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Global Economics

Global Supply Chain Impact: Who's Most Exposed?

The importance of global value chains has meant that import tariffs will have far-reaching implications. We use an input-output model to analyse various scenarios and identify the countries and sectors which are exposed. 80% of the growth impact can be attributed to supply chain disruptions.

Global Economics

Global Supply Chain Impact: Who's Most Exposed?

Analysing the impact of trade measures on the supply chain: In this report, we use an input-output model to analyse the growth impact, which allows us to capture the direct impact on demand and its spillover effects. Indeed, as reflected in our simulations, the supply chain effect dominates, with almost 80% of the eventual growth impact attributable to these spillover effects.

Impact manageable for now, but significant escalation will impart material downside to growth: Global growth would be impacted by just 9bp from the trade measures which have been or are about to be implemented. A meaningful impact of 21bp on global growth could result if a 10% tariff was imposed on US$200 billion worth of China's imports and a 22.5% tariff levied on EU car imports. This impact would rise to 31bp if all imports from China were affected and further to 81bp in a scenario of a 25% tariff hike across all imports from both China and the EU. The starting point of strong global growth provides some buffer, but significant downside risks could emerge if things escalate significantly from here.

Which countries and sectors would be most affected? Apart from the impact on the countries on which tariffs are imposed (China, US and euro area in that order), major trade partners such as Taiwan, Canada, Korea, Mexico and some other smaller European economies (outside the euro area) would be affected too, given their tight integration in the global supply chain. Sectors such as mining and quarrying, electronics, wholesale trade, chemicals and products thereof as well as machinery and equipment would be most impacted in our severe scenario (scenario 4). The intermediate sectors which are not directly exposed to tariffs are just as impacted, if not more.

Cross-asset strategy implications (Andrew Sheets): The base case of protracted trade tensions supports a broad-based bias to be long volatility across most asset classes over the next three months. Specifically, our strategists' modelling suggests outsized impacts for Canada and Taiwan, supporting cautious views on CAD and TWD. We think that JPY and EUR, not USD, would be supported if trade tensions escalate, given large direct impacts on the US economy and potential shifts to interest rate pricing.

What to watch next? i) Steps related to the proposed tariffs on US$200 billion on China's imports; ii) Steps related to the Section 232 investigation on auto imports; and iii) The response and countermeasures by China and other trade partners. In addition, after this week's US-EU negotiations, we will watch closely whether EU heads of state will affirm European Commission President Jean-Claude Juncker's 'deal', as well as subsequent actions by the US administration.

Exhibit 1:

From status quo to full-blown escalation

	Scenario 1: Status Quo	Scenario 2: Escalation	Scenario 3: Significant Escalation	Scenario 4: Full-Blown Escalation
US imposes tariffs on:	• **China:** 25% tariff on US$50bn of goods • **EU, Norway, Switzerland, Russia, Turkey, Canada, Mexico, India:** 25% tariff on steel and 10% on aluminum	In addition to scenario 1 • **China:** 10% tariff on US$200bn of goods • **EU:** 22.5% tariff on autos	In addition to scenario 1 • **China:** 10% tariff on all remaining imports of goods (excluding US$50bn) • **EU:** 22.5% tariff on autos	In addition to scenario 1 • **China:** 25% tariff on all remaining imports of goods (excluding US$50bn) • **EU:** 25% tariff on all goods
China imposes tariffs on:	• **US:** 25% tariff on US$50bn of goods	In addition to scenario 1 • **US:** 25% tariff on US$80bn of goods	In addition to scenario 1 • **US:** 40% tariff on all goods	In addition to scenario 1 • **US:** 100% tariff on all goods
EU imposes tariffs on:	• **US:** ~25% tariffs on €2.8bn of goods	In addition to scenario 1 • **US:** 7.5% tariff on all goods	In addition to scenario 1 • **US:** 7.5% tariff on all goods	In addition to scenario 1 • **US:** 40% tariff on all goods
Amount of trade affected	US$175bn 0.9% of global exports 0.2% of global GDP	US$513bn 2.7% of global exports 0.6% of global GDP	US$869bn 4.6% of global exports 1.0% of global GDP	US$1315bn 7.0% of global exports 1.5% of global GDP
Impact on GDP	**Global:** -0.09pp **US:** -0.1pp **China:** -0.2pp **EA:** -0.05pp	**Global:** -0.21pp **US:** -0.2pp **China:** -0.4pp **EA:** -0.2pp	**Global:** -0.31pp **US:** -0.3pp **China:** -0.7pp **EA:** -0.2pp	**Global:** -0.81pp **US:** -1.0pp **China:** -1.5pp **EA:** -0.7pp

Source: Morgan Stanley Research; For more details on the underlying assumptions, see The global input-output model explained .

