expect domestic China equipment suppliers to become a meaningful threat over the medium term. Conversely, as China aims to close the gap with global manufacturers, especially in areas such as Memory, we expect the current leading semiconductor equipment companies to benefit from a multiyear investment cycle.

China remains a key market for IT hardware companies. IT hardware companies, including Apple, continue to see China as an important market relative to its contribution to global demand, despite the recent slowdown in both macro as well as IT hardware demand. IT hardware companies, including Apple, plan to invest in both the retail channel, to better leverage consumer demand, as well as in R&D and local manufacturing, to further enhance their positioning in the domestic market. Examples include Apple's decision to buildout roughly 50 Apple storefronts in China as well as its plans to invest $500mn in R&D and $30mn in renewable energy for its facilities in China. We continue to expect China to remain a critical part of earnings and investments for IT hardware companies in 2019.

US networking equipment hardware companies have been systematically excluded from China. China remains a largely protected market against international networking equipment suppliers despite the absence of any direct regulations to prevent their entry into the marketplace. Much like how Chinese domestic suppliers, such as Huawei and ZTE, continue to be excluded from the US market, the same is largely true for US companies in China.

IP protection has been the major hurdle to the software market in China. The majority of software companies report negligible revenue contribution coming from China as IP protection has not made the market a viable opportunity in the past. In fact, companies like Adobe and Autodesk have seen their products pirated extensively on a global basis and in particular in the Far East. So changes that help provide true IP protection would likely create much heavier investment in terms of both R&D and marketing to drive the evolution of software in China.

Market classifications have made investment and ownership more difficult. The other hurdle has been the number of software companies whose products have been characterized more as telecommunications, which has a much more restrictive ownership structure requirement that makes it too difficult for many outside investors to build software companies in China. We have seen more limited R&D investments as compared to countries like India or Israel. There are some exceptions like Mentor Graphics (which was acquired by Siemens). But given the technology talent in country this could be a significant opportunity under the right circumstances.

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Global automobiles

- **Chinese economic weakness creates downside risk to H1 demand for this year. If demand is weaker, then we would be more fearful of a price war to maintain market shares than of simply reduced volumes.**
- **Chinese capacity utilization at ~60% is much worse than in Europe or the US which are near historical means.**
- **Electrified vehicles market share to rise to ~30% by 2025 and 60% by 2030. Within EVs, Battery EVs to have 9% overall share in 2025 and 20% in 2030.**
- **Within our coverage BMW and Daimler are the most exposed to any additional tariffs implemented on exports from the US into China.**

The overall slowdown in Chinese car sales over the second half of FY18 has been weighing on the global autos sector as China represents 10-30% of EPS across most of the Global OEMs and, in some instances, contributes to generous dividend payments that support the strong FCF of the Global OEMs. After a difficult end-FY18, we take a constructive view for FY19, forecasting 1% sales growth for the Chinese car market, which should become more obvious towards March/April FY19 supported by 1) a higher share of financing across the auto market, and 2) continued demand growth in China's tier 3 and 4 cities. We would highlight, however, that our current forecast has built in no measures taken by the Chinese government to boost demand.

Global SAAR. We forecast FY19 global sales volume growth of 1.3% yoy, with Europe +1.3%, North America -1% and China +2% yoy combined with strong 10% yoy growth in Russia and +1% in South America (with strong growth in Brazil, +10%, negated by weak Argentina, -35%). We see healthy capacity utilization in Europe and North America at close to 80% (in line with historical average in Europe and slightly below historical average of 83% in NA). In china this is expected to fall below 60% in 2018.

China contraction? We see a risk that the Chinese car market could surprise investors with a more prolonged slowdown in demand before a pickup in demand towards H2FY19. In the case of a moderate downturn in demand (less than 5%), we would fear more the effects of a price war among OEMs to maintain pricing power than the impact of lower volumes. In this context, we would highlight that VW, GM, and the German premium OEMs are delivering higher margins than PSA and Ford, and are better positioned.

Global EV forecast. We expect electrified vehicles to achieve ~30% global market share by 2025 and ~60% by 2030. Within this, we expect BEVs to have 9% global market share by 2025 and 20% by 2030e, with China, Europe and North America showing higher share of electric vehicles. Plug-in hybrids will likely only reach 2.5% market share by 2025, declining to <2% by 2030, with Europe and North America likely supporting the technology.

Global ADAS adoption curve. Every global car should have at least one assisted driving feature by 2022. Of the total cars sold today globally, we believe only ~60% of vehicles will have some assisted driving features that conform to at least Level 0 standards by the end of 2019. **By 2025, we believe cars with Level 0/1 features will form ~80% of cars sold globally,** Level 2 could take up ~15%, L3 ~5% and L4/L5 ~1%. **By 2030, we think fully autonomous cars (L4/L5) can be ~5% of cars sold globally**, of which much is represented by L4 (however wide scale adoption has to go hand-in-hand with 5G network capabilities).

Relatively supportive end markets

We forecast FY19 global car sales growth of 1.3% yoy, Europe ex-Russia +1.3%, North America -0.8% and China +2%. We see upside in both South America and Russia, where we see respectively 1% and 10% growth in FY19 with both markets off in excess of 30% and 50% from peak levels in 2013 and 2008, respectively. We rely in the higher penetration of financial services in China to drive growth in FY19. With regards to Europe, we rely on Germany, France and Spain to be the growth engines over the coming year.

On FY18 volume assumptions we see **China clearly has the number one car market spot (30% of global sales)** followed by North America and Europe (~20% each), and then Latin America and Russia.

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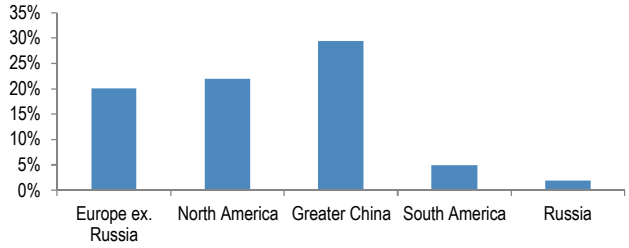
Figure 1: % volume contribution, FY18



Source: Company reports and J.P. Morgan estimates.

Where do we stand on peaks to troughs?

We see **about 4% volume upside** to peak levels in Europe driven mainly by Spain and Italy, where both markets are still in excess of 20% below peak levels. We believe there is significant upside potential in Russia, which is 50% off-peak levels, and South America at ~30%. By comparison, we expect relatively stable markets in North America and slight growth in China.

Table 1: Global growth potential Light vehicle sales

	FY18 Sales	Peak Sales	Year	Delta	FY18 yoy	JPMe FY19 yoy
Europe 39	18,976	19,752	2007	4%	0.6%	1.3%
France	2,647	2,688	2001	2%	4.0%	2.0%
Germany	3,816	4,007	2009	5%	2.6%	2.0%
United Kingdom	2,781	3,076	2016	11%	-4.5%	-1.0%
Spain	1,554	1,915	2005	23%	8.3%	4.0%
Italy	2,130	2,732	2007	28%	-1.7%	2.0%
Russia	1,862	2,956	2008	59%	16.6%	10.0%
Latam	4,696	5,963	2013	27%	7.2%	1.2%
North America	20,579	21,084	2016	2.0%	-1.1%	-0.8%
China	27,675	27,940	2017	1.0%	-0.9%	2.0%
World	**94,873**	**94,873**	**2018**	**0.0%**	**0.7%**	**1.3%**

Source: J.P. Morgan estimates, Company data

Table 2: Global Light Vehicle (units) forecasts

(in '000s)	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18e	FY19e	FY20e
Europe	16,975	16,556	16,645	15,297	15,186	15,800	17,286	18,394	18,976	19,083	19,334	19,683
Russia	1,469	1,907	2,682	2,944	2,790	2,498	1,608	1,428	1,597	1,862	2,048	2,150
Greater China	13,254	17,321	17,994	18,996	21,794	23,573	24,911	28,037	28,422	28,157	28,716	29,286
Japan/Korea	5,983	6,418	5,685	6,793	6,769	7,087	6,750	6,636	6,879	6,888	6,689	6,431
ME/Africa	4,337	5,004	5,047	4,820	4,790	5,269	4,990	4,784	4,680	4,639	4,656	5,117
North America	12,673	13,986	15,275	17,128	18,399	19,485	20,725	21,084	20,798	20,579	20,421	20,427
South America	4,350	5,138	5,605	5,887	5,963	5,411	4,395	3,911	4,381	4,696	4,753	4,966
South Asia	4,973	6,369	6,764	7,754	7,791	7,431	7,616	7,953	8,464	8,968	9,512	9,909
Total	**64,015**	**72,699**	**75,697**	**79,618**	**83,483**	**86,553**	**88,282**	**92,227**	**94,197**	**94,873**	**96,131**	**97,853**

YOY change	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18e	FY19e	FY20e
Europe	-7.0%	-2.5%	0.5%	-8.1%	-0.7%	4.0%	9.4%	6.4%	3.2%	0.6%	1.3%	1.3%
Russia	-50.3%	29.8%	40.7%	9.7%	-5.2%	-10.5%	-35.6%	-11.2%	11.8%	16.6%	10.0%	5.0%
Greater China	49.7%	30.7%	3.9%	5.6%	14.7%	8.2%	5.7%	12.5%	1.4%	-0.9%	2.0%	2.0%
Japan/Korea	-2.8%	7.3%	-11.4%	19.5%	-0.4%	4.7%	-4.8%	-1.7%	3.7%	0.1%	-2.9%	-3.9%
ME/Africa	-5.8%	15.4%	0.9%	-4.5%	-2.2%	10.5%	-5.0%	-3.6%	-2.2%	-0.9%	0.4%	9.9%
North America	-20.7%	10.4%	9.2%	12.1%	7.4%	5.9%	6.4%	1.7%	-1.4%	-1.1%	-0.8%	0.0%
South America	-2.2%	18.1%	9.1%	5.0%	1.2%	-9.5%	-18.5%	-10.9%	12.0%	7.2%	1.2%	4.5%
South Asia	0.4%	28.1%	6.2%	14.6%	0.5%	-4.6%	2.5%	4.5%	6.4%	6.0%	6.1%	4.2%
Total	**-3.3%**	**13.6%**	**4.1%**	**5.2%**	**4.7%**	**3.7%**	**2.0%**	**4.5%**	**2.1%**	**0.7%**	**1.3%**	**1.8%**

Source: Historical figures from IHS Automotive, J.P. Morgan estimates

Capacity utilization across regions

All in all, globally we see capacity utilization in Europe and North America at close to 80% (in line with historical average in Europe and slightly below historical average of 83% in North America). In South America, we expect capacity utilization to pick up with market growth in the coming years (~66% by 2020 versus historical average of 71% and 81% in 2013). In China, falling capacity utilization is a function of ongoing capacity additions outpacing demand growth expectations in the region.

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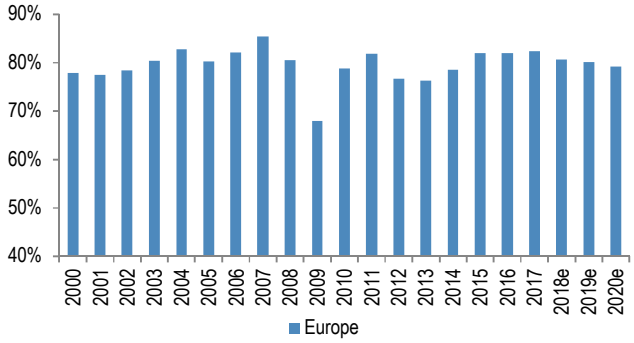
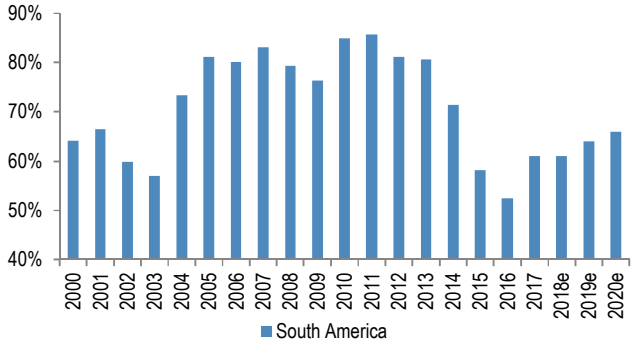
Figure 2: Europe % capacity utilization



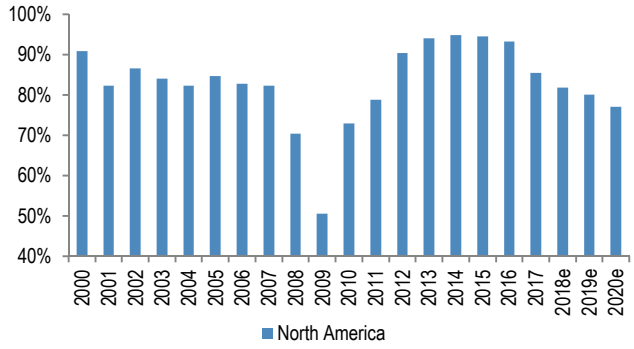
Source: J.P. Morgan estimates & I H S

Figure 3: SA % capacity utilization



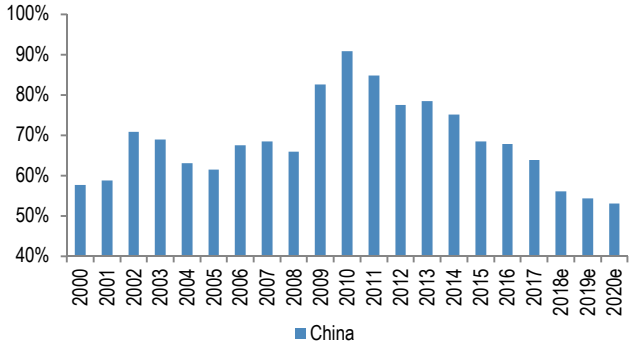
Source: J.P. Morgan estimates & I H S

Figure 4: North America % capacity utilization



Source: J.P. Morgan estimates & I H S

Figure 5: China % capacity utilization



Source: J.P. Morgan estimates & I H S

Global OEM financials

J.P. Morgan's 2018 EBIT margin forecasts for most global OEMs are close to their cycle peaks. BMW and Daimler are exceptions as they face (WLTP, China-US trade and quality recalls) one-offs in 2018. VW, PSA, Renault and FCA are all delivering healthy margins. GM and Ford have seen a stable market and strong pricing power in an overall healthy environment in the US. Within the Asian OEMs, Nissan is struggling with need for a makeover in North America and sluggish demand in China. The picture is mixed for the local Chinese OEMs.

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Table 3: Global OEM % EBIT margins

%	2010	2011	2012	2013	2014	2015	2016	2017	2018e	2019e	2020e
BMW	8.4%	11.7%	10.8%	10.5%	11.3%	10.4%	10.0%	10.0%	9.5%	9.9%	10.1%
Daimler	7.4%	8.2%	7.5%	9.2%	8.3%	8.8%	8.4%	8.1%	6.8%	7.7%	7.7%
VW	5.6%	7.1%	6.0%	5.9%	6.3%	-1.9%	3.3%	6.0%	6.0%	7.2%	7.4%
FCA*	3.1%	5.8%	4.4%	3.4%	3.4%	2.4%	4.6%	6.9%			
PSA	3.2%	2.2%	-1.0%	-0.3%	1.7%	5.0%	6.0%	6.1%	8.1%	8.8%	9.3%
Renault	1.6%	2.9%	0.3%	-0.1%	2.7%	4.7%	6.4%	6.5%	6.4%	6.6%	6.6%
General Motors	3.7%	4.1%	3.7%	4.3%	2.4%	5.3%	5.9%	6.9%	4.8%	6.8%	7.2%
Ford	5.6%	4.8%	4.4%	4.1%	2.0%	4.8%	4.5%	2.0%	3.9%	4.9%	5.9%
Toyota	2.5%	1.9%	6.0%	8.9%	10.1%	10.0%	7.2%	8.2%	8.4%	8.9%	9.7%
Nissan	6.1%	5.8%	5.4%	4.8%	5.2%	6.5%	6.3%	4.8%	4.4%	4.4%	4.7%
Honda	6.4%	2.9%	5.5%	6.6%	5.0%	3.4%	6.0%	5.4%	5.3%	5.6%	5.9%
Hyundai	8.8%	10.3%	10.0%	9.5%	8.5%	6.9%	5.5%	4.7%	3.1%	4.7%	5.1%
Kia	6.6%	8.1%	7.5%	6.7%	5.5%	4.8%	4.7%	1.2%	2.2%	3.4%	3.8%
GWM	12.9%	13.3%	15.4%	17.0%	14.8%	12.2%	12.4%	5.8%	6.4%	7.0%	7.6%
Geely	10.7%	11.5%	11.2%	11.7%	8.9%	9.1%	11.6%	13.8%	14.3%	13.9%	14.1%
BYD	7.3%	5.3%	2.7%	3.8%	4.3%	7.2%	8.9%	8.0%	5.4%	6.1%	5.9%
BAIC		-32.3%	4.3%	-18.9%	2.5%	5.3%	9.9%	13.1%	15.2%	15.2%	15.3%

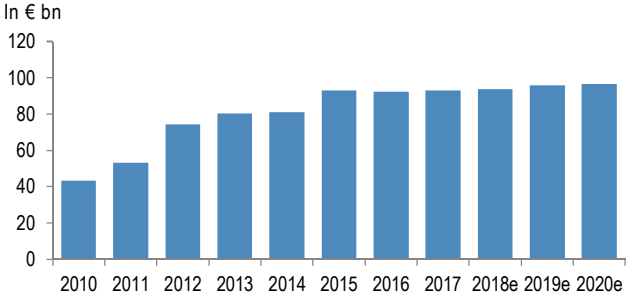
Source: Company data, J.P. Morgan Global Automotive estimates.*restricted on Marelli transaction

Table 4: Global OEM % pre-tax margins

%	2010	2011	2012	2013	2014	2015	2016	2017	2018e	2019e	2020e
BMW	8.0%	10.7%	10.2%	10.4%	10.7%	10.0%	10.3%	10.8%	10.3%	10.6%	10.8%
Daimler	6.8%	7.9%	6.8%	8.6%	7.8%	8.5%	8.2%	7.9%	6.6%	7.4%	7.4%
VW	7.1%	11.9%	13.2%	6.3%	7.3%	-0.6%	3.4%	6.2%	6.6%	7.9%	8.1%
FCA	2.0%	3.7%	2.4%	1.2%	1.2%	0.2%	2.8%	5.6%	5.3%	5.8%	7.2%
PSA	2.4%	1.0%	-9.5%	-3.8%	-1.0%	2.5%	4.3%	4.4%	6.5%	8.3%	8.8%
Renault	9.1%	6.2%	5.5%	2.8%	5.2%	7.2%	9.0%	10.4%	9.0%	9.2%	9.2%
General Motors	3.9%	4.4%	4.1%	4.4%	2.7%	5.5%	5.9%	7.2%	5.9%	6.6%	6.9%
Ford	7.5%	6.8%	6.3%	6.1%	4.6%	7.7%	7.3%	5.8%	2.9%	3.9%	4.8%
Toyota	3.0%	2.3%	6.4%	9.5%	10.6%	10.5%	7.9%	8.9%	9.2%	9.8%	10.5%
Nissan	5.5%	5.6%	5.4%	5.1%	6.0%	6.0%	8.2%	5.9%	5.9%	6.0%	6.4%
Honda	7.1%	3.2%	4.9%	7.5%	6.0%	4.4%	7.2%	7.3%	6.9%	7.2%	7.6%
Hyundai	11.2%	13.4%	13.7%	13.4%	11.1%	9.2%	7.8%	4.6%	4.0%	6.5%	6.9%
Kia	9.3%	10.9%	10.9%	10.1%	8.1%	6.3%	6.5%	2.1%	3.6%	5.4%	5.8%
GWM	13.2%	13.7%	15.9%	17.5%	15.4%	12.7%	12.7%	6.2%	6.8%	7.4%	8.0%
Geely	9.5%	10.4%	10.3%	11.5%	8.9%	9.5%	11.5%	13.8%	14.8%	14.8%	16.0%
BYD	6.7%	3.7%	0.7%	1.7%	1.6%	4.9%	6.6%	5.5%	3.7%	4.8%	4.7%
BAIC		145.3%	107.5%	24.5%	11.9%	9.9%	13.1%	12.7%	15.4%	15.6%	15.9%

Source: Company data, J.P. Morgan estimates.

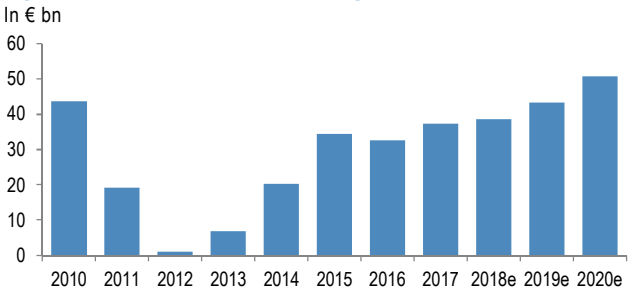
Figure 6: Global OEM total capex



Source: Company data, J.P. Morgan estimates.

Despite an elevated capex cycle with ongoing investments in the megatrends of electrification, automation, digital/connected and shared services, combined FCF generation has improved with the total figure standing at ~€40bn in 2017. Thus, we expect continued solid FCF generation from a steady global SAAR environment.

Figure 7: Global OEM combined FCF generation



Source: Company data, J.P. Morgan estimates.

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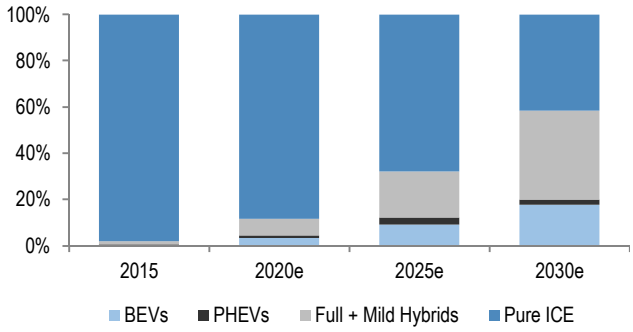
J.P. Morgan Global EV forecasts

Key takes: a) we forecast BEV to take 3% share in FY20 globally and 9% by 2025 b) we forecast mild hybrids to take 23% share in Europe by FY20 the highest share when compared with other regions c) ICE technology will prevail up to 2030 albeit with a declining share from 88% in FY20 to 42% by FY30.