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Executive summary

A protracted escalatory cycle has been under way: The frequency, intensity and scope of trade measures have broadened out significantly in recent months. Reflecting this, our US public policy strategist Michael Zezas highlights that trade tensions are in a protracted escalatory cycle. We believe that a negotiated outcome would still be the endgame. However, reaching that would likely be a protracted process with fits and starts and could take several quarters. (For our recent research on this, see Global / China Economics: Trade Tensions: Lingering for Longer, July 11, 2018, and US Public Policy: $200B Tariff List: Escalatory Cycle in Motion, July 11, 2018.)

Assessing the impact on global growth: Against this backdrop, investors have also been incrementally more concerned about the impact of trade tensions on global growth. The integration of supply chains both domestically and globally has meant that any trade measures implemented on a single country or sector will likely extend beyond the direct impact on demand. To analyse the growth impact more comprehensively, we employ the use of a global input-output model, which allows us to capture both the initial shock from external demand and its spillover effects via the supply chain. The input-output matrix summarises the inter-dependencies among different sectors of the economy and tracks to what extent the output of one sector becomes an input in another sector.

Detailing the input-output approach used in this report: Specifically, our work in this report is based on the World Input-Output Tables. Using this, we simulated the impact of the increase in tariffs and its impact on final demand, tracing back the impact through all the sectors and countries that provide inputs into the final product, allowing us to understand how the trade changes propagate throughout the system. We were therefore able to break down the final impact on growth into the following three broad components: i) The **initial tariff impact** refers to the direct decline in demand for exports and drag on gross value added of the affected sectors; ii) The **domestic supply chain impact** refers to the knock-on effect to the domestic supply chain, i.e., weaker demand for domestic products and services of suppliers within the same industry and other industries; and finally iii) The **international supply chain impact,** i.e., suppliers located in other countries and their own suppliers.

Given the uncertainty surrounding the eventual outcome and the fluidity of recent developments, we explored **four scenarios** (see **Exhibit 1** for a summary). The first scenario covers the trade measures to date while, given the evolving developments, we also explore three escalatory scenarios which imply a further increase in tariffs by the US and an in-kind response from affected trade partners.

1) *Status quo:* *Tariffs which have been announced so far* – 25% on US steel and 10% on US aluminum imports, as well as 25% tariffs on US$50 billion of goods imports from China and vice versa – are fully implemented. Our results reveal an impact of 9bp to global growth, which would be manageable in our view.

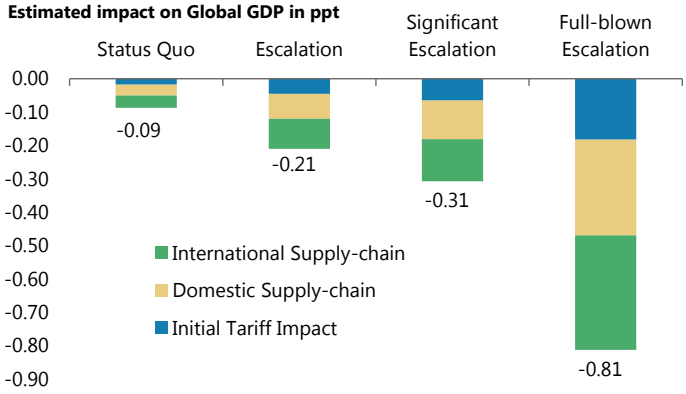
2) Escalation: *The US imposes a 10% tariff on US$200 billion of goods imports from China and a 22.5% tariff on auto imports from Europe.* China in turn imposes a 25% tariff on US$80 billion of goods and Europe imposes a broad-based 7.5% tariff on all goods imports from the US. In this scenario, the impact on global growth would be more meaningful at 21bp.

3) Significant escalation: *The US imposes a 10% tariff on US$500 billion of goods imports from China.* Media reports that the US administration might consider implementing a 10% tariff on all its imports from China. In this scenario, the impact on global growth would be more material at 31bp. China's growth is impacted by 67bp, while the US and Europe's growth are impacted by 34bp and 23bp, respectively.

4) Full-blown escalation: *The US imposes a broad-based 25% tariff on all goods imports from China and the EU and trade partners respond in kind:* Finally, we also consider a scenario in which the US moves to impose a broad-based 25% tariff on all imports from China and the EU, which respond in kind. This then results in an 81bp impact on global growth. China's growth is impacted by 150bp, the US by 99bp and Europe by 74bp in this scenario.

Exhibit 2:

A major escalation of trade tensions could have a meaningful impact on global GDP



Source: Morgan Stanley Research estimates

Impact manageable for now, but significant escalation will impart material downside to growth: In our mid-year outlook, we expressed the view that global growth would moderate but remain above-trend and that, with a maturing cycle, risks are skewed to the downside. Trade policy – alongside US financial stability risks and China tightening – were identified as the key risks. Currently global GDP growth is tracking in line with our base case view of 3.9%Y for 2018. As discussed above, the impact on global growth from the current trade measures is manageable. However, the risks have clearly risen. If the situation were to escalate further, it would impart meaningful downside risks to our growth forecasts.

The supply chain effect dominates… A common thread of our simulation results is that the supply chain effect dominates – almost 80% of the eventual growth impact can be attributed to these spillover effects. Considering the scenario in which the US imposes a broad-based 25% tariff (full-blown escalation), we estimate that 23% of the total growth impact is accounted for by the initial tariff impact, 35% by the domestic supply chain effect and 42% by the international supply chain effect.

…though the magnitude of the final impact will still be subject to some uncertainty: While our analysis has captured the growth impact brought about by the supply chain effects, there are some indirect and longer-term effects which are still not captured. These include second-round effects on domestic demand (on sentiment and the attendant impact on corporate investment, hiring and household consumption). On the flip side, mitigating factors such as policy response (subsidies, monetary policy and fiscal policy response) could also partly offset the drag on GDP.

Which countries and sectors would be more exposed? Given that the broadest tariffs are being implemented on China in the scenarios that we have considered, China therefore faces the largest drag to growth. However, even in scenario 4 where broad-based tariffs are implemented on both China and Europe, China still faces a larger growth impact relative to Europe, considering its larger industrial/manufacturing base and a greater relative dependence on exports to the US. The impact on the US stems from the effects from measures in response. Outside this group, the economies which are closely integrated in the regional supply chain networks of the US, China and the EU (i.e., Canada, Mexico, Taiwan, Korea and Switzerland) would take a significant hit as well. Russia and Norway also rank among the top countries affected due to their role as key suppliers of mining and quarrying products. Sectors such as mining and quarrying, electronics, wholesale trade, chemicals and chemical products and machinery and equipment would be the most impacted sectors in a scenario of a full-blown escalation. This suggests that the intermediate sectors are more exposed, again a reflection of the impact propagated by the supply chain effects.

How would policy-makers respond to the rise in trade tensions? Trade tensions pose a conundrum, particularly for monetary policy as central banks would have to balance rising inflationary pressures with demand destruction. At the current juncture, given the relatively modest impact from the measures which have been implemented to date, we do not expect any changes in policy relative to our base case expectations. This has been corroborated by recent commentary by policy-makers from the Fed and ECB, who are of the opinion that the impact from trade measures would have to be meaningfully higher for them to take action. If further tariffs are implemented, we would expect the Fed to first be more cautious about raising rates, particularly if financial conditions tighten. Meanwhile, policy-makers in China could allow a modest rebound in broad credit growth to accommodate fiscal easing, with a continued boost to banks' on-balance sheet lending capability and slower pace of shadow bank tightening. Aside from the monetary policy response, policy tools such as export subsidies and fiscal policy (both automatic stabilisers and discretionary) could also kick in to support growth and mitigate the downside risks.

Cross-asset strategy implications (Andrew Sheets): Generally, our base case of continued escalation supports a broad-based bias to be long volatility across most asset classes over the next three months. Specifically, our modelling suggests outsized impacts on Canada and Taiwan, supporting cautious views towards CAD and TWD. We think that JPY and EUR, not USD, would be supported if trade tensions escalate, given large direct impacts on the US economy and potential shifts to interest rate pricing.

What next to watch for: Upcoming key actions to watch include: i) Steps related to the proposed list of tariffs on US$200 billion worth of goods (likely around end-August as the public consultation period ends); ii) Steps related to the Section 232 investigation on auto imports and any subsequent actions; and iii) The response and countermeasures by China and other trade partners. In addition, after this week's US-EU negotiations, we will watch closely whether EU heads of state will affirm European Commission President Jean-Claude Juncker's 'deal', as well as subsequent actions by the US administration.