Global powertrain forecasts

We expect electrified vehicles to achieve ~30% global market share by 2025 and ~60% by 2030. Within this, we expect BEVs to have 9% global market share by 2025 and 20% by 2030e, with China, Europe and North America showing higher share of electric vehicles. Plug-in hybrids will likely only reach 2.5% market share by 2025, declining to <2% by 2030, with Europe and North America likely supporting the technology. We believe full/mild-hybrids will reach 20% market share by 2025 and 60% by 2030 mainly on higher penetration of 48V in Europe and North America as regulations on CO2 emission/fuel efficiency get even tougher post 2020. We expect carmakers to stop developing pure ICE engines in the next five years in light of growing pressure from governments. Full hybrid levels are supported by Toyota shifting to a full electric fleet by 2025. This leaves pure ICE vehicles having ~70% market share in 2025 and ~40% in 2030 with most of this in emerging markets.

Figure 8: J.P. Morgan powertrain forecasts

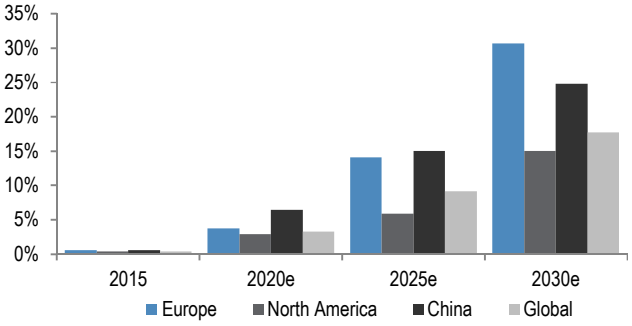


Source: J.P. Morgan estimates.

Battery electric vehicles (BEVs)

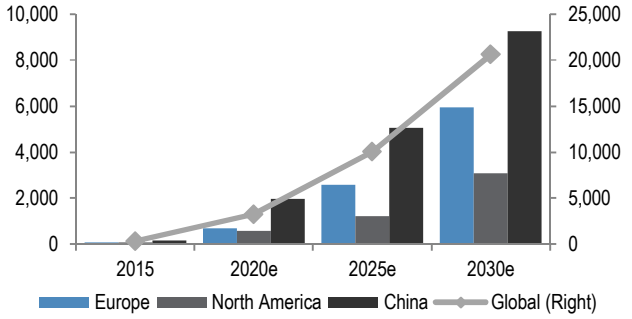
We expect the market share of BEVs in Europe and China to start picking up driven mainly by strict emission regulations in Europe and the need to meet NEV credit requirements in China. In Europe, all carmakers are ready with a series of product launches in 2019/2020 to meet the 95g CO2/km target in 2020/21. In China there is now a significant focus on electric after the government relaxed 2018 requirements and called for 10% and 12% NEV credits in 2019 and 2020 respectively. OEMs have planned many electrified variants starting 2020 mainly. Co2 emissions are not an issue in China (especially for foreign OEMs) as the 2020 target is 117g of Co2/km—a level which was already reached in Europe in 2017. The US and China have a 97g and 93g target respectively out in 2025. Given the relatively relaxed regulatory requirements in the US, we expect a low BEV penetration in 2025. The segment should pick up speed post 2025, with the onset of second generation of BEVs and probable cost parity with an ICE equivalent.

Figure 9: Battery Electric Vehicles: Market Share



Source: J.P. Morgan estimates.

Figure 10: Battery Electric Vehicles: Volumes (000s)



Source: J.P. Morgan estimates.

Plug-in hybrids

Despite costing less than BEVs, we find that plug-in hybrids are not proving very popular in Europe or North America with the European market share for plug-ins being only in line for BEVs while being lower in North America. As battery costs fall and national and city governments offer lower incentives for plug-ins, we believe consumers will prefer to migrate directly to BEVs rather than going for the intermediate step of plug-ins. In China, we are already seeing the pace of PHEV growth slowing as the government reduces incentives. Once the NEV credit system is introduced in 2018, we believe some

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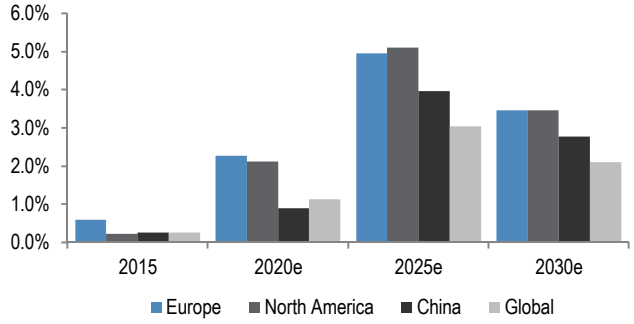
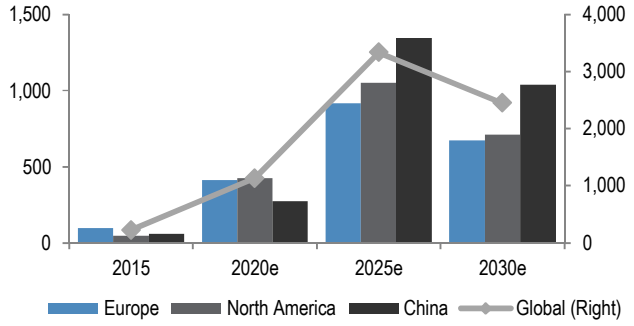
OEMs will launch additional PHEV models in order to fulfill their credits. However, from 2025 onwards, we believe that lower battery costs and longer ranges will make BEVs more popular than PHEVs, hence, continuing to be a **bridge technology.**

Figure 11: Plug-in hybrid vehicles: market share



Source: J.P. Morgan estimates.

Figure 12: Plug-in hybrid vehicles: volumes (000s)

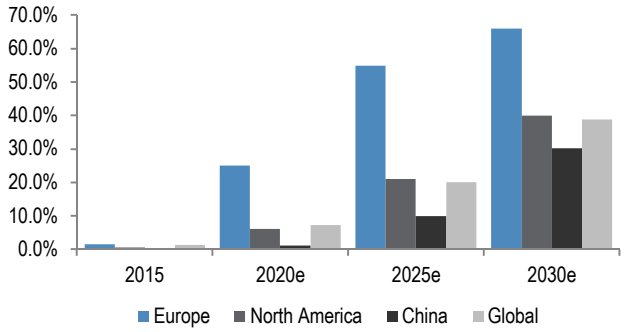


Source: J.P. Morgan estimates.

Full/Mild-hybrids

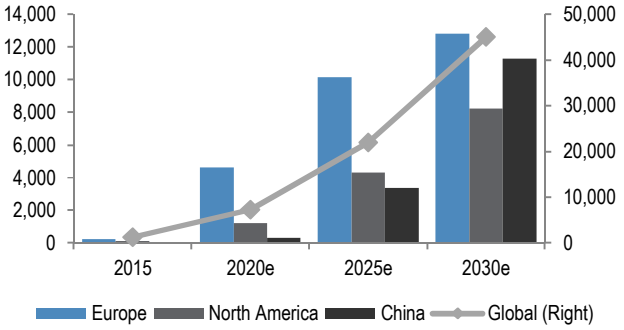
We believe that OEMs are set to introduce **mild hybrid technologies** like 48V into vehicles in order to meet the strict CO2/fuel-efficiency regulations in markets like Europe and the US. For example, Audi has decided to equip the new A8 with a 48V mild-hybrid system as standard, while Volvo and Jaguar having also committed to an electrified powertrain with at least a mild-hybrid system in all its vehicles sold after 2019. The PSA Group has said that every car model will have an electrified option from 2025. In China, penetration of the 48V technology will depend on how strict the post-2020 fuel efficiency targets are. If they are very strict, we will likely see accelerated implementation of 48V mild-hybrid systems. Otherwise, carmakers do not have incentives (or do not get NEV credits) for selling mild/full hybrids. In our forecast, **full hybrid technology** assumptions are primarily driven by Toyota's assumptions of going fully electric by 2025.

Figure 13: Full/Mild hybrid vehicles: market share



Source: J.P. Morgan estimates.

Figure 14: Full/Mild hybrid vehicles: volumes (000s)

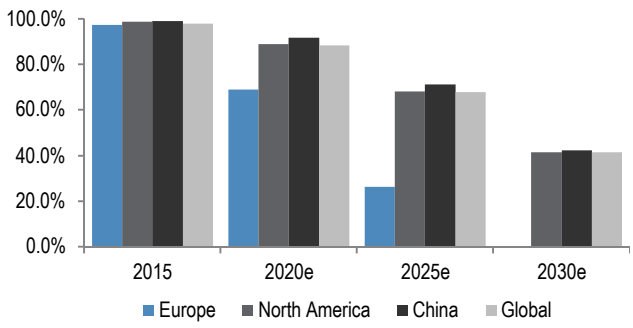


Source: [source for historical data?] J.P. Morgan estimates.

Pure internal combustion engines decline…

Based on our forecasts, we believe that volumes of cars with **only ICEs** (i.e., zero electrification technology) will start to decline after 2020. Pure ICEs will likely only be prevalent in emerging markets like Brazil, China, Russia, India, etc. We assume a ~70% global level in 2025 and ~40% by 2030.

Figure 15: Pure ICEs: Market Share



Source: J.P. Morgan estimates.

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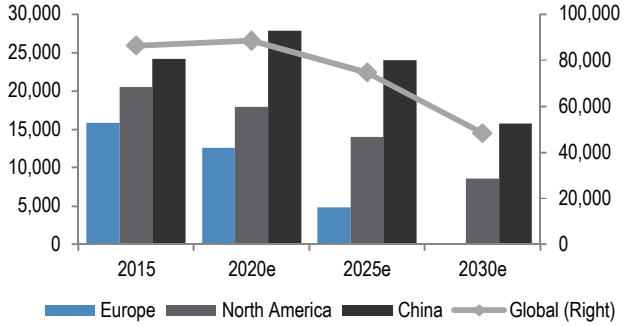
Figure 16: Pure ICEs: volumes (000s)

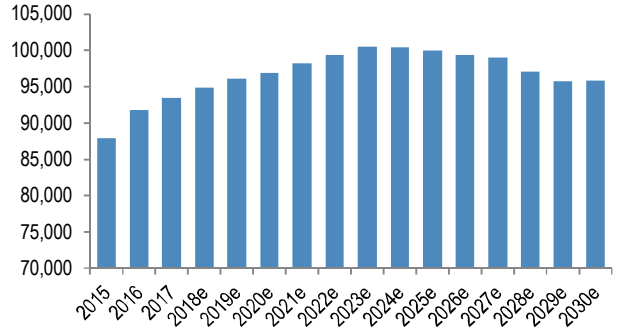


Source: J.P. Morgan estimates.

… But mild-hybrids will keep combustion engine technology alive

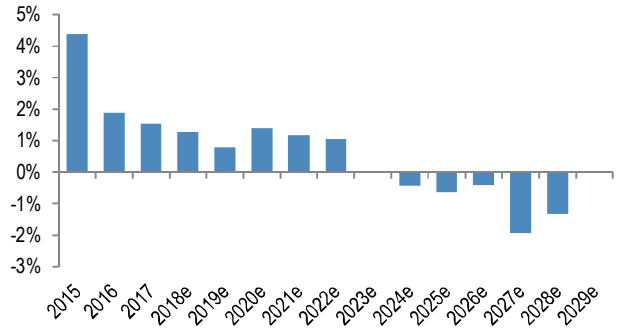
However, looking at the overall demand for combustion engines globally (pure ICEs + hybrids), we find that combustion engines will remain a growing business until 2024, and start to decline slowly thereafter, largely due to a greater BEV push in Europe, and China—finally flowing to the US.

Figure 17: Combustion engine volumes (pure ICEs + hybrids) in 000s



Source: J.P. Morgan estimates.

Figure 18: Combustion engine volumes (pure ICEs + hybrids) growth rate



Source: J.P. Morgan estimates.

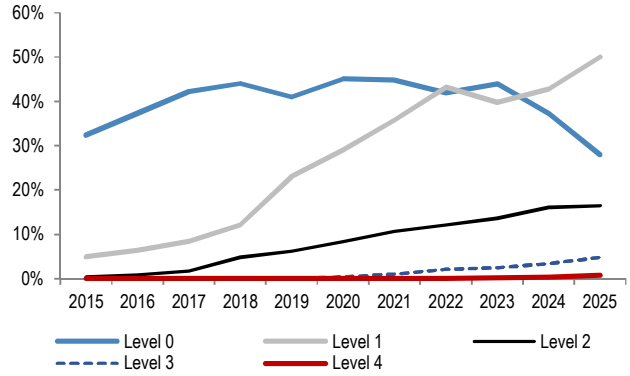
Automated Driving Assistance Systems

Automated Driving Assistance Systems (ADAS) technology can increasingly be found in modern cars and auto suppliers highlight this trend as a key driver of future revenue growth. **Our analysis shows that the ADAS market can expand at >15% CAGR until 2025, reaching a total size of ~€35bn (versus ~€11bn in 2017). At present, European suppliers like Valeo, Continental and Bosch each generate >€1bn revenues from ADAS and hold ~47% of global market share.**

- **ADAS market: >15% CAGR till 2025:** From ADAS-related technologies, we believe the overall revenue opportunity will rise from more than ~€11bn in 2017 to ~€35bn by 2025 and ~€145bn by 2040, implying a 2016-25 revenue CAGR of >15%. We expect ~65% of the market to be made up of sensors (including LiDAR and ~55% ex. LiDAR), Software (~25%) and Control Units (~10%).
- **Revenue pie of ADAS ecosystem:** We think auto suppliers will be major players in the **market for ADAS Hardware (sensors and control units)**, which represent a total market opportunity of ~€7.5bn in 2017, rising to ~€26bn by 2025 (>60% from short-range and mid-range radars). When it comes to **ADAS Software**, we believe the pie could be shared between auto suppliers, OEMs (in-house development) and third-parties (Silicon Valley) and it represents a market opportunity of ~€9bn by 2025 (from ~€3.5bn in 2017).
- **ADAS content opportunity on different levels of autonomy:** In terms of content costs, we estimate sensors supporting level 0 functionalities at ~€120, while the cost of level 1, 2 and 3 hardware at ~€280, €450 and €1,800 respectively on current market prices. Beyond level 3, the hardware content increases significantly and we expect the price tag to be ~€6,000 for L4/L5. The big delta comes from LiDAR, where one unit of solid state LiDAR is expected to cost ~$1k by 2020/21.
- **ADAS adoption curve—every global car should have at least one assisted driving feature by 2022:** Of the total cars sold today globally, we believe only ~60% of vehicles will have some assisted driving features that conform to at least Level 0 standards by the end of 2018. We may have to wait until 2022/23 for all cars globally to have at least one driving assistance feature. By 2025, we believe cars with Level 0/1 features will form ~80% of cars sold globally, Level 2 could take up ~15%, Level 3 ~5%

and L4/L5 ~1%. By 2030, we think fully autonomous cars (L4/L5) can be ~5% of cars sold globally; of which much is represented by Level 4 (however, wide scale adoption has to go hand-in-hand with 5G network capabilities).

Figure 19: ADAS penetration by 2025



Source: J.P. Morgan estimates.

China – US trade wars

The latest developments suggest China and the US could be working through a trade agreement avoiding a trade conflict. This would be beneficial for the German OEMs, namely BMW and Daimler, which are key exporters from the US into China avoiding a 40% import duty from FY19.

Specifics

Within our coverage **BMW and Daimler are the most exposed** to additional tariffs implemented on exports from the US into China. Post the localization of the X3, BMW is expected to export ~100k vehicles/year across the X4, X5, X6, and X7 SUVs. Daimler ships the GLE and GLS SUVs from its Alabama plant in the US into China, with expected volumes of ~60k/year. With the escalation of tensions between US and China, import tariffs on cars imported into China from the US have been increased from 25% to 40%. However, on the retail level both these carmakers have increased prices by only 7%, taking a 4% hit on pricing (received by them). On the other hand, China has stepped up trade efforts with Europe and has reduced import tariffs from the region from 25% to 15%. At the retail level, this has led to 8% lower prices. Overall, we have a 15% differential in prices at the retail level (between German high-end SUVs and luxury SUVs from Audi, Porsche, JLR and Volvo).

EU-US trade relations

All in all, the most recent developments suggest EU car makers should be able to strike a deal with the US government to localize either more car production or component production in North America in order to avoid an increase in import tariffs between the EU and US. We think, in any case, that in some instances (BMW, Daimler and Volkswagen) it was just a question of time before they increased the vertical integration of the business in a region where the demand clearly justifies the installed capacity.

Latest potential action plan:

- **VW looking to add more capacity in North America:** Herbert Diess, CEO of VW, mentioned he could consider making use of Ford idle capacity in North America to produce VW and Audi branded vehicles. We think this would be possible in the sedan segment and unlikely across the SUV or pick-up truck segment.
- **BMW:** BMW may build a second factory in the US that would make powertrains and supplement its SUV factory in Spartanburg, South Carolina, which is its biggest worldwide. It plans to invest €600m ($680m) in the plant by 2021 and create 1,000 jobs.
- **Daimler:** the group is already present across the US, Mexico and Canada building cars and trucks. We suspect the firm could commit to additional sedan production in the US including valuable battery production for its electrification strategy.

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Commercial aerospace

- **China intends to become an aircraft OEM, first to satisfy domestic demand and ultimately as a global supplier.**
- **Progress toward this goal has been and should remain an exceptionally slow process.**
- **Thoughts about eventual Chinese competition may be part of Boeing's vertical integration and aftermarket strategies.**

China plans to become an aircraft OEM though the process has been painful

China has explicitly stated its desire to be a commercial aircraft OEM and aims to supply > 10% of the domestic market by 2025. The country has recently invested in two indigenous aircraft platforms: the ARJ21 regional-jet and the C919, a single-aisle, mainline jet. The ARJ21 was a disappointment and the jury is still out on the C919, but we believe China's resources, technical capabilities, and determination mean it can eventually compete with Boeing and Airbus, though it will take a long time.

Development of the ARJ21 began in 2002 with the intent to compete with regional jets from Bombardier and Embraer. Delays pushed back the development timeline several years and although China's Aviation Administration (CAAC) certified the aircraft in 2012, it did not enter service until 2016. Today, it appears the ARJ21 is operated by one Chinese airline and we count just 14 units in service.

Plans to produce the Comac C919, a competitor to the 737 and A320 families, were first announced in 2008 and the timeline called for first flight in 2014. This was eventually pushed back to 2017. First delivery is now planned for 2021 (with lingering risk to the schedule), and Comac has booked >300 orders from Chinese customers plus ~650 letters of intent. While the C919 could eventually be successful, development has not been especially smooth and there is little indication of demand outside China.

Table 1: Chinese Indigenous Aircrafts

	ARJ21	C919
In Service	14	0
On Order	237	305
LOI to Order	351	653

Source: Ascend.

China's challenges in commercial aerospace stand in sharp contrast to its success in other industries and to some degree in military aerospace as well. One difference may be that China has never played a major role in the global aerospace supply chain, moving more directly toward becoming an OEM and integrator. In fact, Chinese aircraft like the C919 rely on western suppliers, such as GE (engines), Rockwell Collins (avionics), Honeywell (control systems), and others. This is a flipped script from how China has successfully grown its technology sector, where the country established itself as a low-cost supplier and then moved up the value chain. One notable challenge in Aerospace is the certification process, which applies not only to the finished product, but also to its component parts.

Another consideration for China's aircraft manufacturing plans is that incumbents have significant advantages. Boeing and Airbus have deep relationships with major global carriers and there is a high bar for these carriers to invest in unproven products. Moreover, adding complexity to a fleet of aircraft (i.e., new types of planes) can increase maintenance costs and this is a particular consideration for Low Cost Carriers (LCCs), where the business model typically revolves around a single fleet type. As a result, it should be more difficult for a Chinese aircraft to break in with LCCs, which account for ~45% of deliveries in the single-aisle market (i.e., the C919 market). Of course, Chinese airlines' support for a Chinese aircraft is still meaningful, given that China is and will remain the world's most important single-country market for new aircrafts, based on its size and growth rate.

Chinese ambitions may play a role in Boeing's Services push

Boeing's latest push to revamp the company has been in expanding its Services business and becoming more vertically integrated. We believe that Boeing aims to capitalize on its installed base of >10,000 passenger jets to generate a stream of revenue that does not rely on new aircraft deliveries. So far, Boeing has stood up business units or entered into partnerships with suppliers in key areas that include avionics, actuation systems, APUs and seats. Boeing is also offering services to airlines that include digital solutions, airline analytics, and training.

This push may be due, in part, to a long-term view that Boeing will have another competitor for new aircraft sales (i.e., China), one that is willing to sacrifice profitability for market share. By establishing a large Services business today, Boeing is positioning itself for a long-term future where the company is less reliant on OE profits.

Boeing is targeting $50bn in annual sales for its Global Services segment versus ~$16bn in 2018. Through 9M18,

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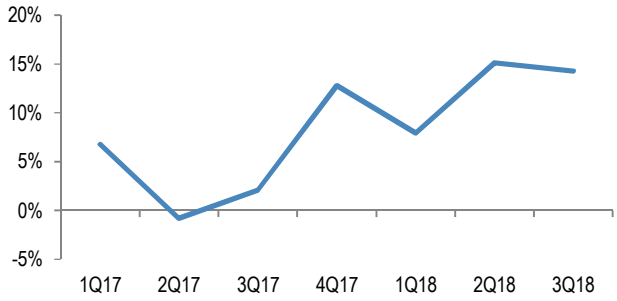
the Commercial Services business has grown ~30% y/y vs underlying market growth of ~6% (as measured by ASMs). The Global Services segment at Boeing is 60% Commercial with Military contributing the other 40%.

Figure 1: Boeing Global Services Quarterly Growth



Source: Company Reports and J.P. Morgan calculations.

Boeing has made some incremental progress but it can make bigger strides when it launches new aircraft programs and can assign new content to itself and push for new aftermarket arrangements with suppliers. This is one consideration behind the mid-size NMA program, for which we expect a launch this year.

China and Russia plan to collaborate on the widebody C929

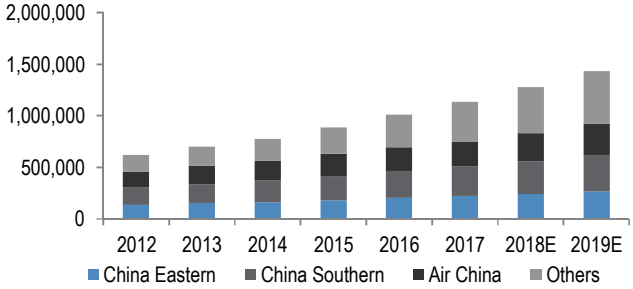
A China-Russia joint venture aims to challenge Boeing and Airbus' dominance in the widebody market with a C929 family of jets. *Reuters* reported that the C929 aims to capture ~10% of the global widebody market and the aircraft is sized to compete with the 787 and A350 families. However, the program is in its early stages, with a target to deliver in the late 2020s, assuming no delays.

Russia has a long history of aircraft production, for both commercial and military use. In this sense, the partnership appears to be a good fit, with China bringing its economic and financial firepower while Russia contributes its expertise, and the two nations may be motivated to counter western rivals. However, we believe Russia is likely wary of China's ambition and will seek to protect its intellectual property at every turn. Also, the geopolitical aims of the two countries may not always be in tune. While the role of western suppliers on the C929 is unclear, they may be important for the viability of the program and that may present a major challenge.

Meanwhile, China still needs foreign aircrafts (?)

Boeing forecasts demand for more than 7,000 aircraft in China over the next 20 years, or ~20% of the global total. China currently comprises ~15% of the fleet of passenger aircraft but air traffic growth is above average and so the country's share will increase. A growing middle class underpins this demand, resulting in strong traffic growth that is expected to remain >10% in 2019. There is a long tail associated with new travelers' propensity to travel and so this trend has remained fairly resilient despite moderating economic growth.

Figure 2: Chinese Capacity Growth (ASKs, mn)



Source: Company Reports, CAAC and J.P. Morgan estimates.

Boeing and Airbus have each delivered >100 aircraft into China annually in recent years with fleets of ~1,700 aircraft for each OEM. China's importance as a customer has meant that both Boeing and Airbus now operate facilities in China though Boeing is mainly focusing on 737 interiors. The facilities are essentially a trade-off between supporting the local industry (an eventual competitor) and winning aircraft orders.

We believe that relations between Boeing and China remain healthy despite the ongoing trade dispute, with Beijing largely excluding commercial jets from retaliatory measures thus far. Aircraft are the leading US manufacturing export to China. With few open slots in Airbus' narrow-body backlog, we believe that Chinese capacity growth requires planes from Boeing, too. While we had concerns that China did not publicly announce a Boeing order in 2018, there were >200 orders placed by unannounced customers in Dec 2018 and these are often destined for China, though we cannot say for certain.

Ultimately, a more severe breakdown in US-China relations would likely affect the country's imports of Boeing aircraft and—given its reliance on western suppliers—perhaps its homegrown aircraft development efforts as well.

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Global Emerging Markets Research
J.P. Morgan Perspectives
31 January 2019

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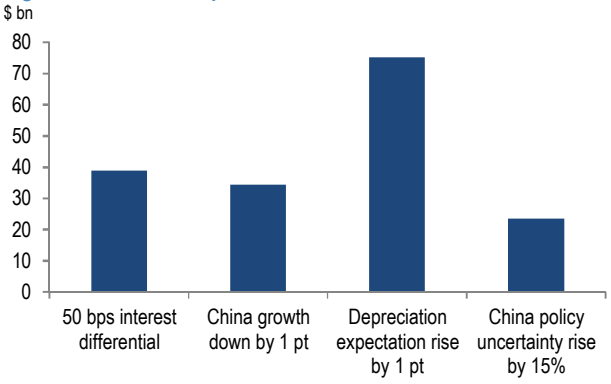
China capital flows and domestic investment style

- **Capital outflows remained subdued despite CNY depreciation pressure.**
- **Continuous market opening should attract foreign inflows, while residents' portfolio diversification should drive capital outflows once financial accounts liberalize.**
- **Both domestic retail and institutional investors favor fixed income and money market products, while exposure to equities remains low.**
- **Further market deregulation, transformation of the asset management industry, and opening to foreign investors should drive capital flow into onshore equities in coming years.**
- **Pension liberalization and increasing individual offshore investment will result in higher demand for professional wealth management services and shape up the asset management industry.**

Short-term drivers of capital outflows

Despite capital controls, we found that both fundamentals and sentiment are still key drivers of China's capital flows (see "China's capital flows: A tug-of-war" C. Wei Liao et al., 28 April 2017). Growth and interest differentials, policy uncertainties, and CNY depreciation expectations are all important drivers (Figure 1), while actual spot depreciation seems not to play a significant role in driving capital flows (see "China: Controlling CNY expectations via the CNH market" C. Wei Liao and A. Luk, 7 Dec. 2018).

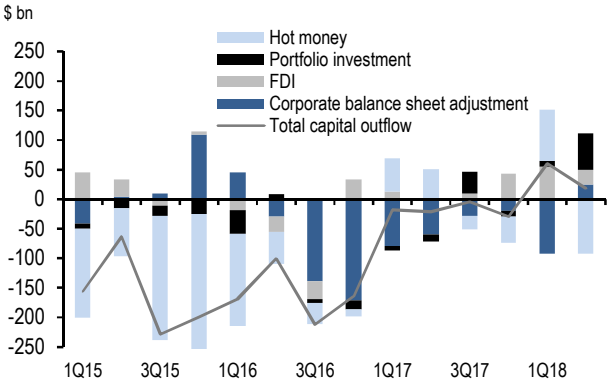
Figure 1: Drivers of capital outflows



Source: J.P. Morgan

CNY appreciated by 25% against the USD and by 50% in REER terms between July 2005 and August 2015, turning it from an undervalued currency into an overvalued one. Following the unexpected PBOC's exchange reform of August 2015, the CNY depreciation pressure intensified. CNY depreciation expectations, as captured by the difference between the USD/CNH 1-year forward rate and the spot rate, further intensified, prompting massive capital outflows. Net outflows peaked at $715bn in 2015, and remained high in 2016. Other investments, such as bank loans, trade credit, currency and deposits, as well as errors and omissions dominated the flows, reflecting corporates balance adjustment and capital flight (Figure 2).

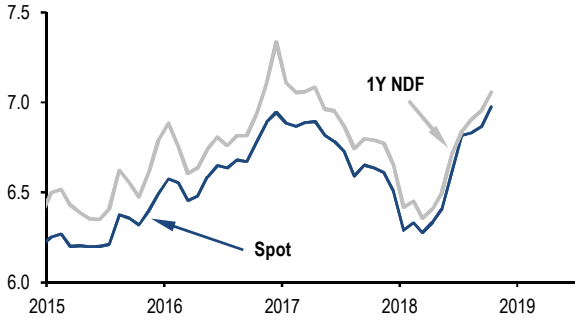
Figure 2: China capital flow breakdown



Source: SAFE

Different from 2015-2016, capital outflows remained surprisingly subdued despite the over 8% depreciation of the CNY. Depreciation pressure has mounted due to a narrowing China-US growth differential, easing monetary policy in response to a slowing economy, rising trade tensions, and China's narrowing current account surplus. But expectations for substantial depreciation did not build this last year (Figure 3), driven by either markets or by PBOC policies, which partially explains why capital outflows have been moderate this year compared to 2015-2016. Therefore, we expect **mild capital outflows in 2019, as long as expectations are well anchored**.

Figure 3: USD/CNY and 1-year non-deliverable forward rate



Source: Bloomberg, J.P. Morgan

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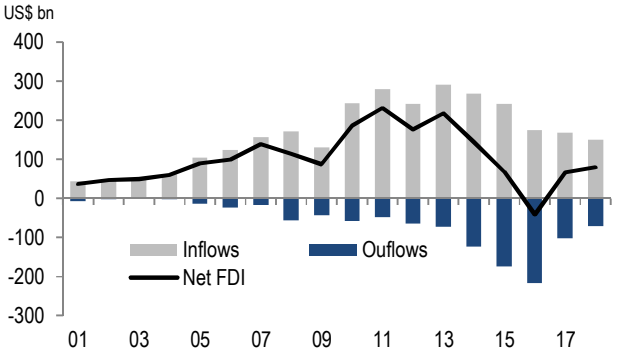
Long-run structural changes

The **composition of China's capital flows** has also evolved. **FDI** used to be the main contributor of financial account inflows (Figure 4), but its net flow turned negative for the first time in 2016, on the back of steadily declining FDI inflows and surging ODIs. Quarterly FDI net inflows averaged less than $10bn since 2016 against an average inflow around $50bn over 2010-2014. Inward FDI has troughed, but the trend is expected to recover only modestly due to shifting regional supply chains amid rising trade tensions. Since 2H16, tightened controls on outbound corporate FDI, particularly investments in real estate and non-core businesses of Chinese firms, materially slowed outbound direct investment (ODI) flows. However, ODI likely will continue to rise in the medium term as capital accounts open up further and Chinese companies continue to diversify their assets globally. Nevertheless, it is unlikely for net FDI inflows to return to the high level as in previous years.

Figure 4: FDI



Source: SAFE, J.P. Morgan

Similarly, the **portfolio investment account** has stabilized in recent quarters, with net inflows averaging around only $2.6bn since 2016. In the long run, while continuous opening of China's domestic financial market to foreigners will attract more inflows (Table 1), residents' portfolio diversification demand also will drive capital outflows once financial accounts liberalize.

Meanwhile, the errors and omissions have remained high (Figure 2), averaging nearly $46bn outflows per quarter since 2016. While other investments registered net inflows in 2017, the bulk of inflows likely came from corporate foreign borrowing, which is more sensitive to exchange rate and interest rate fluctuations.

Furthermore, the **current account** surplus is expected to continue to narrow, due to rising domestic costs, trade frictions, and China's policy to increase imports. We estimate that the current account could turn to a modest deficit as early as 2020. Thus, it is critical for China to attract more foreign capital to maintain a balanced external account and to prevent further falls in foreign reserves, especially given the persistent depreciation pressure on CNY amid a slowing economy and trade frictions.

Table 1: Access to onshore financial market

	QFII/RQFII	CIBM	Bond Connect	Stock Connect
Regulatory approvals	CSRC: QFII/RQFII license; SAFE: QFII quota	Pre-filing with PBOC	Pre-filing with PBOC	Northbound: no restriction.
Investment quota	Base quota	No specific quota restrictions.	No specific quota restrictions	Northbound quota at 52bn yuan daily
Eligible products	All cash bonds	All cash bonds and onshore interest rate derivatives	All cash bonds	Selected stocks
Custody arrangement	Domestic custody	Domestic custody	HKMA CMU	Transaction through eligible securities companies
Lock up period or repatriation restrictions	3 months, but no restriction on open-ended funds	No restriction	No restriction	No restriction.

Sources: PBOC, HKEX, J.P. Morgan

Investment style of domestic investors

The Chinese onshore financial markets are becoming more internationalized and institutionalized following a series of reform measures over the past few decades. The **Split-Share Structural Reform** carried out in 2005-2007, that allowed stakeholders of state-owned enterprises to convert their non-tradable A shares to publicly tradable shares, was one of the major revolutions. The program helped resolve the issue of ownership concentration of SOEs, improved corporate operating efficiency and governance, and enhanced equity market liquidity. This paved the way for a rapid development of the China financial markets in the last few years, and provided a unique investment opportunity for domestic and foreign investors.

We take a closer look on how domestic investors are investing in China onshore markets and the growth potential. Current data show that both the domestic retailers and institutional investors have a **defensive bias** and **favor fixed income and money market instruments,** while their exposure to equities is still low. Policy missteps (e.g., the margin financing crackdown in 2015 and the introduction of the circuit breaker in 2016),

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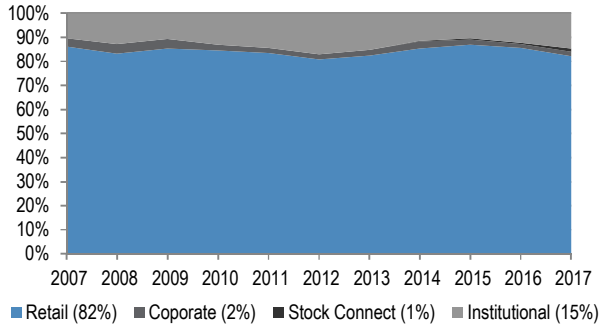
regulatory headwinds on the wealth management industry, and the bumpy equity market performance over the past few years have hit investors' confidence on A shares significantly. We believe a more mature regulatory system, a larger investable universe (e.g., listing of CDR and innovation enterprises), the transformation of the asset management industry, along with the further opening to overseas investors will drive steady capital flows into the China equity markets in coming years.

Domestic retail investors

China onshore equity markets are highly driven by retail investors despite the increasing participation of the institutional and foreign investors. Domestic individuals represent c.70% of the total number of investor accounts, and contribute to over 80% of the trading volume on the Shanghai Stock Exchange (Figure 5). This is very high compared with other developed market including Hong Kong, where retail investors contributed to 30% of HKSE turnover only.

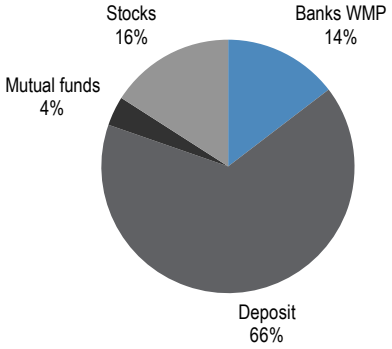
Figure 5: SSE trading volume by investor type



Source: Shanghai Stock Exchange.

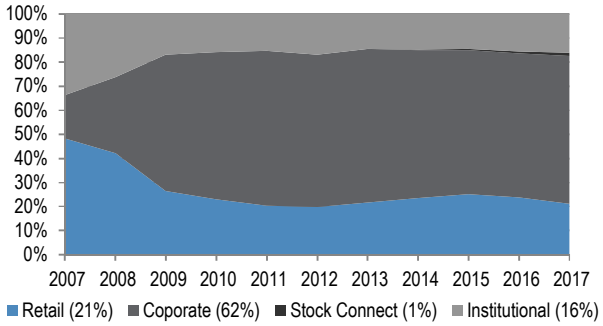
While Chinese individuals account for a majority of the domestic stock market, **China households are indeed heavily underinvested**. According to data released by Asset Management Association of China, **bank deposits accounts for 66% of total household investable financial assets**, whereas **stocks and mutual funds are just 16% and 4%,** respectively (Figure 6). The traditional practice of holding cash and properties is one of the key reasons for the underinvestment in capital markets. Other reasons may include limited investment products and channels due to the immature mutual fund industry and capital control, and the high volatility of equities itself due to the dominance of retail investors. This prevents risk-averse investors from entering the stock market. Corporates, in particular the SOEs, are still holding a significant portion of the tradable shares following the split-share structural reform (Figure 7).

Figure 6: Allocation of China household financial asset



Source: Asset Management Association of China.

Figure 7: SSE tradable market cap by investor type



Source: Shanghai Stock Exchange.

Given high cash holding of Chinese households, we see tremendous investment demand from more sophisticated and educated domestic investors in coming years. We believe the investment style of the Chinese individual investors will change over time given the evolving market structure. Direct participation in the stock markets will likely decline steadily despite the stabilizing market measures carried out in past years (e.g., enhances the supervision of shares suspensions and margin financing). Instead, individual investors are more likely to channel their investments through mutual and pension funds, given the increasing product diversification, lower volatility compared to individual stocks, and higher demand from offshore investment.

Domestic institutional investors

China's investment fund industry only started off in 1998, with China Southern Fund Management and Guotai Fund Management launching two close-ended funds, raising CNY4bn in total. Since then, domestic institutional investors have taken up a more important role in China capital markets, driven by a series of market reforms and openings throughout the last two decades. We look at the background, investment holdings and the potential change in asset allocation of the major domestic institutional investors in the following sections.

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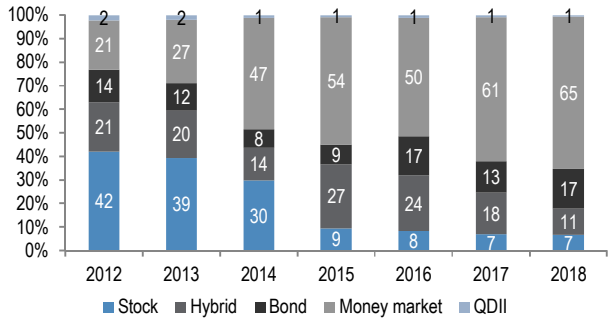
Mutual funds

China's mutual funds industry has grown rapidly since the launch of the first open-ended investment fund in 2001. As of November 2018, there were 5,547 publicly-offered investment funds in total, out of which 4,884 (88%) were open-ended funds, comprised of stock, hybrid, bond, money markets, and QDII investments. The net value of the investment funds totaled CNY13.6tr, up 375%, or 30% pa, since December 2012 when the data were first published by the Asset Management Association of China.

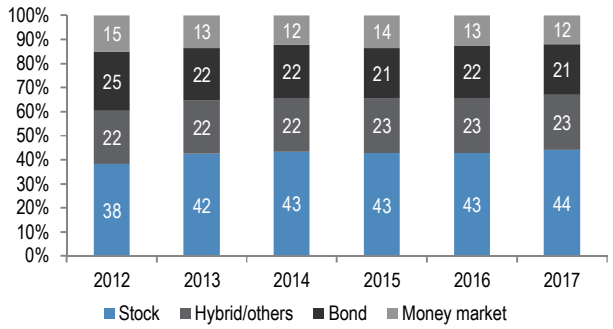
Details of the open-ended mutual funds data show a remarkable change in the product mix over the years (Figure 8). There is a significant increase in the amount of the money market (57% pa) and bond (34% pa) funds since end-2012, whereas pure stock investment funds saw a decline of 5% pa. The meltdown in the onshore equity markets in 2015 prompted investors to seek fewer risky assets, focusing instead on bonds and money markets. In addition, the launch of Yu'e Bao in 2013, the online monthly market fund offered by Alibaba and management by Tianhong Asset Management, has gained a high popularity. This boosts the share of the money market funds from 21% in 2012 to 65% of total mutual fund AUM currently.

Figure 8: Breakdown of China's open-ended funds



Source: Asset Management Association of China. Data as of November for 2018.

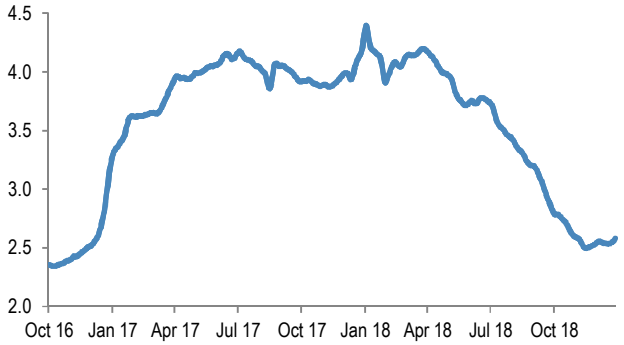
Figure 9: Breakdown of worldwide regulated open-ended funds



Source: ICI.

In the long term, we expect to see more balanced asset allocation within the China's mutual fund industry. Worldwide regulated open-ended funds' exposure to equities was high at 44% (China: 7%) in 2017, while money markets accounted for 12% (China: 61%) of the total net asset (Figure 9). We believe further deregulation in the China onshore stock market, greater share class variety, lower investment returns and tightened control on the blooming fintech industry will result in a gradual shift in portfolio allocation of the mutual fund investors. The trend has started to reflect in recent data, with Yu'e Bao reporting a 33% decline in net asset value from its peak of CNY1.7trn in March 2018, whereas stock fund AUM have increased by 43% since the market trough in February 2016, outpacing SHCOMP (-3.7% during the period).

Figure 10: Yu's Bao annualized yield (%)



Source: Alipay.

Insurance companies

Insurance companies have become a major part of the domestic institutional investors with total funds at CNY16trn as of November 2018, up 109% since end-2013, or 16% pa. Given the substantial size of these funds, the Chinese government has been encouraging insurance companies to channel more money into the capital markets to support infrastructure and housing projects, as well as equities. In particular, the regulators have lifted the stock investment ceiling for insurance firms from 25% to 30% in 2014, and further increased the limit to 40% after the market collapse in 2015 (which was lowered back to 30% in December 2016).

A breakdown of the use of fund shows that insurers remain heavily invested in fixed income (bank deposit, bonds) and alternative investments (include banks WMP, trust funds, and infrastructure investment plans), which account for 88% of the total use of funds. Stock investment is just 12.4%, down from 16% in May 2015, before the equity market crash and is significantly below the investment limit of 30%. The latest data show a gradual decline in the share of the alternative investments

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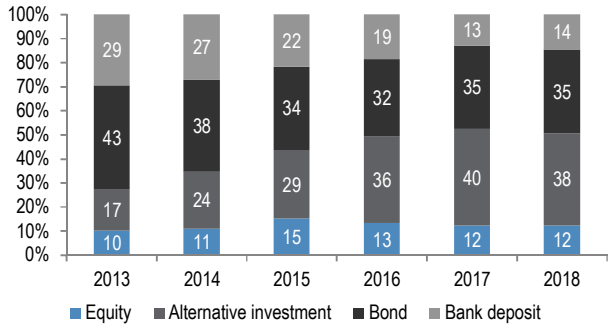
(from 40.2% in December 2017 to 38.2% in November 2018), partly due to a tightening of regulations on wealth management products this year (Figure 11). We believe this trend will stay and see further room for the insurers to increase their equities holdings in coming years. Specifically, the stock investment limit of 30% implies additional fund inflows of CNY2.8tr into the stock market potentially.