A deep dive into global supply chains

Chetan Ahya, Georgi Deyanov, Derrick Kam, Nora Wassermann, Helen Lai, Jonathan Cheung

The importance of global value chains

Global value chains (GVCs) have grown rapidly since the 1990s... The information and communications technology revolution and prevailing differences in unit labour costs across borders have led to increasing production fragmentation across the globe. In view of the potential savings in labour and other input costs, companies in developed markets started to move select production stages offshore at a global scale since the 1990s, mainly to emerging market economies with lower per capita incomes.

...transforming the economic landscape: The attendant economic implications have been profound. For DMs, GVCs provided access to inputs and products that are more competitively priced, while also benefitting from the economies of scale which raised productivity in tradable sectors. Meanwhile, for EMs, GVCs offered a 'fast track' to industrialisation through embodied technology and knowledge transfers, helping to lift productivity growth and per capita income levels.

GVCs accentuate business cycle swings: As cross-border trade increased significantly alongside the expansion of GVCs, business cycles of major trade partners have become increasingly synchronised. According to the IMF, a higher bilateral trade intensity[1] between two countries can lead to more synchronised business cycles of the countries. Stronger vertical linkages between countries can lead to further synchronisation. Taken together, the expansion of GVCs and bilateral trade between countries has accentuated swings in global business cycles.

Who are the main players?

European and Asian production networks dominate global trade: GVCs are marked by three regional blocs in Europe, Asia and NAFTA. These global supply chains are organised in a hub-and-spoke pattern around the four manufacturing giants of Germany, China, the US and Japan. Japan is an outlier in that it has strong linkages predominantly only with the US, China and Korea.

The European and Asian networks are significantly larger than the NAFTA network both in terms of domestic value added and as a share of world exports. Europe and Asia account for 22% and 19% of domestic value added content as a percentage of world exports, respectively, compared to 7% for NAFTA. Similarly, exports of those regions as a percentage of global exports are higher than for NAFTA (**Exhibit 4**). That said, NAFTA economies have the most intensive supply chain trade relationships with each other. North-East Asian economies have the second-most intensive supply chain trade relationships, with China, Japan, Korea and Taiwan the key players. Meanwhile, European nations are heavily reliant on Germany for intermediate goods, with Germany being the key supplier. Given that China, Germany and the US are regional hubs in their supply chain networks, any potential impact on trade from tariffs would likely have amplified repercussions throughout the supply chain.

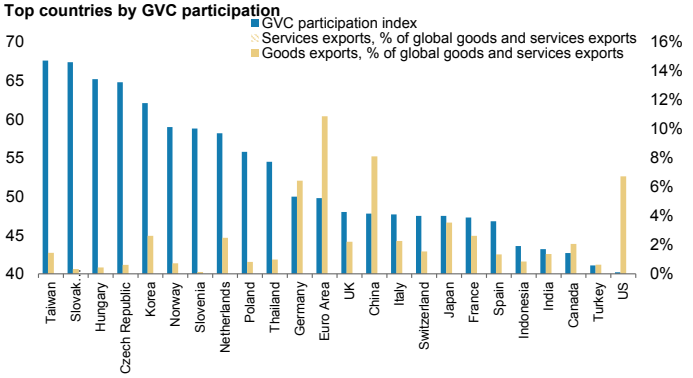
What are the main industries/sectors?

GVCs dominated by manufacturing of capital/durable goods

Given that durable goods generally involve more stages of production and intermediate parts, the durable goods sector has been the main driver of GVC expansion. The share of durables in global trade increased to around 53% during the 2000s from 48% in the late 1980s. In the aftermath of the Global Financial Crisis, trade in durables has moderated due to the subdued growth and investment

Exhibit 3:

European and Asian countries topping the ranks of GVC participation



Source: OECD, Morgan Stanley Research; GVC participation index, as proposed by Koopman et al. (2010), is expressed as the share of foreign inputs (backward participation) and domestically produced inputs used in third countries' exports (forward participation) in a country's gross exports. It indicates the level of backward and forward linkages of an economy with its foreign partners.