Figure 11: Breakdown of insurers' use of fund

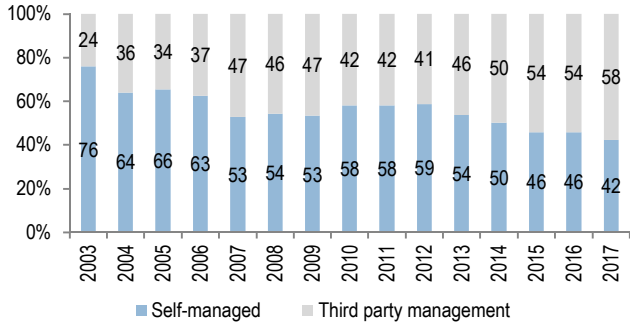


Source: China Banking and Insurance Regulatory Commission. As of November for 2018.

Social security fund

Since its inception in August 2000, the **China National Social Security Fund** has grown rapidly in size, with total asset growing 111 times, or 32% pa, to CNY2.2tr as of 2017. The fund was allowed to make capital investment in 2001 through self-managed (mainly in bank deposits, government bonds, trust investments, and receivables) or domestic fund managers (including onshore and offshore equities, bonds, and securities funds). According to NSSF annual reports, investments via third party managers have increased from 24% of total assets in 2003 to 58% as of 2017, which reflects the trend of investment diversification over the years (Figure 12). In addition, **provincial pension funds** were allowed to invest in financial products under NSSF management since 2015. With the growing size of the funds amid the increasing social security coverage, we expect NSSF to take a more important role as an institutional investor in coming years.

Figure 12: Self-managed and third party investment of NSSF

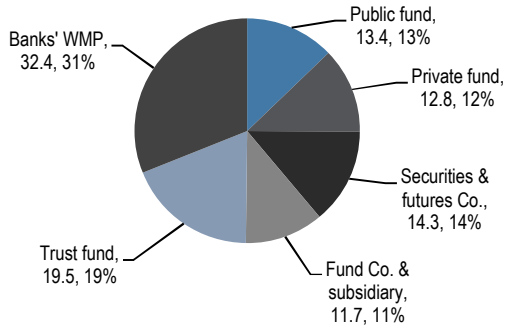


Source: NSSF.

Growth potential in asset management

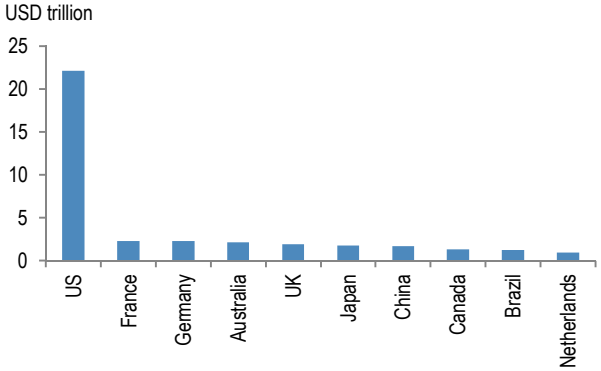
Total AUM of China's asset management products totaled CNY104tr as of 3Q18, out of which 31% (CNY32trn) are in banks' WMP, 19% (CNY20tr) in trust funds and 50% (CNY52trn) in traditional asset management business (e.g., public, private, and securities funds, Figure 13). In particular, the AUM of the public open-ended mutual fund market is just CNY12.7tr, around 1/10th of the US market (Figure 14). We see tremendous growth potential in China's traditional asset management business, given the 1) changing asset management and wealth management product model, 2) pension liberalization, and 3) higher demand for overseas investments due to the rising household investable wealth.

Figure 13: China's asset management products' AUM breakdown



Source: Asset Management Association of China, China Trustee Association, CCDC.

Figure 14: Total net assets of open-ended funds across countries



Source: ICI 2017 factbook.

Changing AM and WMP business model

Many asset managements' and banks' WMP implementation guidelines have been released since November 2017 (see *China banks*, K. Lei and G.Cai, 3 Dec. 2018) to reduce the systemic risk of the industry. Major targets include: curbing the implicit guarantees; addressing the duration mismatch of products; and relaxation on equities investments: Banks' publicly offered WMP can invest in stock mutual funds, whereas

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WMPs issued by WMP subsidiaries are allowed to invest in listed equity securities directly. The new regulations have a far-reaching impact on the China asset management industry and may induce funds shifting from banking products into mutual funds. Replacement of implicit guarantee products will result in a higher demand of traditional funds, and increasing equities investment from banks' WMP will drive institutional flows into the A share market over time.

Pension liberalization

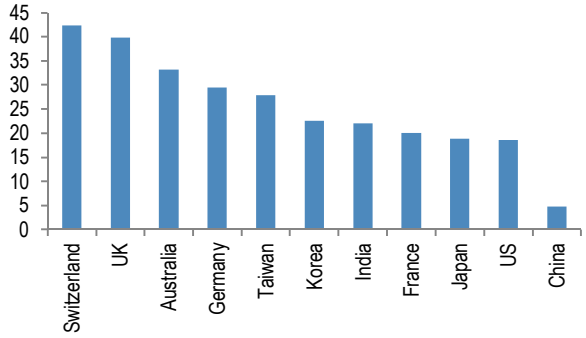
CSRC granted approval to the first batch of 14 pension target funds in August 2018, of which nine are "target-date funds" and four are "target-risk funds". This marked an important step in the development of China's third-pillar pension market, and allows mutual fund managers to play a bigger role in the pension funds industry. While the funds are adopting the fund of funds strategy initially, this will essentially help optimizing the equity market investor structure and improve market liquidity. In addition, markets will become less speculative as pension funds generally adopt a long-term investment strategy and seek more stable returns.

Individuals overseas investments

The fund management industry is set to capture the strong growth in China's individual wealth due to their increasing demand for investing abroad and asset diversification. China is ranked among the top four countries with the largest number of high-net-worth individuals (investable assets of over $1mn), for which their total wealth rose more than 10% in 2017.[1] However, most of the investable financial assets are sitting onshore, mainly due to capital control and limited overseas investment channels. According to a survey by BCG and Industrial Bank, overseas investments account only for about 5% of Chinese individuals' total investable financial assets, far below the major developed and Asia markets' c.20-40% (Figure 15). We expect to see more individuals to consider investing abroad to seek for higher investment return and dispersing risks in the long term.

Under the current regime, **QDII** and **Stock Connect** are the two official channels for domestic investors to invest in overseas security markets. As of November 2018, there were 142 publicly offered open-ended QDII funds, with net investment value of CNY80bn, accounting for only 0.6% of the total open-ended fund industry. Meanwhile, there is increasing participation in the Stock Connect program, for which 370 funds have been investing in 2018, compared to 166 funds as of 2017, according to Wind. While fixed assets (e.g., properties) and FX deposits remain the most favorable investments among Chinese individuals. A survey done by Hurun showed that the Chinese high net worth group is planning to increase their offshore investment through wealth management products and mutual fund markets in the next three years (Table 2). As a result, with individual wealth continuing to accumulate, we expect to see higher demand for professional wealth management services amid further capital account opening in the near future.

Figure 15: Individuals' overseas investment as % of total investable financial assets



Source: BCG

Table 2: Overseas investment channels of China's HNWIs

% of respondents	Current	In next 3 years	In/decrease
Fixed assets	30	44	14
Insurance	16	26	10
Wealth management product	16	25	9
Mutual funds	10	17	7
Trust	8	14	6
Bonds	9	14	5
Gold	6	9	3
Others	15	17	2
Stocks	15	15	0
FX deposit	43	34	-9

Source: Hurun Immigration and the Chinese HNWI 2018 report

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[1] *World Wealth Report 2018*, Capgemini https://www.capgemini.com/financialservices

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Global Index & Portfolio Research
J.P. Morgan Perspectives
31 January 2019

J.P.Morgan

Bond Index – China inclusion

- **China has been under-represented in major global bond indices.**
- **Recent landmark market reforms have paved the way for China's index exposure to reach full potential in the coming years.**
- **The inclusion of China in the major fixed income benchmarks can generate approximately $250-300bn in flows.**

China's local currency (i.e., Renminbi) denominated bonds have traditionally been under-represented in major global bond indices relative to the size of the Chinese economy and the stock of RMB denominated debt outstanding. Although China is the world's second largest economy accounting for 18% of the global GDP[1], and the world's third-largest bond market with more than $2 trillion of government bonds outstanding, the country's bonds have been highly underrepresented in the most frequently used global bond indices. This was predominantly due to accessibility hurdles and policy restrictions that were in place until landmark market reforms were enacted in recent years, including the opening up of the onshore interbank market (CIBM Direct) and offshore connectivity to mainland China bond market from Hong Kong (Bond Connect). **The enhanced accessibility and favorable policy measures have brought the RMB-denominated bond market in scope for potential eligibility in prominent global bond indices, including the J.P. Morgan Emerging Markets Government Bond Index Global Diversified (GBI-EM GD) and the FTSE World Government Bond Index (WGBI). On 31 January 2019, Bloomberg announced that Chinese RMB-denominated government and policy bank securities will be added to the Bloomberg Barclays Global Aggregate Index starting April 2019 and phased in over a 20-month period.**

J.P. Morgan bond indices have a 14-year track record of covering China's RMB-denominated government bonds (CGBs) in the broadest GBI-EM Broad series since the benchmark was first launched in December 2005. The GBI-EM Broad benchmark tracks 21 different markets including China, which is the largest country with a market capitalization of $820bn across 60 instruments. In terms of index weight, China makes up 37% of the unconstrained GBI-EM Broad product, and 10% (which is the max possible weight) of the GBI-EM Broad Diversified index. Although the GBI-EM Broad series provides the broadest coverage in terms of countries and securities, only about US$2 billion in assets tracks this benchmark. In contrast, the J.P. Morgan GBI-EM Global Diversified (GBI-EM GD), which is the preferred version within the EM local markets space, is tracked by an estimated $200bn in assets (i.e., 100X AUM tracking the GBI-EM Broad series). The GBI-EM GD aims to provide a balanced benchmark by tracking 19 investable EM countries, but currently excludes China and India. In 2016, China was placed on Index Watch (see *Index Watch: China eligibility*, G. Kim et al.,15 Mar. 2016) for inclusion in the GBI-EM GD on the back of market reforms and improved accessibility to the onshore bond market (CIBM Direct) and efforts by Chinese policymakers for Renminbi internationalization. China continues to be on Index Watch for the GBI-EM GD but with promising potential for inclusion.

Separately, China RMB-denominated government bonds are fully included in the J.P. Morgan Asia Diversified Broad (JADE Broad), which is a regional benchmark that tracks local-currency government bonds issued by emerging and developed Asian countries (excluding Japan). JADE Broad has a robust following (est. $5bn in AUM benchmarked) among Asia-domiciled investors who have mandates for Asia bond markets.

Within the larger Investment Grade fixed income index space, China is currently not included in any of the flagship indices. However, Bloomberg Barclays launched a new *Global AGG +China Index* in March 2017 to provide a transition benchmark for users of their flagship Global AGG benchmark. Currently, the assets managed against this new index are marginal.

In the Investment Grade local currency sovereign debt benchmark space, FTSE Russell added China to their Emerging Market bond index in March 2017. However, in an unprecedented move, they also announced within months that the CGBs were eligible for their WGBI-Extended index (a staging area for inclusion in the headline WGBI). The pace of the announcements sent mixed signals to benchmark investors as it signaled a move for China from EM to DM within the same year.

Although China is represented in some indices, these benchmarks have limited or no traction as several trading and operational hurdles still persist even on the newly available access channels (CIBM Direct and Bond Connect). In addition, the process to appoint bond and FX trading counterparties, and the registration process

[1] Source: IMF World Economic Outlook, Gross domestic product based on purchasing-power-parity (PPP) share of world total.

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with Chinese market regulators were not seamless and required several months to get on-boarded to the platforms. Since China has been placed on a watch list for inclusion by all the major global bond indices, there will certainly be increased focus and activity from foreign investors on the China onshore bond market, which can fuel proper traction. Investors will look for liquidity and replicability to fully commit.

China is the third-largest bond market in the world, but liquidity is a concern

The China Government Bond (CGB) market boasts an active yield curve through frequent bond auctions. However, this can be a double-edged sword as it aggravates the already severe liquidity issue faced by off-the-run securities. China government bonds (CGB) issued by the Ministry of Finance currently totals RMB14.2 trillion (approximately $2.1 trillion) outstanding. The Ministry of Finance has maintained an active China onshore government bond yield curve through its frequent auction schedule across key tenors on the curve, ranging from 3-months to 50-years. For the past three years, new benchmark bonds with short-to-medium tenors, e.g., 1y, 3y, 5y, 7y, and 10y, were issued once every three months, while the longer-dated CGBs (30y and 50y) were issued two to three times a year. There has also been ad hoc issuance of CGBs outside the established auction schedule. The issue size is not standard and varies from bond to bond. Whilst frequent issuance across key tenors supports an active yield curve, it indirectly contributes to the liquidity drop-off for bonds that are no longer on-the-run (OTR).

Given the frequent auction schedule before 2019, CGBs only remain on-the-run for a matter of months with ample market depth during the period, but liquidity starts to taper off once these bonds become off-the-run. This leads to a significant dispersion between on-the-run and off-the-run CGBs in terms of accessibility and cost of trading. The CFETS trade volume data for 2018 suggests that 60% of trading activities in the interbank CGB market was concentrated in bonds issued in the past year (Figure 2), even though these newly issued instruments constituted only 22% of the market as of 2018 year-end (Figure 3). In addition to diminishing market depth, off-the-run CGBs often trade at wider bid-ask spreads than their on-the-run counterparts.

Since the onset of 2019, the auction schedule of 3y, 5y, 7y, and 10y CGBs issued to the China interbank market has been changed to semi-annual issuance from previous quarterly issuance (Table 1). This is a welcome change in the primary market since it increases the shelf-life and liquidity of the benchmark OTR bonds. If the Ministry of Finance were to conduct re-open auctions (taps) on existing bonds, instead of issuing new bonds at frequent intervals, it would further preserve the traction on benchmark tenors and enhance overall liquidity of CGBs. Lastly, the larger domestic Chinese investor base is often blamed for the lack of liquidity in the secondary market as local investors tend to buy government bonds with the purpose of holding them to maturity.

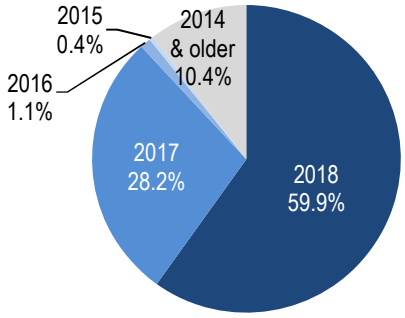
Table 1: 2018 Auction schedules of CGBs with latest "on-the-runs"

Tenor (year)	2018 Auction frequency	2019 Auction frequency	"On-The-Run" bond	Issue Date
1	3 month	6 month	CGB 2.41% Nov 2019	22-Nov
2	2-3 per year	Ad hoc	CGB 3% Oct 2020	18-Oct
3	3 month	6 month	CGB 3.17% Oct 2021	11-Oct
5	3 month	6 month	CGB 3.29% Oct 2023	18-Oct
7	3 month	6 month	CGB 3.6% Dec 2025	06-Dec
10	3 month	6 month	CGB 3.25% Nov 2028	22-Nov
30	2-3 per year	Ad hoc	CGB 4.08% Oct 2048	22-Oct
50	2 per year	Ad hoc	CGB 3.82% Nov 2068*	19-Nov

Source: J.P. Morgan.

Figure 1: Newly issued bonds make up almost 60% of 2018 trading activities of all CGBs in the interbank market

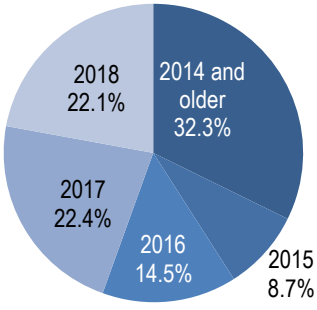
2018 CGB trade volumes in the interbank market by year of issue



Source: J.P. Morgan, CFETS

Figure 2: Bonds issued in 2018 only make up 22% of the interbank CGB market at 2018 year-end

CGBs in the interbank market notional breakdown by bond issue year



Source: J.P. Morgan, CFETS

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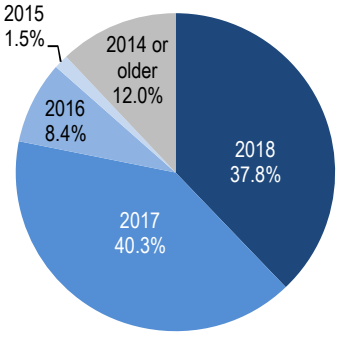
Investors may utilize policy bank bonds for liquidity and alpha opportunities

China policy bank bonds hold the credit worthiness of the sovereign in the eyes of the investor base and provide better off-the-run liquidity, but present dispersion among issuers. Currently, there are three major policy banks in China, namely China Development Bank, the Agricultural Development Bank of China, and the Export-Import Bank of China. As it stands today, China policy bank bonds total RMB14.3 trillion (approximately $2.2 trillion[2]) outstanding. Similar to CGBs, policy bank bonds liquidity start to taper off as they become off-the-run but not to the same extent as CGBs. The compiled annual CFETS trade volume data for 2018 shows that policy bank bonds issued in 2017 (off-the-run) had as much trading activities as bonds issued in 2018. This contrasts with the CGB market where securities issued less than a year ago accounted for majority of trading activities (Figure 4). Among the policy banks, China Development Bank has the largest amount of bonds outstanding, accounting for more than half of the size of policy bank bonds on the interbank market. Furthermore, China Development Bank bonds constituted an even larger portion of trading activities over the past year (Figure 5). Although there is no explicit government guarantee for policy bank securities, there is implicit government support, making these instruments attractive to CGB benchmarked investors. Policy banks are not eligible for the J.P. Morgan GBI-EM Global Diversified or the FTSE WGBI as these indices only include government bonds. Policy banks will likely be eligible for the Bloomberg Global AGG benchmark.

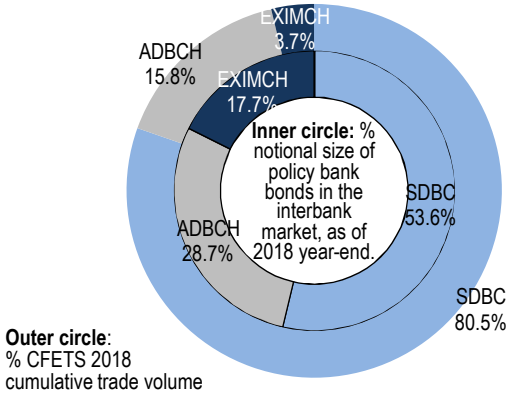
Figure 3: "Off-the-run" policy bank bonds see liquidity taper off slower than for CGBs
2018 trade volume of policy bank bonds broken down by year of issue



Source: J.P. Morgan, CFETS, Bloomberg

[2] Excludes exchange traded bonds which are not accessible via CIBM Direct or Bond Connect.

Figure 4: Comparison across the three policy bank bonds
On trade volume (2018 cumulative data from CFETS) and notional size (as of 2018 year-end)



Source: J.P. Morgan, CFETS, Bloomberg

China's index inclusion outlook and potential investor demand

Landmark market reforms passed in the last two years have paved the way for China onshore bonds to reach full potential index exposure in the major global bond indices in the coming years. Alternative benchmarks with China exposure have not recieved investor traction but potential inclusion in the mainstream benchmarks will spur investor uptake. In January 2019 Bloomberg announced[3] that it will include Chinese RMB-denominated government and policy bank securities in their flagship Global AGG beginning April 2019, over a 20-month period. The inclusion was contingent on the following criteria: the local currency debt market must be classified as investment grade, its currency must be freely tradable, convertible, hedgeable, free of capital controls, implementation of delivery versus payment settlement, ability to allocate block trades across portfolios, and clarification on tax collection policies. The aforementioned requirements have been met so we expect Bloomberg to announce China's inclusion into their flagship Global AGG index soon. China's inclusion will likely take place starting the end of April and will be phased in over a 20 month period. The RMB is expected to become the 4th largest currency exposure in the Global AGG (behind USD, EUR and JPY) with Chinese government and policy bank bonds representing approximately 5.5% of the benchmark. If China is indeed

[3] Bloomberg (https://www.bloomberg.com/company/announcements/bloomberg-confirms-china-inclusion-bloomberg-barclays-global-aggregate-indices/

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included in April, it will provide added data points to assess further index replicability of China.

FTSE Russell WGBI continues to assess the inclusion of China RMB-denominated government bonds (CGBs) in the WGBI and we anticipate any potential inclusion indications to come during the second half of the year. The last market accessibility consultation was conducted during the fall of 2018, which resulted in the establishment of the FTSE Fixed Income Country Classification Framework and the addition of China to their watch list. China RMB-denominated government bonds satisfy several necessary conditions for inclusion but perhaps not all if the rules were applied conservatively (see Table 2). More prudently, a consultation with market participants will probably need to take place before a definitive conclusion is made on China's inclusion.

As for the J.P. Morgan GBI-EM Global Diversified and Narrow Diversified indices, China theoretically meets the inclusion criteria. However, full eligibility is still being assessed as inclusion is predicated on investors' ability to replicate the benchmark exposure seamlessly. We believe China's accessibility is continuing to develop in the right direction and can potentially meet full inclusion. We will engage the investor base for feedback during the 2019 J.P. Morgan Index Governance Consultation, which occurs between 2Q and 3Q 2019. If included[4] in the GBI-EM GD, China would have a weight of 7-10% in the benchmark.