1. Bilateral trade intensity refers to the ratio of the sum of exports between a country pair to the sum of their GDPs, and is a frequently cited trade variable.

dynamics in DMs, with negative repercussions on EM growth. Now that investment growth has been recovering, global trade growth has also seen a significant pick-up. The longer trade tensions persist, the more they could threaten the investment recovery, with negative repercussions on durables and global supply chains. EM Asia is particularly exposed, given its larger manufacturing base and gearing towards G3 manufacturing imports.

The role of services in GVCs has risen as well

The role of services in GVCs has extended far beyond merely a facilitating agent across borders. Examples include the embodiment of services in the manufacturing industry such as R&D, design and logistics. Manufacturing firms are also increasingly bundling goods and services together as one product to be sold, such as installation services and follow-on servicing and maintenance contracts as additional value add to customers. Hence, trade in services can sometimes be 'hidden' in trade of goods. During 1995-2011, the share of foreign services value added increased in all major manufacturing industries, particularly in chemicals, ICT and electronics, electrical machinery and motor vehicles. Consequently, any shocks to global goods trade will impart disruptions to the services sector as well, amplifying the related impact on global growth.

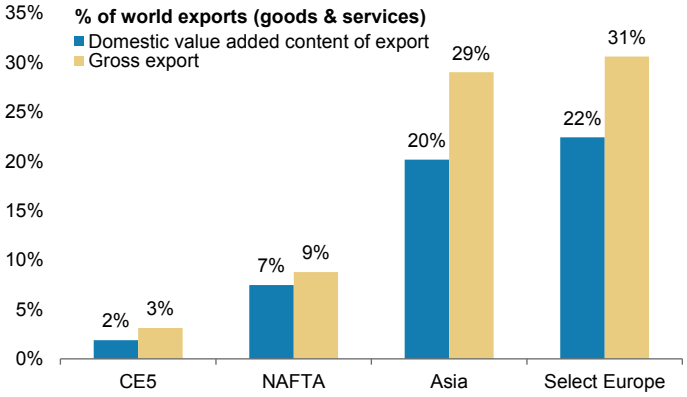
Traversing borders – the role of multinational corporations (MNCs) in global value chains

MNCs at the crux of GVCs… Underpinning the rapid expansion of GVCs are multinational corporations (MNCs), who have relatively ample access to financial resources and human capital. The unbundling of production across borders requires complex flows of inputs (including people, technology and relevant know-how), and thus demands a significant capital commitment.

…and taking a more prominent role in the global economy: As GVCs become more prevalent, the importance of MNCs in the global economy has also grown over time. MNCs and their foreign affiliates are estimated to have accounted for around close to one-third of global GDP in 2014, while around 70% of world exports are estimated to take place within MNC networks or arm's length contracts with MNCs. An important implication is that a country's exports may not be produced by its domestic firms; in China, foreign-invested enterprises (FIE) made up 46% of its exports in 2014, while for exports specifically to the US, the share becomes much higher at 60%.

Exhibit 4:

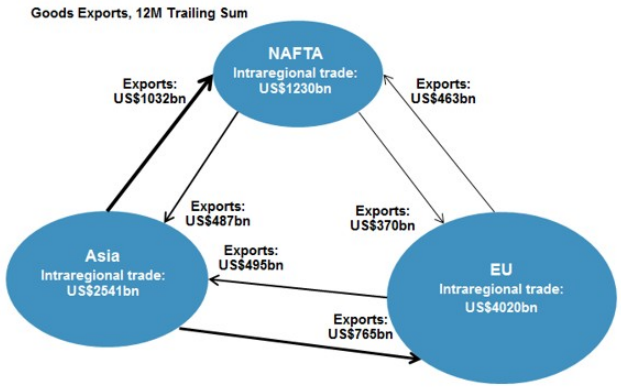
Exports share by region



Source: WTO, OECD, Morgan Stanley Research; CE5: Czech Republic, Hungary, Poland, Romania and Slovakia; NAFTA: US, Canada and Mexico; Asia: Cambodia, China, Hong Kong, India, Indonesia, Malaysia, Philippines, Singapore, Taiwan, Thailand and Vietnam; Select Europe: Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Netherlands, Norway, Slovenia, Spain, Sweden, Switzerland and the UK.