The inclusion of China in the three major benchmarks (J.P. Morgan GBI-EM Global Diversified, Bloomberg Global AGG and FTSE WGBI) can generate approximately $250-300bn dollars in flows. The combined assets under management for all three indices are estimated to be $4.5-5trn; China will hold a weight of approximately 6-7% in each index. In the J.P. Morgan GBI-EM Global Diversified index, we envision China's initial weight to be approximately 7% as only the liquid on-the-run bonds will be included initially. China's weight can eventually climb to 10% in the GBI-EM Global Diversified.

The fundamental differences between CIBM and Bond Connect – two main channels to access China local bonds

China Interbank Market Direct (CIBM) (2016) and Bond Connect (2017) are the preferred channels by which international investors access China's domestic fixed income market. Both channels were introduced to liberalize China's domestic bond market, and since their inception, both channels have evolved to enhance access to the China onshore bond market and improve market efficiency.

CIBM Direct is an investment channel that allows foreign investors to access the China onshore bond market through a "Type A" approved custody and settlement bank that resides onshore. The channel was first piloted with Sovereign investors in 2015 and was later extended to other types of investors in February 2016. With the pilot program, sovereign wealth funds and pension funds were given a head start, which continues to be the preferred investment channel for this type of investor in accessing the onshore bond market. At its inception, CIBM Direct offered several improvements compared to the older channels like QFII and RQFII: 1) Registration process: through CIBM Direct investors only need to pre-file with PBoC and no longer need to acquire approval before trading; 2) Investment quotas: investors on CIBM Direct are not subject to investment quotas or the need to state intended investment amount; and 3) Accessible instruments: in addition to non-listed cash bonds, CIBM Direct investors can access a wide range of hedging tools (onshore interest rate derivatives are available to all CIBM investors, and repo transactions are open to select types of CIBM investors).

Commenced in July 2017 in a pilot form, Bond Connect is the latest innovation in China's domestic bond market liberalization process. The platform allows overseas investors access to the onshore fixed income market through Hong Kong without having to open an onshore account. The platform has been popular among all types of international investors, in addition to large institutional investors who tend to access the market through both channels. Since its inception, ongoing developments aimed at bringing the Chinese bond market to international standards have been implemented on Bond Connect. In the summer of 2018, provision for block orders on Bond Connect was introduced in July, followed by delivery-versus-payment settlement in August, which reduces counterparty risks for investors, as well as clarification of tax treatments. Bond Connect shares some common features with CIBM Direct, such as no investment quota and fast registration process, but it also differs in many aspects including accessible instruments (onshore interest rate derivatives and repo transactions are not currently available through Bond Connect), trading and settlement process, and remittance restrictions, etc. For a detailed comparison between the two platforms (Figure 6).

[4] Final determination of index eligibility will be made by the J.P. Morgan Global Index Research group and disseminated to market participants.

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Table 2: Index inclusion rules

	J.P. Morgan GBI-EM Global Div.	Bloomberg/Barclays Global AGG	FTSE WGBI
EM or DM	EM only	EM or DM	EM or DM
Min. Rating (inclusion)	N/A	IG (middle rating of Moody's, Fitch and S&P).	A3 / A- (S&P & Moody's)
Min. Rating (exclusion)	N/A	Two of three agencies need to have LC rating below IG	Both S&P & Moody's need to have LC rating below IG
Min. Size	USD 1 billion at the instrument level USD 500 million for globally settled (local ccy. linked) bonds	Minimum issue sizes for each local currency instrument. For example: USD 300 million (excl. ABS) GBP 200 million JPY 35 billion CNY 5 billion	Total of eligible issues must be USD 50 billion, EUR 40 billion AND JPY 5 trillion. *Additional instrument level criteria applies (e.g. MXN 10 billion, ZAR 10 billion, MYR 4 billion)*
Min. Maturity	2.5 years for inclusion Below 13 months is excluded	At least one year remaining maturity	At least one year remaining maturity
Instrument type	Sovereign	Sovereign, Quasi and Corp	Sovereign
Liquidity criteria	Regular two-way pricing, objective factors incl. bid/offer spreads, exchange trade volumes, investor surveys, turnover	Regular two-way pricing, objective factors incl. bid/offer spreads	Regular two-way pricing, objective factors incl. bid/offer spreads, exchange trade volumes, investor surveys, turnover
Regulatory	No capital controls, investment restrictions or quotas	No capital controls, investment restrictions or quotas	No capital controls, quotas Sustainable issuance Transparent monetary policy
Taxes	Taxes ok provided doesn't impair index replicability; similar to index peer group.	Clarity on tax regime	No taxes
Settlement	Global clearing preferred or Equivalent seamless domestic option; Suitable settlement cycle for foreign investors	Global clearing (e.g. Euroclear) preferred or Equiv. seamless domestic option; DVP, suitable settlement cycle for foreign investors	Global clearing (e.g. Euroclear) preferred or Equiv. seamless domestic option; DVP, suitable settlement cycle for foreign investors
Custody	Connectivity with Global custodian preferred or alternative local equivalent with seamless access	Connectivity with Global custodian preferred or alternative local equivalent with seamless access	Connectivity with Global custodian preferred or alternative local equivalent with seamless access
FX	Tradable, no convertibility issues	Freely tradable and convertible, and not exposed to exchange controls; Established fwd. or NDF market	Freely convertible spot and forward Established fwd. market or NDFs
Fixed Income Derivatives	Availability is considered but not a precondition for inclusion	Presence of sufficient interest rate derivative products will be considered	Sufficiently developed and liquid fixed income derivative markets
Barriers-to-Entry	No accessibility hurdles such as capital or exchange controls, or other policies impairing ability of investors to replicate index performance	No accessibility hurdles such as capital or exchange controls	Market should actively encourage foreign investor participation

Source: J.P. Morgan, Bloomberg, FTSE

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Table 3: Comparison of CIBM Direct and Bond Connect

	CIBM Direct	Bond Connect
Inception Year	2016	2017
Investment Quota	No	No
Regulated By	PBoC, SAFE	PBoC, SAFE, and HKMA
Registration and application process	Filing with PBoC with assistance of the Bond Settlement Agent	Filing with PBoC through Bond Connect application and China Foreign Exchange Trading System (CFETS)
Accessible Products	• Unlisted cash bonds (open to all investors) • Onshore interest rate derivatives (open to all investors) • Onshore repo transactions (open to select investors)	• Unlisted cash bonds
Trading	• Execute with onshore approved market maker/CIBM dealer • Execution by voice • Trade input on CFETS via the Bond Settlement Agent	• Executed with approved Bond Connect market makers • Electronic execution via recognized platform (e.g. TradeWeb)
Trading Hours	• 09:00- 12:00 China local time • 13:30 - 16:30 China local time	• 09:00- 12:00 Hong Kong time • 13:30 - 16:30 Hong Kong time
Account location	China (onshore)	Hong Kong (offshore)
Settlement Method	Delivery- versus- payment ("DVP")	Delivery- versus- payment ("DVP")
Foreign Exchange Management	• Both CNH/CNY and foreign currency funding allowed • Investors can convert foreign currency to CNY in the onshore FX market via their Bond Settlement Agent	• Both CNH/CNY and foreign currency funding allowed • Investors can convert foreign currency to CNY in Hong Kong via trade settlement banks
Remittance Restrictions	Restriction on the remittance ratio of CNY to foreign currency amount: a 10% deviation is allowed	Proceeds from foreign currency funded trades must convert back into the same currency at the prevailing rate

Source: J.P. Morgan

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Global Markets Strategy
J.P. Morgan Perspectives
31 January 2019

J.P.Morgan

China's twin inclusion

- **Index inclusion of Chinese onshore equities and bonds began last year and will intensify this year and next.**
- **Index inclusion is the first step on a roadmap that will eventually make Chinese onshore equities an important component of global equity portfolios and onshore bonds an important component of global fixed income portfolios.**
- **The potential can be seen by the share of Chinese onshore equities and bonds in global equity and bond universes, which stands as high as 11% and 18%, respectively, on a free float unadjusted basis.**
- **Overseas investors currently hold a modest amount of ~$430bn of onshore Chinese equities and bonds.**
- **This is more than double the amount they held a couple of years ago but still represents a big mismatch relative to the 11% and 18% shares of Chinese onshore equities and bonds in global equity and bond universes.**
- **This shows how under-owned investors are currently in terms of onshore Chinese assets and how much they would need to buy over the coming years as Chinese onshore assets become important components of global portfolios.**
- **A key requirement for this scenario to play out over the coming years is currency convertibility.**
- **And this is where the challenge lies with Chinese policy makers as currency volatility and uncertainty about China's currency regime have taken their toll over the previous years.**
- **Standard Chartered's Renminbi Globalization Index (RGI index) declined between 2015 and 2017. It rose modestly in 2018 helped by Chinese reforms to open their onshore equity and bond markets to international investors and by index providers announcing the inclusion of onshore Chinese equities and bonds to their indices.**
- **The appetite of FX reserve managers for Renminbi assets increased last year, especially in Q2 2018 as indicated by the IMF's COFER data.**
- **The involvement of central banks is important as they add legitimacy to the renminbi market even as onshore renminbi is not yet fully convertible.**

The process of including **Chinese A-shares** in major equity indices began last June with MSCI. A-shares were included in the MSCI China and related composite indices, such as MSCI Emerging Markets, with a 5% inclusion factor. 2.5% was added last June and a further 2.5% was added last September, bringing the total number of companies up to 235. After this inclusion Chinese A-shares took a 0.7% weight in MSCI Emerging Markets Index and attracted approximately $2bn of passive inflows based on calculations by our index team.

Subsequently, MSCI announced proposals to increase the respective **free float-adjusted market cap** of A-shares from 5% to 20% in two phases of 7.5% each, in May 2019 and August 2019. That would raise the weight of Chinese A-shares to 2.8% in MSCI Emerging Markets Index and would attract an additional $6bn of passive inflows.

Following MSCI, **FTSE** has also announced plans to include large-, mid- and small-cap A-shares in its indices over three phases between June 2019 and March 2020. **Upon completion of the first phase, China A Shares are expected to constitute 5.5% of the total FTSE Emerging Index,** attracting initial net passive inflows of $10bn.

While the above inflows from purely passive investors appear small, we believe this greatly underestimates the bigger impetus that could potentially arise from active managers or other non-benchmarked institutional investors, who are much bigger in size than purely passive investors and have little or no exposure to onshore Chinese equities. This is especially true as the above moves represent only initial steps to a roadmap that should eventually see the share of China rising significantly in equity indices.

According to the equity index providers' roadmaps, **China's total share in EM equity indices is expected to rise from around 30% currently to above 50% under full inclusion** of Chinese shares at their free float adjusted weight. This full inclusion assumes no foreign ownership limits, abolishment of the quota system, full liberalization of capital mobility restrictions and alignment of international accessibility standards. And in this case, the **equivalent total share of China in world indices would be close to 5.5%.**

These calculations suggest that as capital liberalization continues and the above roadmap progresses, the Chinese equity market would dominate Emerging Market equity indices over the coming years. And this process could be self-reinforcing, as an initial inclusion would generate impetus for further capital liberalization in the medium

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term which would see a faster progression along the above roadmap. In addition, as the participation by foreign institutional investors rises at the expense of domestic retail investors, who currently account for more than 80% of trading volumes, the onshore Chinese equity market would become more diverse in terms of its investor base and thus more stable, inducing further foreign investor participation.

However, the impact of capital liberalization is not only confined to equities. Chinese onshore **bonds** are approaching inclusion in major global bond indices. Our colleagues in EM bond index research estimate that if Chinese government-related bonds were to enter into the three leading global bond indices, China could see close to $230bn of inflows from managers benchmarked to these indices (see Kim et al. above).

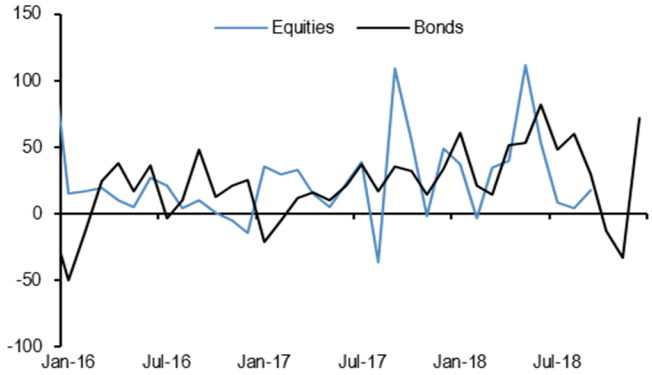
Similar to equities, we believe this flow underestimates the bigger impetus that could potentially arise from other non-benchmarked institutional investors who have little overall exposure to onshore Chinese bond markets and are seeing the beginning of a process that will eventually make Chinese onshore bonds an important component of fixed income portfolios.

An early sign that the inclusion of Chinese A-shares and an approaching inclusion of Chinese government-related bonds into major benchmarks are manifesting themselves into reallocation flows is evident in the data on foreign investor holdings of Chinese equities and bonds in PBOC and CCDC data. Figure 1 shows monthly changes in foreign investor holdings of Chinese assets adjusted for equity and bond returns, and has shown an increase in inflows in 2018, particularly in bonds.

And the foreign ownership of Chinese onshore assets is still so low that international investors will likely come under heavier pressure to add as the index inclusion process advances. According to PBoC, as of Oct 2018, external institutions holdings of Chinese bonds stood at RMB1.7trn or 2.1% of the RMB83trn stock of onshore bonds including government, policy bank and corporate bonds. The equivalent share for equities was 2.9%, i.e. overseas investors held RMB1.3trn of Chinese stocks as of the end of 2018 versus a stock of RMB45trn of onshore equities (unadjusted for free float). Overseas investors thus currently hold a modest amount of only $430bn of onshore Chinese equities and bonds. This is more than double the amount they held two years ago ($200bn as of May 2016), but still represents a big mismatch relative to the share of Chinese onshore equities and bonds in global equity and bond universes which rises to as high as 11% and 18%, respectively, on a free float unadjusted basis (Figure 2). And this shows how **under-owned** investors are currently in terms of onshore Chinese assets and how much they would need to buy over the coming years as Chinese onshore assets become more important components of global portfolios.

Figure 1: Foreign investors' net buying of Chinese onshore bonds and equities

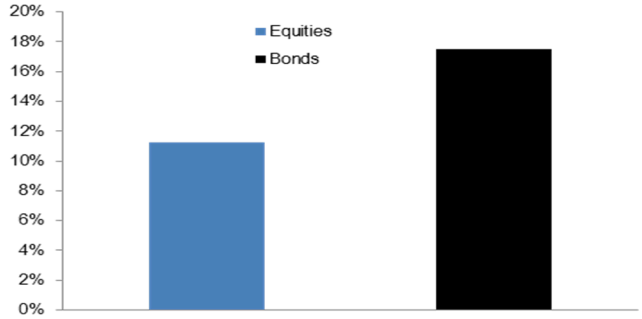
CNYbn per month, flow adjusted for market value changes using the JPM GBI-EM China bond index and the Shanghai Shenzen CSI 300 index. Equity flows up until Sep 2018 (PBOC data). Bonds flows up until Dec 2018 (Chinabond data).



Source: Chinabond, PBOC,J.P. Morgan.

Figure 2: Current share of onshore Chinese equities and bonds in the world

Share as % of the total universe of equities and bonds in the world with no free float adjustment.



Source: J.P. Morgan.

A key requirement for this scenario to play out over the coming years is **currency convertibility**. And this is where the challenge lies with Chinese policy makers. In previous years, up until 2014, the yuan rose exponentially in cross border trade settlements as a result of financial liberalization and the opening up of the capital account. The Renminbi had overtaken almost 30 currencies and in August 2015 had reached a record 4th place in SWIFT rankings in terms of the most used currencies for payments by value. But this process has stalled since August 2015. Since then, currency volatility and

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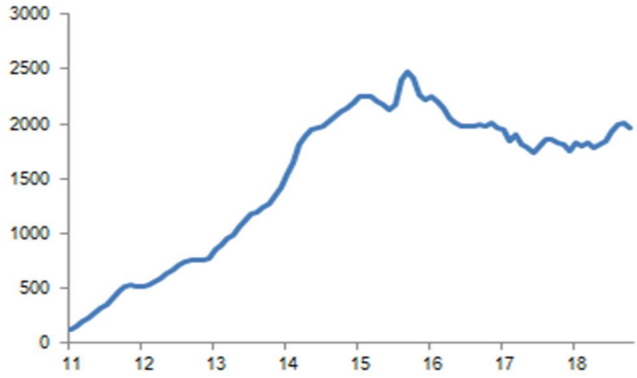
uncertainty about China's currency regime has taken their toll with the Renminbi falling to sixth place by April 2016.

Standard Chartered's Renminbi Globalisation Index (RGI index) is sending a similar message. The index aims to measure overall growth in offshore Renminbi usage. The RGI is computed on a monthly basis, based on four CNH market components with weights inversely proportional to their variance; 1) CNH deposits, 2) trade settlement and other international payments, 3) Dim Sum bonds and certificates of deposit (CDs) issued, and (4) FX turnover, all from an offshore perspective and denominated in Renminbi. The index had risen exponentially up until the end of 2014, but fell over 2015-2017. It rose modestly in 2018 helped by Chinese reforms to open their onshore equity and bond markets to international investors and by index providers announcing the inclusion of onshore Chinese equities and bonds to their indices (Figure 3).

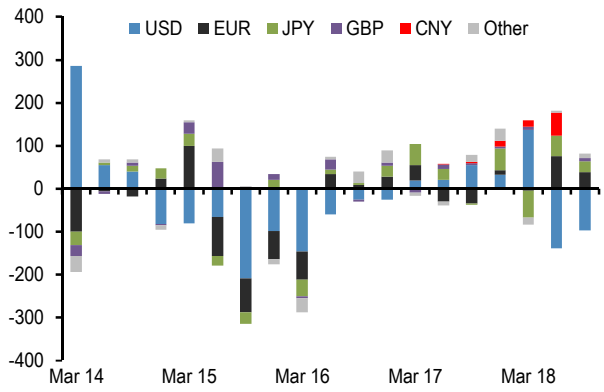
The rising status of the Chinese Renminbi in international payments systems up until 2014 had also attracted foreign central banks who were finding the combination of low volatility and an appreciating trend for Renminbi difficult to beat by other currencies or assets. Numerous central banks had announced the inclusion of the renminbi in their foreign currency reserves. However, the previous combination of low volatility and an appreciating trend was no longer in place from August 2015, reducing the relative attractiveness of the Chinese Renminbi. But with central banks still hungry to diversify away from major currencies and with the IMF recognizing the Chinese Renminbi as a reserve currency in its SDR basket, the appetite of FX reserve managers for Renminbi assets increased last year, especially in Q2 2018 as indicated by IMF's COFER data shown in Figure 4. The involvement of central banks is important as they add legitimacy to the Renminbi market even as the onshore renminbi is not yet fully convertible. **China targets to achieve full Renminbi convertibility over the next few years**. Such commitment to achieve full currency convertibility is an essential component for the above roadmap of index inclusion for onshore assets to progress swiftly.

Figure 3: Standard Chartered Renminbi Globalisation Index
The index aims to measure overall growth in offshore Renminbi usage. The RGI is computed on a monthly basis, based on four CNH market components with weights inversely proportional to their variance - (1) CNH deposits, (2) trade settlement and other international payments, (3) Dim Sum bonds and certificates of deposit (CDs) issued, and (4) FX turnover, all from an offshore perspective and denominated in Renminbi. Location-specific data for each component is used to compute a corresponding global aggregate. More centers are added to the index as they become more significant.



Source: Standard Chartered.

Figure 4: Quarterly flows by FX Reserve Managers
In $bn per quarter. Based on COFER data adjusted for both bond and FX returns. Last obs is for Q2 2018.



Source: IMF COFER, J.P. Morgan calculations.

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Green bonds

- **China's nearly $100bn in green bond issuance in three years cements it as a leading player in using the instruments to help achieve its environmental goals.**
- **Regulators are increasingly turning to financial markets through initiatives such as carbon trading and corporate environmental transparency to address air and water pollution challenge.**
- **Chinese companies will be forced to confront their laggard environmental disclosure practices, and worse environmental, social and governance (ESG) performance.**

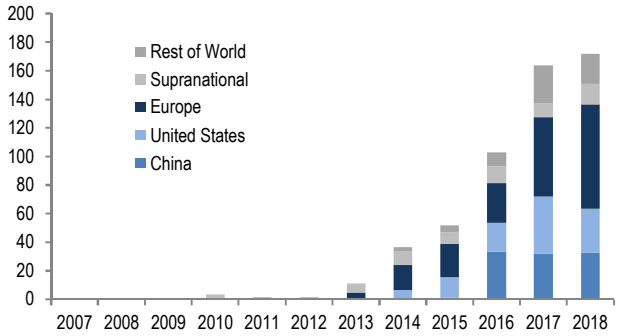
Much like poppy flowers blossoming across World War I ravaged battlefields, China's green bonds issuance bloom is the early sign of the transformation taking place as the country promotes green and sustainable investing. Green bonds are just the first front of its widening focus on using financial markets to help achieve its clean air and water goals. Since China published its green bond guidelines at the end of 2015, domestic entities have issued nearly $100bn in green bonds, beating out the US for the top issuer spot, second only to the US, and the country is by far the largest issuer of corporate and financial green bonds at over $85bn, according to BNEF data. Subsequently, China has released plans for a national carbon market, announced intentions to require listed companies to provide public environmental disclosures, and recently issued Green Panda Bond guidelines. China has the largest underweight position across the J.P, Morgan ESG EMBI and CEMBI indices, reflective of companies largely ignoring environmental and wider ESG issues, but that may change as companies face growing direct and indirect costs to improve performance.

Green bond issuance boom

China was relatively late to join the burgeoning green bond market with only the first such deal taking place in 2015, but issuer interest exploded virtually overnight after the People's Bank of China (PBoC) and the National Development and Reform Commission (NDRC) each issued green bond guidelines in December 2015. Chinese issuers, particularly Chinese banks, have embraced green bonds as a way to fund the country's investment in a cleaner environment with around $32bn in green bonds issued annually since 2016.