Exhibit 5:

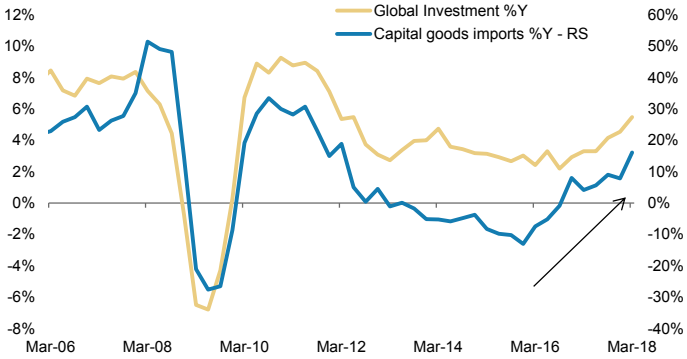
Asia exports to NAFTA and EU are the largest export flows among regions



Source: CEIC, Haver Analytics, Morgan Stanley Research.

Exhibit 6:

Stronger investment growth supporting global trade



Source: Haver Analytics, Morgan Stanley Research

Trade barriers that impede global trade flows impact both MNCs… Given the large share of MNC participation in global value chains and global trade, barriers that impede trade flows such as import tariffs will weigh on MNCs (domestic headquarters/plants and foreign affiliates) too. In other words, the related impact will not remain within domestic players in the economy being targeted, but spread far wider than the territorial constraints imposed by the trade barrier. Among the FIE exports from China to the US, most of them are likely shipped by MNCs from South Korea, Japan and the US based on past FDI trends. Import tariffs at the US border would therefore hit these foreign enterprises indirectly too.

…and their GVC suppliers: In addition, higher costs and eroding margins due to trade barriers may also lead to relocation of operations by MNCs, in order to maintain global competitiveness. Such moves will have implications for growth and employment for economies along the GVCs and long-term productivity. With regard to the ongoing trade tension, Harley-Davidson has already announced plans to move production for Europe-bound motorcycles to Brazil, India or Thailand from the US, in view of the EU's tariffs in response. Some factories in China are also accelerating plans to diversify production to South-East Asia, as trade tensions continue to escalate.

Measuring the global impact of tariff hikes

Chetan Ahya, Georgi Deyanov, Derrick Kam, Nora Wassermann, Helen Lai, Jonathan Cheung

Our approach

A more comprehensive analysis of tariff hikes

Using an input-output approach: In this report we build our analysis on data from the 2014 World Input-Output tables, which summarise the inter-dependencies among different sectors within and across countries. This approach allows us to capture both the initial and supply chain-related impacts of tariffs and provides a more comprehensive analysis as compared to earlier notes.

The three channels of impact: Our analysis in this note is able to capture three main effects across countries: The **initial tariff impact** refers to the direct decline in demand (we assume full pass-through to import prices, which affects demand through a price-demand elasticity) for imports from the specific trade partner and the drag on gross value added of the trade partner's exporting sectors. The supply chain impact refers to the knock-on effect to the **domestic supply chain,** i.e., weaker demand for domestic products and services of suppliers within the same industry and other industries (intra- and inter-industry effects, respectively) as well as the **international supply chain,** i.e., suppliers located in other countries and their own suppliers, etc. Our results suggest that the global impact via domestic and international supply chains from tariffs accounts for almost 80% of the overall drag on gross value added. Note that while our results are expressed in gross value added (GVA), we use the drag on GVA as a proxy for the potential drag on GDP. For a more detailed explanation of our methodology, see **The global input-output model explained** .

Four scenarios: From status quo to full-blown escalation

To assess the impact on growth, we work with four scenarios:

1) Status quo: This scenario incorporates the major tariffs that have been implemented recently or are about to be implemented (25% tariff on US imports from China and vice versa; 25% tariff on US steel imports and 10% on US aluminum imports from selected countries; ~25% tariffs on select EU imports from the US). For a snapshot of existing import tariffs for the top five imports for select nations, see **Exhibit 8.**

2) Escalation: We assume an escalation as indicated by the US administration (10% tariff on an additional US$200 billion imports from China and 22.5% tariff on EU cars) and in-kind responses from affected countries. The risk of such a scenario occurring has increased significantly during recent weeks as the US administration released a proposed list of US$200 billion imports from China on July 10 that could be affected. In terms of the timeline, these measures could be announced around September/October if they were to be implemented. With regards to the US tariffs on car imports from the EU, this week's negotiations have reduced the risk of immediate action, but have not eliminated the possibility of such a scenario.

3) Significant escalation: We pencil in a 10% tariff on all remaining US goods imports from China (excluding the US$50 billion already targeted) and a 22.5% tariff on EU cars. Such an outcome is less likely but has also been indicated as a possible scenario by the US administration in recent media reports.