As China's middle class grows and environmental issues become more pressing, the government has focused its efforts on cleaning up notoriously poor air quality. President Xi Jinping declared the importance of "ensuring harmony between humans and nature," at the 19th National Congress of the Chinese Communist Party in October 2017, underscoring the government's growing focus on environmental as well as material well-being.

Figure 1: Rapid growth in green bond issuance ($ billions)



Source: BNEF, J.P. Morgan

China's rise to prominence

A green bond is debt that finances environmentally-friendly projects like renewable energy, energy efficiency, low-carbon transportation, green buildings and water infrastructure. The European Investment Bank (EIB) and the World Bank led the way on green bonds starting with the first such instruments in 2007. A decade later, global annual green bond issuance was $167bn in 2018, according to the Climate Bonds Initiative (CBI).

In 2016, Chinese issuers' green bond embrace led to both a proliferation of issuance, $33bn, and cemented its position as a leader in the rapidly growing market, responsible for around one-third of new issuance in the year—ahead of the $28bn issued across all of Europe, according to BNEF data.

China's green bond market has been dominated by bank issuance. Since 2016 after publication of China's green bond guidelines, $68bn in financial sector green bonds have been issued, 71% of total national issuance and over half of the total amount of green bonds issued globally by financials. Corporates were only 19% of the Chinese market and the balance was government agencies. That compares to globally where over 2016-2018 financials were only around 30% of new issuance, corporates 24% and government agencies 12%, based on BNEF data.

On a currency basis, about 80% of Chinese issuance has been in local currency, followed by US$ at just over 10% and Euro almost all of the balance of deals.

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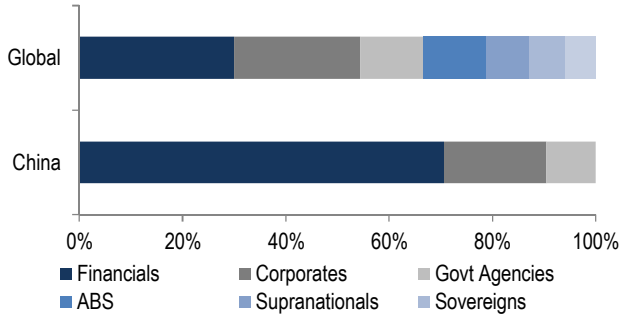
Figure 2: Financials dominate China's green bond issuance (2016-18, % of issuance by value)



Source: BNEF, J.P. Morgan

China's green bond 'clean coal' problem

China's definition of green bonds has several important differences that are at odds with international standards, most importantly the eligibility of '**clean coal'** power station projects. This, along with broader issues around project funding transparency, is an impediment to attracting environmentally-focused international investors. There was an additional $10.5bn in Chinese-labelled green bonds issued in 2018 that did not meet CBI's definition. That sum is over one-third of the $31bn in CBI-aligned Chinese green bonds issued last year. While CBI states it is currently reviewing including large hydropower projects (>50 MW) that are excluded from its definition of green bonds, but included in China's, coal power is anathema to international green bond buyers and will remain a point of difference.

Limit to green bond halo incentive

Chinese green bond annual issuance (that meets international definitions) has been flat since the initial explosion in 2016, pointing to the potential limits of relying on green bonds to nudge greener investments. Given that green bonds price the same as their non-green variants, there is no clear financial incentive for issuers. The benefits tend to be in appealing to a broader investor base, such as sustainably-focused investor, and the reputational boost of being seen as environmentally-friendly. While green bonds can play an important part in promoting China's environmental goals, it is only a first step.

Financial markets enlisted in environmental fight

Chinese regulators are pushing beyond the nudge of green bonds, to the more forceful use of regulations to leverage financial markets for achieving environmental objectives. From the 2017 announcement for plans of what could be the world's largest carbon market to last year's pronouncement to require listed equity and debt issuers to disclose environmental data, investors and market forces are being pulled deeper into shifting capital to greener investments.

The largest carbon market in the world

China putting a price on carbon not only will curb emissions from the largest greenhouse gas emitter in the world, but it will also help address air quality concerns by reducing coal usage. The market will cover about 3 billion metric tons of carbon, over one-third of China's annual output. The market will only cover power generation for now, which is less ambitious than initial discussion of applying to industry as well, but still would be about 1.5 times the size of the EU carbon market. Trading is expected to start this year or next after developing a registry and handing out credits.

Shining a light on corporate emissions

Moving deeper to leveraging the power of markets, the China Securities Regulatory Commission (CSRC) announced at the beginning of 2018 that it plans to require mandatory environmental disclosure for listed companies and debt issuers by 2020. This would address the gaping lack of corporate-level emissions disclosure, and help investors better understand and address potential investment risks.

The Hong Kong and Singapore stock exchanges have each implemented ESG disclosure guidelines in recent years as investors pay greater attention to such risks. China following suit will help not only support its efforts to curb pollution, but also improve the international attractiveness of its markets.

Turning around lagging corporate ESG disclosure and performance

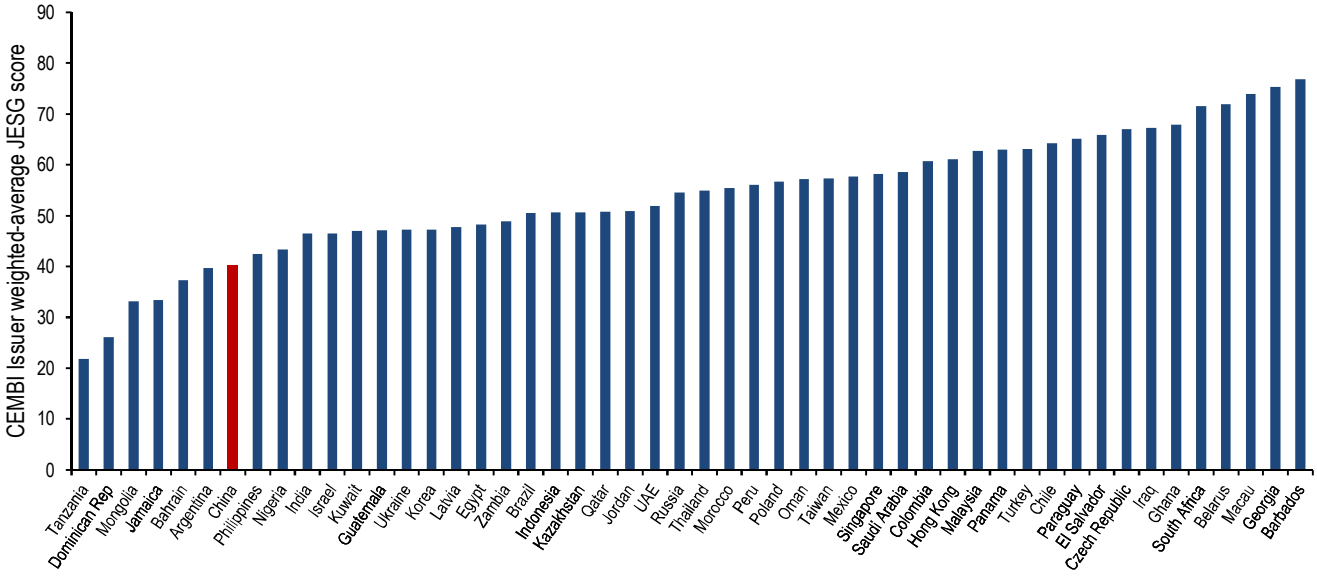
Chinese companies generally rank poorly on ESG performance, but that will change as regulatory focus and investor scrutiny increases. Chinese corporate and quasi-sovereign issuers' weak ESG performance are manifest in both the very low average J.P. Morgan ESG (JESG) scores they earn, and the significant underweighting they receive as a result in our JESG EMBI and JESG CEMBI emerging market debt indices (see *Introducing the J.P. Morgan ESG Index Suite (JESG)*, Gloria Kim et al., 18 Apr. 2018).

Chinese corporate bond issuers in our CEMBI index have one of the lowest weighted average JESG scores: 25% lower than the overall level of the baseline index and 30% lower than the ESG-tilted JESG variant. China has around

a 2 percentage point lower weighting in our JESG CEMBI index versus the baseline, the second lowest after Brazil, which has been plagued by past corruption scandals. China's weighting in the JESG EMBI index of sovereign and quasi-sovereign issuers is even worse at 3 percentage point lower, by far the biggest difference. It is worth noting that while the baseline EMBI Global Diversified index is around 80% sovereign issuance by market cap, quasi-sovereigns represent nearly 95% of China's inclusion. Improving ESG practices, particularly around policies and data disclosure, would help boost scores and issuer weighting.

As investors both domestically and internationally pay greater heed to ESG issues, and the Chinese government deepens its commitment to using the financial markets to achieve its environmental goals, all Chinese companies will be forced to respond.

Figure 3: China's lagging ESG scores



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Global Emerging Markets Research
J.P. Morgan Perspectives
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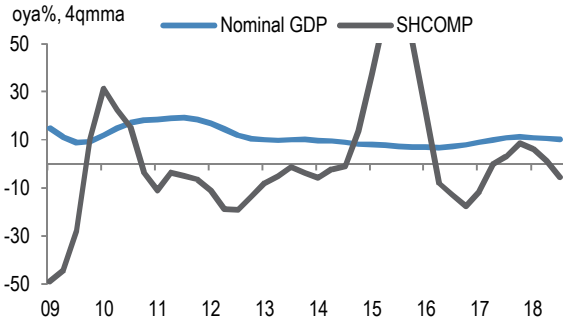
J.P.Morgan

China equity markets: Rising to international standards

- **China's equity market has diverged from its macro fundamentals.**
- **Underperformance is attributable to a number of factors, such as regulatory problems, dominant SOE sectors that are not profit oriented, a relatively closed capital account, and the investor base.**
- **Regulatory reform, institutionalization and openness are key to equity market development.**

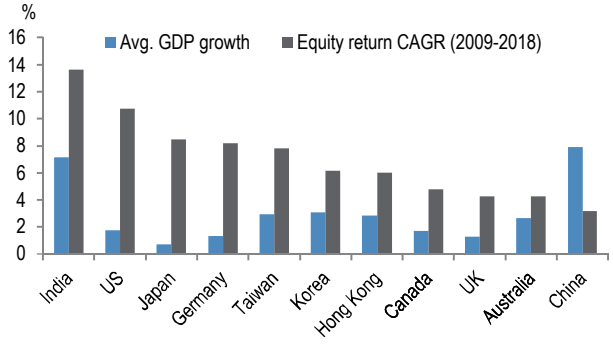
China's equity market performance has diverged from its macro fundamentals. Despite robust economic activity, China's stock market has significantly underperformed global peers since the recovery from the GFC. It is the only country amongst major markets where equity performance has lagged economic growth. SHCOMP has returned only 3.2% pa over the past 10 years, compared to over 10% for the S&P500. When compared to emerging markets such as India, China's stock market performance looks even worse. India has grown over 6% per annum over the past decade, and its NIFTY index has generated an annual return of 13.6% over the same period.

Figure 1: China GDP growth and SHCOMP index



Source: CEIC, J.P. Morgan

Figure 2: GDP growth versus Equity return



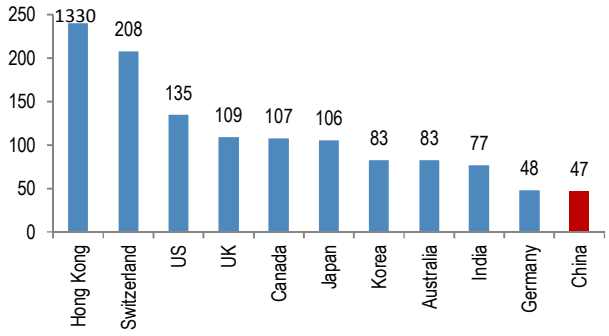
Source: Bloomberg, J.P. Morgan

The China equities underperformance can be attributed to a broad range of macro and micro factors, ranging from heavy government regulation, dominant SOE sectors that are not profit oriented, a relatively closed capital account, as well as the investor base. These issues are in part a reflection of China's equity market being relatively young and immature. As China continues to open up its financial markets, some of these issues will be addressed. Indeed, financial market reforms appear to be gathering pace and are at the forefront of China's push to open up domestic markets.

Still relatively young and small

While the Shanghai Stock Exchange's (SSE) history extends back to the 1860s, it is important to note that the exchange was shut down for roughly 50 years during the communist revolution. In its current form, the SSE and the Shenzhen stock exchange (SZSE) have only been in operation for 28 years (since 1990). In terms of size, the China equity market remains relatively small, at only 47% of GDP. That compares to over 100% of GDP for most developed economies. As such, the stock market still has many caveats, such as tight regulation on the IPO side but insufficient supervision on listed companies, the use of the equity market for fund-raising rather than for long-term investment, and a lack of long-term investors. Hence, the link between China's economic and equity performance tends to be weak.

Figure 3: Stock market cap as % of GDP (2018)



Source: Bloomberg, IMF.

Chinese household allocations to stocks are also low compared to other countries. For this generation of Chinese households, stock trading and public company investment are a relatively new concept. China households are underinvested in equities due a tradition of holding cash and property for security and retirement, as well as a lack of investment channels and capital controls. According to the Survey and Research Center for China Household Finance, housing represents close to 70% of household assets in China, while financial assets only

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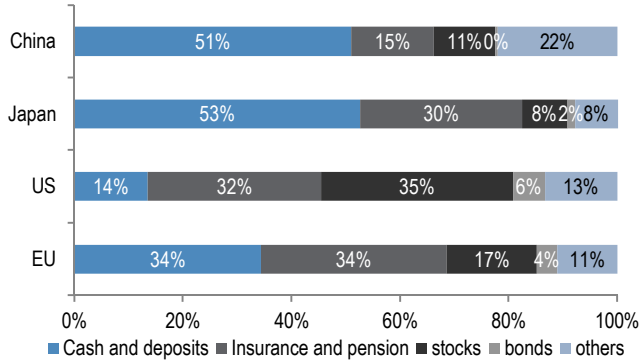
accounted for 12%. Within financial assets, cash and equivalents accounted for 51% and equity only accounted for 11%. As such wealth effects from equity returns have a limited impact on consumption in China, weakening the feedback loop between equity markets and the economy (see also Liao and Cheung).

Figure 4: China household financial assets allocation



Source: <China household financial asset allocation risk report - 2016>, SWUFE

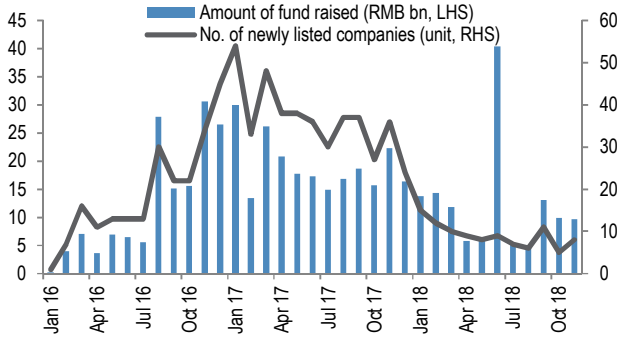
While household holdings of stocks are still small, the China equity market is highly driven by **retail investors** and the participation rate of institutional investors remains low. According to the Shanghai Stock Exchange, domestic individuals contribute to over 80% of the trading volume, whereas institutional investors account only for c.15%. The market is, therefore, highly speculative and volatile due to the dominance of the less fundamentally driven retail investors. This prevents some of the risk-averse and foreign intuitional investors, which are more fundamental driven, from entering the onshore stock market.

Regulatory reform still in progress

The highly-regulated primary fund-raising mechanism is one of the major overhangs for the development of the China equity market. China runs an approval-based system for IPOs, for which companies need to obtain CSRC approval before listing on the Shanghai/Shenzhen Exchange. To be fair, other equity markets also had high regulatory processes early on in their development stage. The British government enacted the Bubble Act in 1720, requiring a similar IPO approval process, which was in place for over a century, before it was repealed in 1825.

One issue of this approval system is that it has led to China equities being **skewed towards SOEs** (accounting for roughly two thirds of A-share market cap), which are less profit oriented than private enterprises (more details below). Secondly, the pace of IPO approval varies in different years, and the CSRC tends to slow the pace when market sentiment is weak. A-share IPOs were suspended in ten periods since 1994, mainly during the global and domestic market downturns. The regulator has pledged to speed up the approval progress and gradually transition to a registration-based IPO system. In November 2018, a science and technology innovation board was announced at the SSE to experiment with a registration-based system for IPOs. However, the number of IPOs has declined significantly in 2018 compared to 2017, amid the re-emerging internal and external risks (Figure 5).

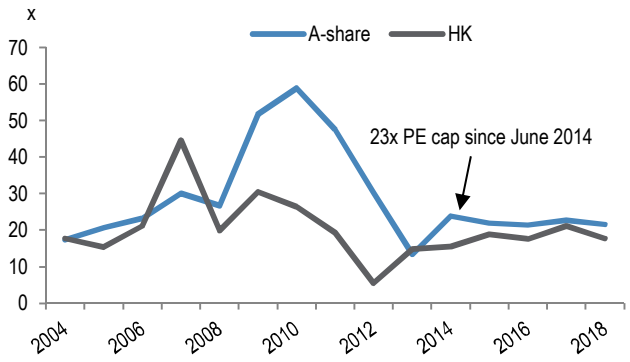
Figure 5: A shares IPO funds raised and number of newly listed companies



Source: CEIC, CSRC. Foxconn Industrial Internet debuted on 7 June 2018, raising USD4.3bn.

The approval-based IPO system leads to **artificially high IPO prices** in China, which limits the secondary market performance in the equity market. With regulators aware of this issue, an implicit cap on the P/E ratio was put on IPOs beginning in mid-2014. Since then, IPO valuations have become more in line with markets such as Hong Kong.

Figure 6: IPO P/E comparison (annual average of listed stocks)



Source: Wind, J.P. Morgan; Note: Excludes HK IPO with PE>200x or <-200x

Another problem in the regulatory framework is tight control in the IPO process, but lax supervision on listed companies and an absence of a de-listing system. As a consequence, the equity market has faced the problems of **inadequate corporate governance**, unreliable financial

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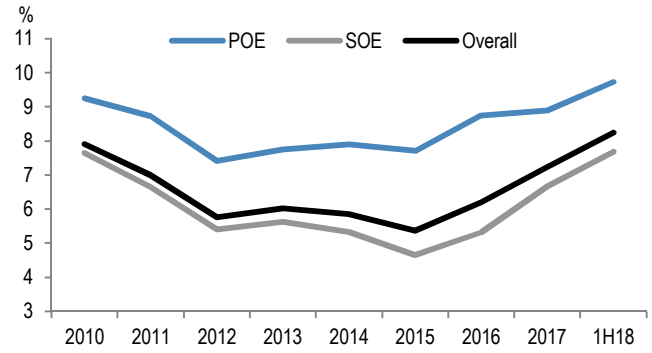
data and an insufficient penalty for company misconduct. The regulator has been aware of these problems and recent regulatory reform has focused on the reform of the IPO system (to a registration-based system), strengthening of supervision on listed companies, and a de-listing system. The reforms are still in progress.

SOE return to profitability

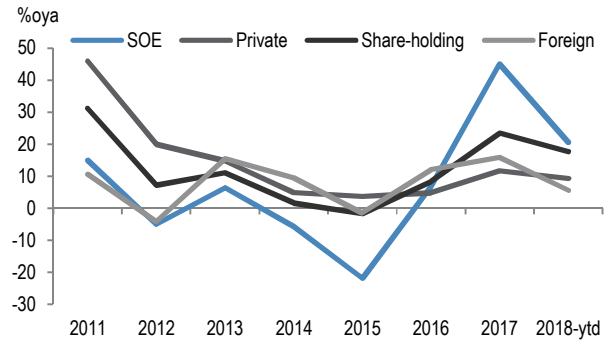
One issue limiting the A-share shareholder returns is high representation of SOEs, which have historically lagged private sector enterprises in terms of key profitability. Apart from the social responsibility aspect of SOEs (to maintain employment) that limit the focus on profits, macro factors such as overcapacity issues stemming from GFC stimulus led to a deflationary environment over 2012-2016, particularly in the upstream sectors where SOEs are highly concentrated. The situation has started to change in the past two to three years when overcapacity reduction, especially in steel and coal industries, became a priority task. The progress has helped end the 54 months of continuous PPI deflation and benefited most SOEs in the upstream industries.

Figure 7: A-share EBIT margin comparison (excl. Financials)



Source: Wind, J.P. Morgan

Figure 8: Industrial profit growth by type



Source: NBS, J.P. Morgan

Looking ahead, SOE reforms such as mixed ownership and transfer of SOE shares to the National Social Security Fund (NSSF) are some of the measures aimed at increasing the viability, governance and accountability of SOEs to shareholders. The pilot program of mixed ownership reform was announced in 2016, with select SOEs from specified sectors such as telecommunication, defense and energy, and is set to be expanded to a broader range of sectors. Indeed, the ability to provide a market-based exiting scheme for "zombie companies," if implemented, will be a key driver for SOE profitability in the coming years.

Corporate governance and transparency

The divergence between equity market and macro performance also reflects confidence issues in terms of corporate governance and transparency. Looking at the global Corruptions Perceptions Index, China ranked 77th globally, modestly improving (excluding the 2014 outlier) since President Xi took office and enforced an anti-corruption campaign. While the index is a measure of public sector corruption, it creates additional uncertainties and risks even among private enterprises that are unmeasurable by fundamentals. Anti-corruption is a positive as it addresses this problem in the long run, but in the near term could be negative news. In general, the announcement of high-profile corruption investigations not only affects the company being investigated, but also related sectors and companies with similar profiles.

Figure 9: China's corruption perception ranking

Source: Transparency International, J.P. Morgan

Another somewhat unique feature of the Chinese equity markets, related to corporate governance, has been concerns over the **relative ease of stock trading suspensions** in the A-share market. During the 2015 stock market crash, an astounding 1,346 stocks (out of the 2,808 A-share universe), were suspended from trading, limiting investor ability to mitigate the downturn. The issue is a significant risk for foreign investors, and was a key issue

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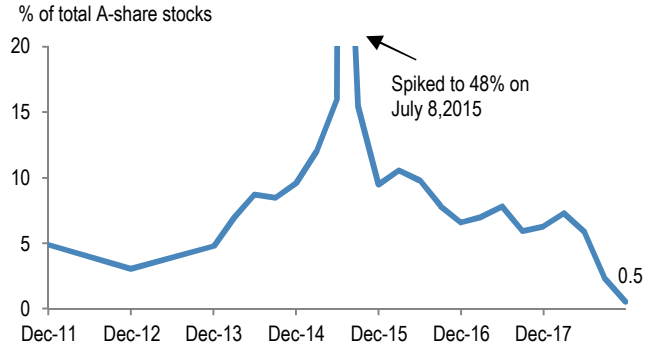
in A-share inclusion in indices such as MSCI (see also Panigirtzoglou and Inkinen). Strengthening regulation on disclosure and suspension has been a primary condition for further expansion of A-share inclusion in various indices, and progress has been made over the past year. In November 2018, CSRC announced new draft regulations to limit random suspensions, shorten the suspension periods, and increased disclosure requirements. In addition, share buyback rules where announced in September 2018, broadening the circumstances under which share buybacks are allowed, giving companies an alternative to share suspensions in managing equity market downturns.

Figure 10: % of trading suspension stocks in A-share



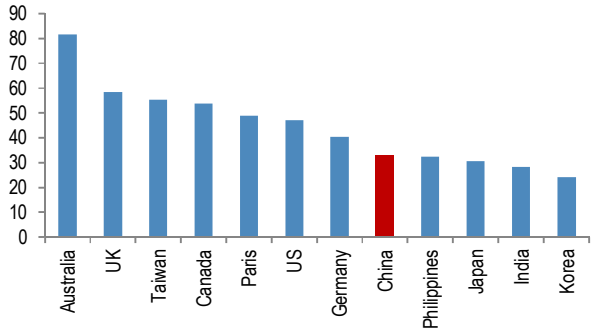
Source: Wind, J.P. Morgan

Institutionalization and openness key to further development

Looking ahead, apart from the issues mentioned above, **structural reforms are still needed** to elevate China's equity market efficiency in line with global peers. Indeed, financial market openness and increasing foreign participation in China's domestic market can accelerate the development process. The ongoing financial reform also reiterated that a healthy market for direct financing (including equity and bond markets) is a priority area to change the landscape of China's financial sector in the long run.

Increasing long-term investors, and reducing market speculation: Introducing long-term capital to China's domestic markets will reduce volatility and act as a market stabilizer. One way to increase the attractiveness of China's stock market to long term investors, such as insurance companies and pension funds, are by increasing dividend payout ratios. China authorities have been encouraging listed firms to increase their cash dividends payout over the past years. According to CSRC, 70% of all listed companies have declared a cash dividend in 2017, with a total amount of CNY980bn being paid. The overall dividend payout ratio for CSI300 was 33%, up from 28% in 2008. That said, the payout ratio for A shares is still low compared to some of the major stock markets (Figure 11). While international investors are generally investing in emerging markets for growth rather than dividends, the improving dividend payout is one of the key parameters, which reflects the financial health and quality of the companies.

Figure 11: Dividend payout ratio (%)



Source: Bloomberg.

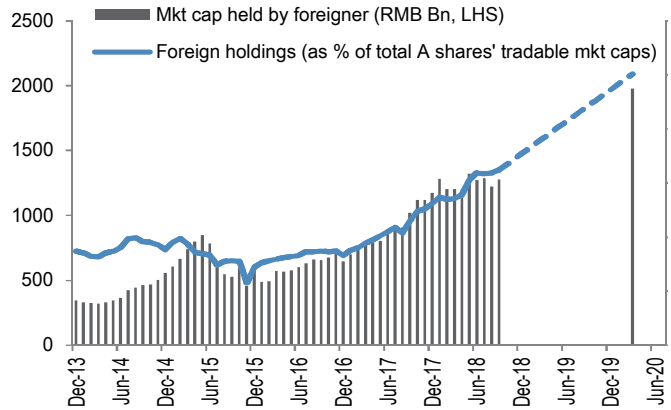
***Increasing foreign/institutional participation*:** China A shares are playing an increasingly important role in the global capital market amid the gradual opening of the financial industry. While the foreign investor participation rate is still low, at only 3% of the A Share market held (Figure 12), we expect further de-regulation of the equity market and increasing product variety will attract more foreign investment in the long run.

Chinese authorities have taken some important steps on financial market opening in 2018. Major announcements include 1) lifting the monthly 20% cap on fund outflows for QFII/RQFII investors and removing the lock-up period for investment principal, 2) removing the aggregate quota of the stock connect, and lifting the northbound and southbound daily quota to CNY52bn and CNY42bn (from CNY13bn and CNY10.5bn) respectively, and 3) approving the listing of China Depositary Receipts (CDR), which allow foreign companies, including the overseas listed Chinese companies, to list onshore. In addition, the potential launch of the London-Shanghai Stock Exchange will mark a major milestone to connect China with the global capital markets.

Given broader and better access to the A-share market, major global index companies have started or have planned to include A shares into their benchmark indices. In particular, MSCI started to include China A shares in its benchmark indices in June 2018. The current inclusion factor is 5%, and MSCI has already announced a plan to

raise the inclusion factor to 20% in its May 2019 review. Meanwhile, FTSE has also announced to include A shares with an inclusion factor of 25% on June19, September19, and March 2020 (see also Panigirtzoglou and Inkinen). Our derivative team forecasts total passive fund inflows of USD15.5bn, and USD100bn if include the active flows.

Figure 12: Foreign holdings as % of total A shares' tradable market cap



Source: Shanghai Stock Exchange.

Accelerating financial market openness: Related to increasing foreign and institutional participation in the A-share market is the acceleration of financial market openness. Opening up of the banking, broker, asset management and insurance industries to foreign companies will help establish institutional knowledge in China's financial markets (see, *China announced opening policies for financial sector*, H. Zhu et al., 11 Apr 2018).

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Global Emerging Markets Research
J.P. Morgan Perspectives
31 January 2019

J.P.Morgan

China fixed income markets: Too big to ignore

- **China Government Bonds (CGBs) offer international investors: 1) a return-volatility ratio commensurate with both a global cross-asset portfolio and a global government bond portfolio; 2) real long-term yields reasonably compensating for China's rising public debt and the narrowing current account balance; and 3) low cross-correlation with other DM and EM bond markets.**
- **China's policy rates can be expected to stay low for long in the context of moderating growth and limited inflation pressures.**
- **But the scope for CNY FX outperformance to enhance total bond market returns appears limited beyond the normalization in an arguably expensive global USD, and shorter-term events related to a trade war truce and China's fiscal stimulus.**
- **Foreign participation in the onshore corporate bond market should accelerate if there is wider credit differentiation and a more transparent regulatory framework.**

Third largest bond market

China's debt markets are now too big to ignore with a size of $12tr and third only to US and Japan in absolute terms based on the latest BIS statistics (Figure 1). The 20% annualized growth in market capitalization over the past five years was driven by government- and financial-bond issuances. CGBs offer international investors:

a) a return-volatility ratio commensurate with both a global cross-asset portfolio and a global government bond portfolio(Figure 2);

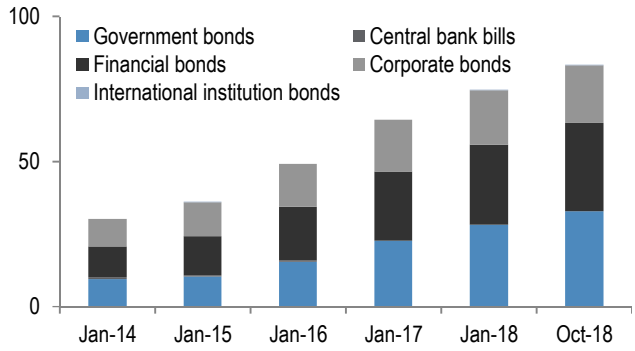
b) real long-term yields reasonably compensating for China's rising public debt and the narrowing current account balance (Figure 3); and

c) low cross-correlation with other DM and EM bond markets (Figure 4).

Monetary accommodation for long

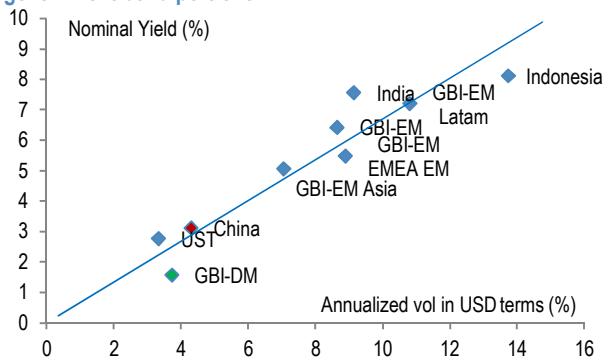
China's onshore bonds delivered 7.4% pa total returns in USD terms in the decade ending 2014 with the currency contributing an annualized 2.9ppts. However, the total returns slumped to a meager annualized 0.6% in the following four years as a weaker currency debited 2.5pts. With China's monetary policy settings expected to stay accommodative in the context of moderating growth and the search for a new growth model, the scope for currency out-performance would appear limited beyond normalization in an arguably expensive broader USD FX, and shorter-term events related to a trade war truce and China's fiscal stimulus.

Figure 1: China's domestic debt market grows exponentially
CNY trillion



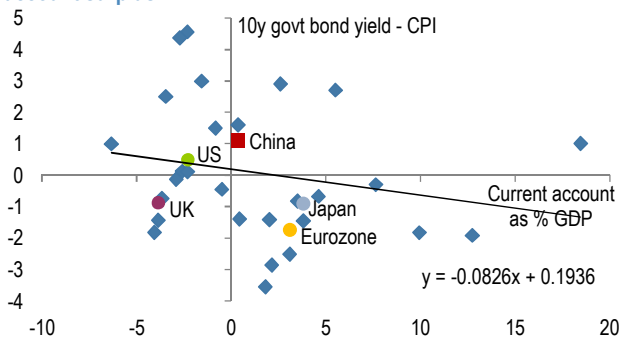
Source: PBOC, J.P. Morgan.

Figure 2: 10yr CGBs risk-reward commensurate with a global government bond portfolio



Source: Bloomberg, J.P. Morgan.

Figure 3: China's real yield still favorable despite a fading current account surplus



Source: Bloomberg, J.P. Morgan

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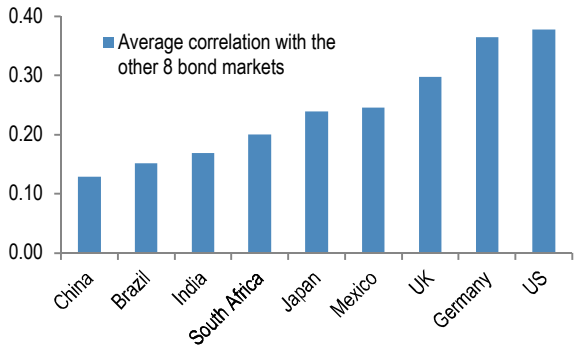
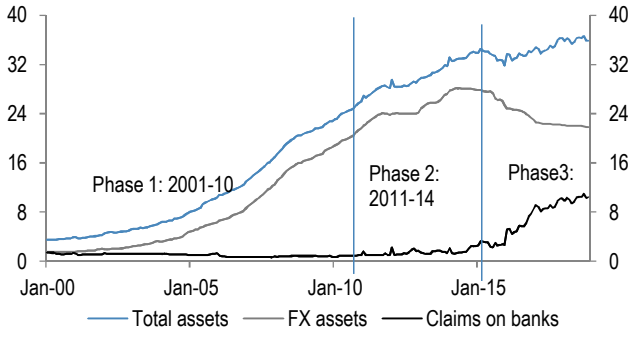
The PBoC's policy stance viewed through the prism of its balance sheet has had three distinct phases over the past two decades (Figure 5): Phase 1 over 2001-2010, when Chinese real GDP growth averaged 10.5% p.a. and during which total assets expanded at 21% p.a. and foreign assets by 30% p.a. as China's current account averaged 5.2% of GDP and the capital account 3.2%; Phase 2 over 2011-14 which saw real GDP moderate to 8.1% p.a. and during which the CB's total assets growth stepped down to 7.0% p.a. and foreign assets to 6.0% p.a.; and Phase 3 over 2015-18 which has witnessed real GDP slow further to 6.8% p.a. and during which CB's total asset expansion has flat-lined at 2% p.a. even as foreign asset growth has shrunk 5.0% p.a. amidst a modest current account surplus of 1.6% of GDP. Phase 3 set in motion a declining trend in the ratio of the PBoC's net foreign assets to net domestic assets—a development which appears set to continue, underpinning rates but not CNY FX in the medium term.

Figure 4: China bond market least correlated with global peers
Weekly correlation of GBI/GBI-EM local index returns



Source: J.P. Morgan.

Figure 5: Ratio of net domestic assets in PBoC's balance sheet has been on a trend increase
CNY trillion



Source: PBOC, J.P. Morgan.

Offshore participation

Foreign investors doubled their holdings in China bonds from $123bn in Dec-16 to $254bn in Sep-18 or a still miniscule 2% of total outstanding stock. This followed the enhancement to the Bond Connect Scheme, the exemption from corporate income tax and VAT on interest gains on all bonds for a three-year period, and growing access to onshore FX instruments. In March 2018, Bloomberg announced a plan, confirmed today January 31, to add Chinese government and policy bank bonds to the Bloomberg Barclays Global Aggregate Index, with an estimated $6bn of monthly inflow to occur for 20 months starting April 2019. Meanwhile, FTSE Russell is set to review the inclusion of Chinese bonds into its global indexes in March 2019, which could generate $150bn of inflows over time from WGBI alone. Finally, J.P. Morgan's Index team has confirmed that China would be re-assessed for eligibility in the GBI-EM Global Diversified in 2019. Successful index inclusion could generate around $2.3bn of monthly inflows for 10 months assuming China has 10% weight in the EM local markets benchmark. Further discussion on this topic in Kim et al and Panigirtzoglou and Inkinen.

Prospect of 'reserve currency' status

IMF COFER data show that only 1.8% of global FX reserves are in the Chinese Renminbi as of Q3 2018, which is much lower than the China's share of GDP and trade in the world. Running a current account surplus does not seem to be a necessary condition of being a reserve currency based on the evidence of the US and UK. China's lower and more stable inflation trajectory makes the currency a proper store of value. If China's share of global FX reserves rose to 10% (RMB's weight in the SDR basket), foreign ownership of China bonds would go up by four-fold to over $1trn. See also Hui above.

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Global Credit Research
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31 January 2019

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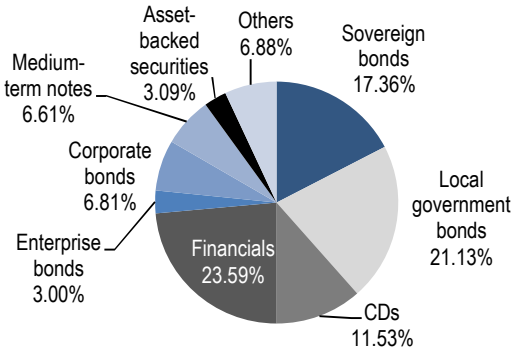
China corporate bond market: New investment opportunity

- **We believe that China's onshore corporate bond market will evolve into an important funding source for corporates, as in other developed markets. This should also entice more foreign participation that could accelerate the development of the market.**
- **The onshore bond market is highly concentrated in AAA and AA-ratings and does not provide much credit differentiation. The entry of foreign rating agencies and stronger regulation can play key roles in this regard. And on Jan 28, the PBOC announced it had approved for S&P Global to rate bonds in the onshore market.**
- **While painful in the near term, the recent rise in the onshore default rate signals a maturing market. A more rule-based and consistent regulatory framework should also increase the appeal of onshore corporate bonds to foreign investors.**
- **The eventual opening and maturing of the onshore bond market should thus open up an even bigger space for foreign investors. It would also allow investors more flexibility to allocate between onshore and offshore markets, depending on their currency and rate views.**

An alternative funding source

We believe that China's onshore corporate bond market will evolve to become an important funding source for corporates, as in many developed markets. While it has grown to RMB86 trillion, the domestic market is still largely made up of central and local government bonds, as well as bonds issued by financials. Corporate enterprise bonds and MTNs make up only around 16% of the outstanding total (Figure 1). More developed capital markets should translate into greater efficiency in capital allocation. A gradual opening of the onshore bond market to foreign capital should also hasten the development of the market in coming years. For the banking sector, such disintermediation may create challenges, but this could be supportive of borrower discipline to the extent bank lending is potentially subject to government directive. At the moment, capital markets make up only a small share of total social finance, at 14.2%. This compares with 72.3% for bank lending. Greater options for financing in the bond market may eventually challenge banks' loan growth. However, fundamental concerns may be offset if banks are relieved of "national service" obligations that influence lending decisions.

Figure 1: Breakdown of China onshore bond market



Source: WIND.

Need to see bigger credit differentiation

One development that could help the onshore bond market to mature would be increasing credit differentiation. Currently, **credit ratings** of the onshore bond market are skewed toward AAA ratings, which make up close to 58% of bonds outstanding, while bonds rated AA make up another 32% (Figure 2). Such a high concentration in the highest categories discourages investors from sufficiently distinguishing between credit profiles. Ironically, some credits that carry AAA-ratings onshore are rated high yield in the USD bond market by international credit rating agencies. Such **wide rating differentials between the onshore and offshore rating** has called into question the creditability of the onshore rating process.

Ratings agencies and regulation can play a key role in greater **credit differentiation**. On January 28, the PBOC announced it had approved S&P Global to start rating bonds in the onshore interbank market and support more foreign credit rating agencies to enter the Chinese market. Separately, reform of domestic ratings agencies is already underway, as the China Securities Regulatory Commission (CSRC) last year suspended Dagong Ratings for one year. Dagong was charged with offering consultation services to firms seeking ratings, in addition to providing false information to the National Association of Financial Market Institutional Investors (NAFMII), a body that oversees the interbank market and is backed by the PBOC. *Caixin* reported on January 7 that further regulation of the ratings industry may be on the way, as NAFMII is now planning to introduce rules regulating conflicts of interest and disclosures in the ratings industry. We believe such steps, combined with the growing

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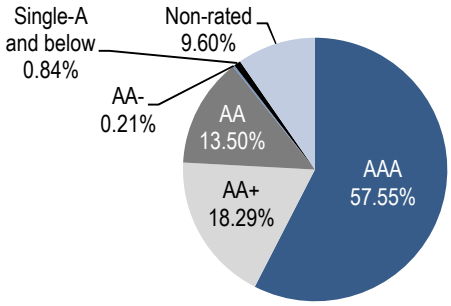
presence of global ratings firms onshore, will be supportive of a more differentiated credit market.

Figure 2: Onshore rating breakdown of corporate and enterprise and MTN

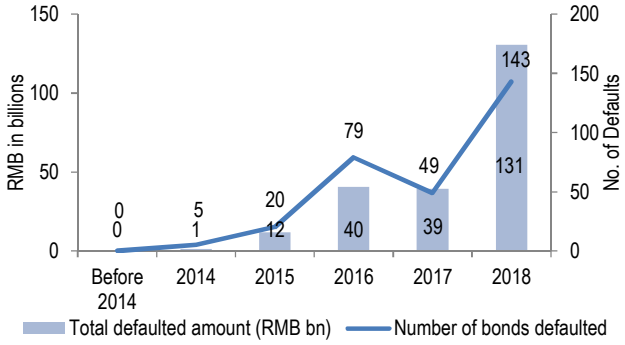


Source: WIND.

Rising onshore default rate is positive in the long-term

We believe that the **rising default rate** in the onshore bond market would also force investors to exercise greater credit differentiation. The onshore bond market saw its first default only in 2014, but defaults have since been rising steadily as regulators intervene less and move towards a more market-based regime. The 143 bonds that defaulted in 2018 still total a mere RMB131 billion (or less 1% of total outstanding, (Figure 3). But we expect the rising trend to continue, partly due to a more challenging economic backdrop and less intervention by the regulator. The ensuing improvement in credit differentiation, or wider spread between IG and HY paper, should eventually attract new foreign investors and deepen the domestic corporate bond market, reducing the over-reliance on the banking sector for funding.

Figure3: China's onshore bond market has seen a rising default rate in recent years



Source: WIND.

Evolving regulatory framework

A more rule-based and consistent regulatory framework should also make onshore corporate bonds more appealing to foreign investors. The domestic market is heavily controlled by overlapping regulators (i.e., the National Development and Reform Commission, the China Securities Regulatory Commission, the PBOC and National Association of Financial Market Institutional Investors). Besides such a complex regulatory framework, investors also have to contend with frequent changes in regulations that have amplified volatility in the onshore corporate bond market. One example is regulation on bond issuance by China property developers, which are heavily dependent on the capital market given restrictions on using bank loans for land acquisition. After a surge in issuance in 2015 and 2016 due to a relaxation on regulations, the sector faced considerable refinancing risks in 2018 as the bulk of these issues were maturing at the same time the approval process was tightened. This forced China developers to flock back to the offshore bond market for refinancing, subject to the NDRC approvals. Time limits imposed on such NDRC approvals have occasionally led to lumpy issuance, especially toward year end, and wild swings in the market, as happened in 4Q18 when two-year double-B China property bonds were issued at high single-digit and single-B at near mid-teens, both of which could be considered distressed levels (Figure 4).

Figure 4: Regulatory changes have amplified volatility of China HY property bonds in recent years

Source: J.P. Morgan

We believe that the maturity of the onshore bond market could be viewed as an alternative investment opportunity for foreign investors, which have thus far focused largely on the offshore bonds issued by Chinese corporates. We have seen China emerge as the largest Asian issuer in the offshore USD bond market. Total market capitalization of China issuers in the J.P. Morgan Asia Credit Index ("JACI") grew from $25bn at the end of 2010 to $455bn

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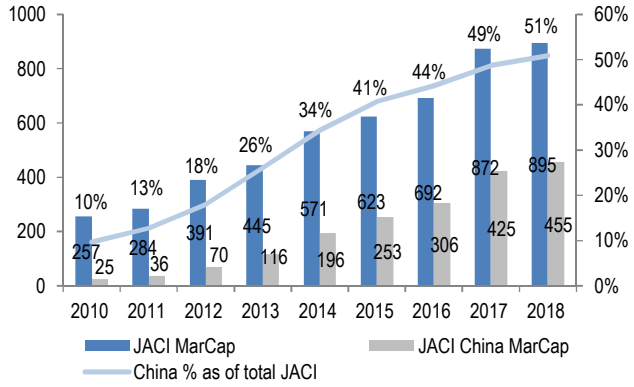
as at the end of 2018, accounting for 51% of the JACI (Figure 5). While we expect the China USD bond universe to continue to expand, we believe it will remain smaller than the country's onshore bond market. The eventual opening and maturing of the onshore bond market should open up an even bigger investment space for foreign investors. It would also allow investors greater flexibility to allocate between onshore and offshore, depending on their currency and rate views. Real estate and property developers in particular are especially likely to benefit. This is because they have been some of the largest issuers into the USD bond market. China's four largest banks have a total of RMB3,797bn, or 7% of their loan portfolio, in loans to the property and construction sectors. Development of the onshore bond market would diversify funding options for higher-quality companies that had previously relied on either bank loans or USD funding.

Figure 5: China USD offshore bonds outstanding



Source: J.P. Morgan

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Implications for global macro investing

- **For almost two decades, "the China trade" has animated both bulls and bears. From the early 2000s to the GFC, China's +10% growth rate drove the commodity supercycle narrative, with positive spillovers to many EMs. For most of the post-GFC era, China's deleveraging process has driven bearishness around the renminbi, the metals complex and Chinese equities.**
- **But over the past two years, the China trade has become more complicated. Bearishness around some China assets has persisted due to incomplete deleveraging, the US-China trade war and China's loss of a current account surplus. Bullishness comes from tech sector opportunities around the Made in China 2025 agenda, market liberalization and China's inclusion into major equity and bond benchmarks.**
- **This note focuses on the interaction of these forces to decide how to treat China in a cross-asset portfolio over the next several years. Successful execution of the 2025 agenda probably renders MSCI China a structural overweight, though without corresponding strength in the currency. Regardless of the 2025 agenda, it still seems appropriate to think of Base Metals and Metals and Mining stocks as inferior cyclical assets, despite their cheapness. As long as the slowdown in Chinese fixed investment continues, China-related Cyclicals will keep on underperforming within Equities.**
- **Should the 2025 agenda fail or be delayed materially due to the US-China conflict, shorting the currency offers better risk-reward than underweighting Chinese Equities given relative valuations.**

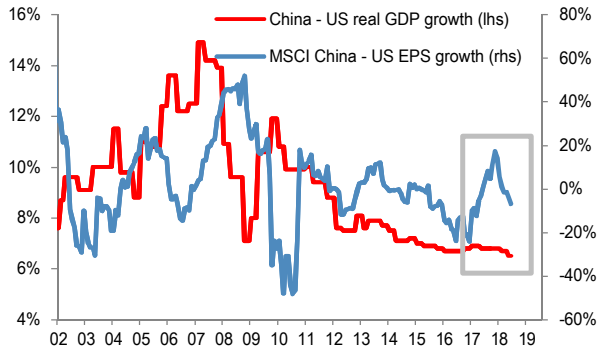
The many phases of "the China trade"

For almost two decades, "the China trade" has animated both bulls and bears. From the early 2000s until the Global Financial Crisis, China's +10% growth rate and resource-intensive development informed a supercycle narrative that drove hyperbolic moves in the commodity complex and many EM assets (see also Kaneva and Shearer). The subsequent deleveraging process spawned a post-Lehman bearishness that typically involved some combination of underweight positions in Chinese Equities, Credit and the renminbi.

Figure 1: Boom-bust cycle in China fixed investment growth has driven similar swings in Base Metals and Mining stocks
China fixed asset investment growth versus JPM Base Metal Price Index and MSCI Metals & Mining stocks index; % change yoy all series

Source: J.P. Morgan

Figure 2: Except for 2017's tech-related surge, relative China-US EPS momentum has tracked relative real GDP growth
Differentials between China-US real GDP and EPS growth



Source: J.P. Morgan

Figure 3: Similarly, relative equity performance has also tracked growth differentials except in 2017
China-US real GDP growth differential versus MSCI China-US returns

Source: J.P. Morgan

Cross-currents over the past two years have made the China trade more complex: incomplete deleveraging, the US-China trade war and China's loss of its current

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account surplus sustain some investors' pessimism, while the rise of a tech-dominated equity market plus capital markets liberalization have motivated longer-term structural optimism. This note focuses on the interaction amongst these forces to decide how to approach China in a cross-asset portfolio over the next several years.

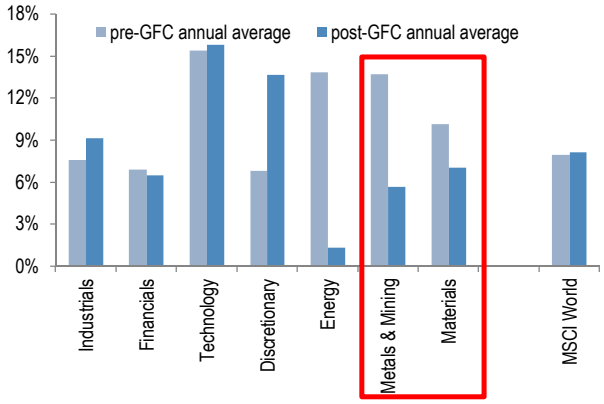
Boom-bust cycles and the China trade

Behind the hyperbole from both China cheerleaders and critics, **the China trade** for global investors has involved positioning around an atypical boom-and-bust leverage cycle plus a complicated structural transformation. Figures 1 to 9 and Table 1 trace some of the stylized facts around the Chinese economy and global markets as these themes have evolved over the past two decades.

The early 2000s to 2009 delivered the boom, characterized by a +10% annual growth rate on real GDP; +25% growth in fixed investment; superior earnings growth, multiple expansion and equity returns versus the US; roughly +25% annual gains on Base Metals and Metals and Mining stocks; +30% annual gains on MSCI China; 3% annual gains on the renminbi and about 8% annual returns on USD-denominated Chinese corporate credit and CNY-denominated government debt (Table 1 and Figures 1 to 3).

The 2010 to 2018 period has delivered a bust with uniquely Chinese characteristics. The economy now expands at 6% (half the pre-GFC pace, with fixed investment growth at only 6% (one-fourth the pre-GFC base). Thus, Chinese earnings growth has also slowed relative to the US, and its equity market has de-rated relative to the S&P500. Average annual returns on Base Metals and Mining stocks have been about -2% since 2010 despite the second-longest global expansion in post-war history. Annual returns have been about 5% on MSCI China, 6% on Corporate Credit and 0.2% on the currency (+3% per annum with carry).

Figure 4: China's fixed investment slowdown has created a two-tier set of cyclical sectors in global equities
Average annual returns on MSCI cyclical equity sectors pre and post-Global Financial Crisis



Source: J.P. Morgan, MSCI

Anyone familiar with the anatomy of leverage cycles should realize how atypical these patterns are. No country that has accumulated debt as rapidly as China (for example, a 65-percentage point of GDP increase in

Table 1: Until the 2018 trade war, Chinese Equities had been a relative winner from the economy's structural transformation, while the resource sector and the currency had been losers
Annual performance of economic and financial variables in the pre and post-GFC era

	China real GDP growth	China-US real GDP growth	China FAI growth	Tech sector share in MSCI China	Base Metals prices, change	Metals & Mining stocks, returns	MSCI China, returns	CNY vs USD, spot return	CNY vs USD, total return	China Corp Credit (CEMBI), returns	China Gov't Bonds (GBI-EM), returns
2002	9.6%	7.4%	23.4%	4%	5%	-5%	-16%	0%	2%	NA	NA
2003	10.0%	6.7%	29.6%	3%	34%	61%	78%	0%	0%	4%	NA
2004	9.8%	6.4%	28.9%	3%	23%	16%	0%	0%	-1%	6%	-2%
2005	10.8%	7.3%	27.8%	4%	30%	35%	16%	3%	2%	2%	17%
2006	12.2%	9.8%	26.6%	2%	52%	35%	79%	3%	4%	7%	7%
2007	14.2%	12.0%	26.8%	2%	-8%	41%	62%	7%	6%	5%	4%
2008	9.6%	9.6%	26.8%	3%	-50%	-59%	-52%	7%	7%	-11%	23%
2009	10.6%	13.6%	32.1%	6%	93%	87%	58%	0%	1%	43%	-3%
2010	9.9%	6.7%	24.9%	5%	17%	21%	4%	3%	2%	17%	5%
2011	9.4%	8.5%	24.5%	6%	-17%	-28%	-20%	5%	4%	-5%	10%
2012	7.5%	5.0%	20.7%	6%	3%	-2%	18%	1%	3%	22%	3%
2013	7.9%	6.0%	19.9%	11%	-8%	-17%	0%	3%	7%	-1%	1%
2014	7.1%	4.1%	15.8%	12%	-7%	-21%	4%	-2%	0%	8%	7%
2015	6.9%	4.5%	10.2%	23%	-24%	-39%	-10%	-4%	0%	5%	3%
2016	6.7%	5.2%	8.3%	32%	21%	49%	-1%	-7%	-2%	6%	-3%
2017	6.8%	4.5%	7.2%	41%	30%	30%	52%	7%	12%	5%	2%
2018	6.5%	3.5%	5.9%	36%	-19%	-18%	-4%	-3%	-1%	-1%	2%

Pre-GFC boom

Post-GFC bust

Source: J.P. Morgan

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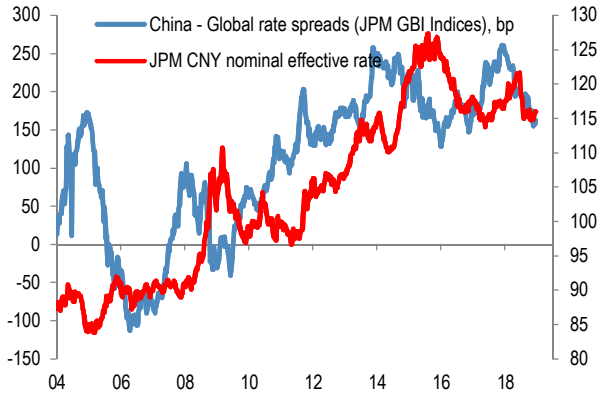
corporate debt in the past decade) has escaped recession, a bear market in Equities, credit losses due to surging defaults and at least double-digit currency depreciation. Either the payback is still to come, or a mixed economy with partial capital controls, a largely state-owned banking sector and $3trn in forex reserves (though down from a peak of $4trn) is uniquely equipped to stage-manage this process. Slower growth and sub-par asset returns are unavoidable, but a recession and high-volatility asset deflation can be averted.

This is why we have always approached the China trade selectively in global portfolios. China's ability to manage the deleveraging process indefinitely through controls and reserves always suggested to us poor risk-reward on positioning for materially-higher credit stress or substantial currency weakness (i.e., at least 10% more than the forwards). However, the inevitability of a growth slowdown and China's policy intent to rebalance away from fixed investment suggested several external casualties like Base Metals, Metals and Mining stocks and some commodity currencies (AUD/USD), which we have tended to be neutral-to-underweight rather than neutral-to-overweight, even while the global economy was expanding above trend. The idea was that China's rebalancing created two-tiers of cyclical assets globally, which is why it was logically consistent at times to overweight MSCI China within global portfolios during a global expansion (on the tech sector's structural ascent), even while underweighting parts of the commodity complex.

Structural transformation complicates the China trade

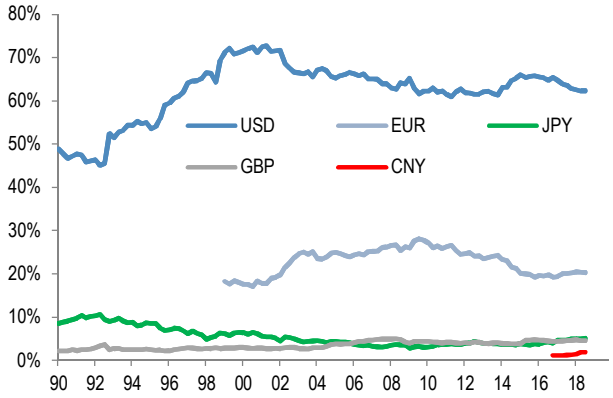
The question of how to treat China in global portfolios has become more complex over the past two years, due to conflicting cyclical and structural trends. For the bears, China's incomplete deleveraging process—corporate debt to GDP has merely stabilized near a record 165% rather than begun declining—has been prolonging the economy's deceleration, even before the US-China trade war began a year ago. Also, China's current account surplus had declined steadily from a high of 10% of GDP in 2007 to about 0.5% of GDP now, at a time when Fed tightening had erased the renminbi's former interest rate advantage over the dollar (Figure 5). Collectively, these factors have tended to sustain negatively towards the currency and the metals/bulk commodity complex.

Figure 5: A diminishing current account surplus has rendered CNY more vulnerable to a diminishing interest rate differential
China minus global bond yield differentials vs CNY nominal effective exchange rate. Yields based on JPM Bond Indices



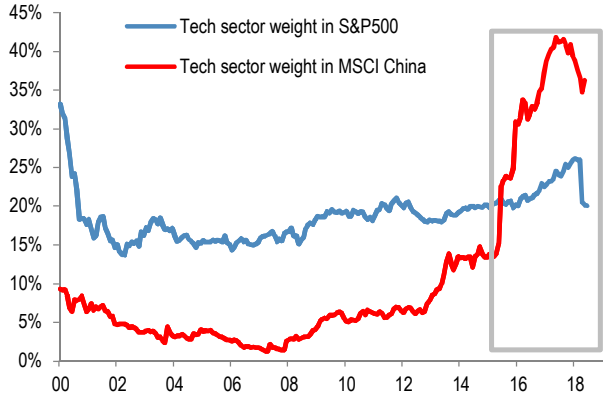
Source: J.P. Morgan

Figure 6: CNY's share of reported central bank reserves is a trivial 2%, which is disproportionately small relative to the size of the Chinese economy
Currency shares of central banks' reported foreign exchange reserves



Source: J.P. Morgan, IMF COFER

Figure 7: Since 2017, the technology sector's weight is larger in MSCI China than in the S&P500
Tech sector weights in S&P500 and MSCI China



Source: J.P. Morgan

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For the bulls, structural positives related to the prospects for offsetting capital inflows for both equity and fixed income markets, partly related to market liberalization and partly to secular growth trends. Market liberalization promised greater passive inflows into equities as China A shares entered MSCI benchmarks, and into fixed income when local currency bonds enter fixed income indices or global reserve managers reallocated from US dollars (Figure 6, and Kim et al. above). The secular growth thesis involved both the emergence of large-cap Chinese technology/e-commerce companies (Tencent, Alibaba, Baidu) and prospects for President Xi's Made in China 2025 initiative to transform China into an advanced manufacturing leader by targeting 10 emerging sectors such as robotics, clean-energy vehicles and biotechnology. This agenda also envisions taking public 150 unicorns, or privately -held companies valued at $1b or more each. Since 2015, when President Xi first annunciated the Made in China 2025 agenda, the weight of tech/e-commerce companies in MSCI China has spiked from 15% to 40%. This share surpasses the tech sector's 20% weight in the S&P500 currently as well as that sector's 35% share during the dot-com bubble era of the late 1990s (Figure 7).

Flow trends also reflect these cross-currents. Foreign buying of Chinese equities and local currency bonds each surged to a record $30bn per quarter in 2017 (Figures 8 and 9), which is equivalent to about 1% of GDP for each product. The US-China trade war has curbed these cross-border flows materially over the past year, with bond inflows dropping by two-thirds and stock inflows reversing into outflows.

The Made in China 2025 trade: treat China markets like Japanese ones

If the Made in China 2025 agenda survives the US-China trade war, the China trade will probably involve some combination of overweighting Chinese equities and local currency bonds but underweighting the currency, similar to how some global investors have thought about Japan at times. As discussed above by Zhu et al., China's next decade will probably involve the following: a further fall in real GDP growth to ~5% over the next five years and lower over the next decade; a current account balance in deficit; and the possibility of near-zero policy rates to manage the country's debt burden. This baseline assumes success/failure on the Made in China 2025 agenda, but nonetheless anticipates that the authorities' catch-up ambition of matching the US economy's size will be delayed. Assuming US nominal GDP growth averages 4%, China's GDP deflator at 3%, and cumulative renminbi depreciation of 10%, China will be 80% of US economy by 2025 and about 90% by 2030.

Figure 8: During China's tech boom, net foreign purchases of equities reached about 1% of GDP on an annualized basis
Net foreign purchases of Chinese equities vs MSCI China index

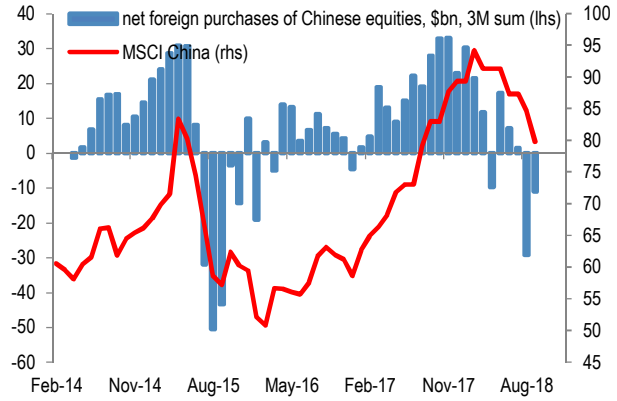

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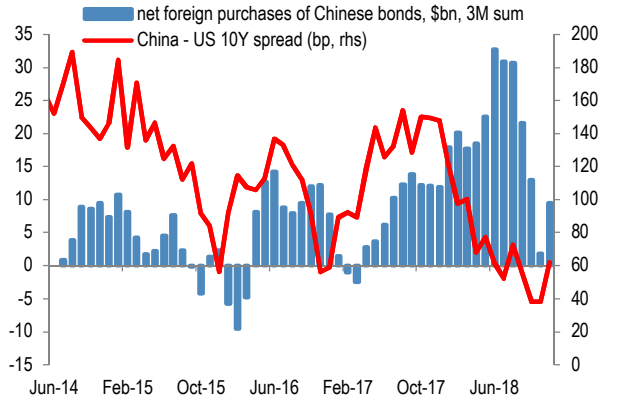
Figure 9: A diminishing interest rate differential may have dented cross-border flows into Chinese local currency bonds
Net foreign purchases of Chinese local currency bonds vs China-US 10Y yield spread



Source: J.P. Morgan

This medium-term outlook should sound mildly Japanese, given that country's lost decade of the 1990s following the bursting of the twin stock market and real estate bubbles. Like China's experience thus far, Japan too avoided recession after a leverage build-up but Japan's hangover era involved a decline in policy rates to about 0% as well as a decade of near-zero nominal GDP growth. The Nikkei remains about 50% lower than its 1989 peak, but the currency about 25% stronger in real effective terms.

An important potential difference for the Japanese and Chinese equity markets during their respective deleveraging phases is that Japan never implemented concurrent structural reform initiatives. Japan's best but still incomplete attempt at structural reform only came 20 years later in via Abenomics, following Shinzo Abe's election as Prime Minister in 2012. Made in China 2025 is

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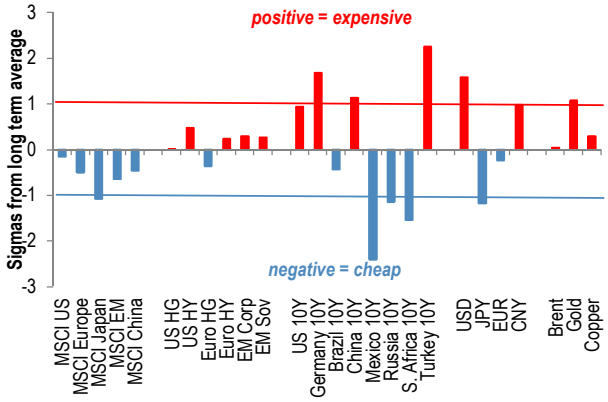
more promising as a driver of alternative sources of growth and corporate profits. An important difference for currencies, however, is that Japan never lost its current account surplus. Relatedly, Japan has always been amongst the world's largest net international creditors, holding net foreign assets of about 60% of GDP compared to only 15% for China. Thus, arguments for up-tiering Chinese manufacturing might be a required condition for a cheap Chinese equity market (Figure 10) to re-rate outright and relative to the US, given how closely relative performance has tended to track both relative momentum in both EPS and GDP growth (Figures 2 and 3). This structural transformation might not prove sufficient to lift a somewhat expensive Chinese currency (Figure 10), if near-zero rates and a balanced current account position are also part of this multi-year scenario.

If we are wrong about the prospects for successful execution of the Made in China strategy, then the currency should still be underweighted in global portfolios. It is unclear that strategic fixed income inflows from index inclusion or central bank reserve allocations will be sufficient balance of payments supports for a low-yield currency that also fails to attract substantial cross-border equity flows. Regardless of the fate of China's technology strategy, it still seems appropriate to think of Base Metals and Metals and Mining stocks as inferior cyclical assets, despite their cheapness (Figure 10). As long as the slowdown in Chinese fixed investment continues, two tiers of Cyclicals within Equities will persist. The least likely policy path over the next 10 years is that China returns to large-scale fiscal and monetary stimulus to drive a multi-year upturn in fixed investment growth given the country's existing debt burden. Such a policy reversal seems a pre-requisite for a trend revival in the metals complex and resource shares.

Figure 10: China market valuations in cross-asset context
Deviation from long-term average for equity forward P/Es, credit spreads, real bond yields, real commodity prices and real exchange rates



Source: J.P. Morgan

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IB clients*	53%	47%	37%
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IB clients*	75%	65%	56%

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IB clients*	65%	64%	57%

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