4) Full-blown escalation: We pencil in a 25% tariff on all US goods imports from China and the EU with in-kind responses from those trading partners.

Note that the Chinese authorities have indicated that, in the case of further escalation, they would use both tariff and non-tariff measures (quantitative and qualitative) to respond. However, for simplicity and to be able to model the impact, we focus on tariff increases only. Across all the scenarios, we have assumed that the trade partners' response in kind is to impose tariffs in a way that the tariff collections match that of the US.

Estimating the impact on global growth

Global perspective: The results from our quantitative analysis suggest that the impact on growth would be manageable in scenario 1 (status quo) and scenario 2 (escalation), with an overall drag on GDP of 0.09pp and 0.21pp, respectively. In our scenario 3 (significant escalation), we would expect a more visible drag on growth of 0.31pp which would pose noteworthy downside risks to GDP growth. Finally, in scenario 4 (full-blown escalation), our most severe scenario, the impact on global GDP would be an estimated 0.81pp. In terms of timing, we would expect most of the drag from tariff hikes on GDP to only become visible from 2019 as measures could be

Exhibit 7:

From status quo to full-blown escalation

	Scenario 1: Status Quo	Scenario 2: Escalation	Scenario 3: Significant Escalation	Scenario 4: Full-Blown Escalation
US imposes tariffs on:	• **China:** 25% tariff on US$50bn of goods • **EU, Norway, Switzerland, Russia, Turkey, Canada, Mexico, India:** 25% tariff on steel and 10% on aluminum	In addition to scenario 1 • **China:** 10% tariff on US$200bn of goods • **EU:** 22.5% tariff on autos	In addition to scenario 1 • **China:** 10% tariff on all remaining imports of goods (excluding US$50bn) • **EU:** 22.5% tariff on autos	In addition to scenario 1 • **China:** 25% tariff on all remaining imports of goods (excluding US$50bn) • **EU:** 25% tariff on all goods
China imposes tariffs on:	• **US:** 25% tariff on US$50bn of goods	In addition to scenario 1 • **US:** 25% tariff on US$80bn of goods	In addition to scenario 1 • **US:** 40% tariff on all goods	In addition to scenario 1 • **US:** 100% tariff on all goods
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Amount of trade affected	US$175bn 0.9% of global exports 0.2% of global GDP	US$513bn 2.7% of global exports 0.6% of global GDP	US$869bn 4.6% of global exports 1.0% of global GDP	US$1315bn 7.0% of global exports 1.5% of global GDP
Impact on GDP	**Global:** -0.09pp **US:** -0.1pp **China:** -0.2pp **EA:** -0.05pp	**Global:** -0.21pp **US:** -0.2pp **China:** -0.4pp **EA:** -0.2pp	**Global:** -0.31pp **US:** -0.3pp **China:** -0.7pp **EA:** -0.2pp	**Global:** -0.81pp **US:** -1.0pp **China:** -1.5pp **EA:** -0.7pp

Source: Morgan Stanley Research; For more details on the underlying assumptions, see The global input-output model explained .

Exhibit 8:

Import tariffs for major US trading partners

US trade deficit by country, top 5 sectors						Total US Trade Balance, US$bn	Weighted Average Import Tariff % on Manufactured Goods (US at 1.7%)
Country	1	2	3	4	5		
China	Electric machinery	Nuclear reactors, boilers, machinery	Furniture and bedding	Toys. Games and sporting equipment	Apparel articles and accessories	-389	4.3%
China import tariff %	8.7	8.0	7.0	10.9	16.2		
US import tariff %	1.5	1.2	1.6	2.0	12.8		
Mexico	Vehicles	Electric machinery	Nuclear reactors, boilers, machinery	Furniture and bedding	Optic, photo, medic or surgical instruments	-71	3.8%
Mexico import tariff %	10.5	3.5	2.7	10.6	2.4		
US import tariff %	3.1	1.5	1.2	1.6	1.1		
Japan	Vehicles	Nuclear reactors, boilers, machinery	Electric machinery	Rubber and articles	Iron and steel articles	-70	1.1%
Japan import tariff %	0.1	0.0	0.1	0.2	0.5		
US import tariff %	3.1	1.2	1.5	1.6	1.2		
Germany	Vehicles	Nuclear reactors, boilers, machinery	Pharmaceutical products	Optic, photo, medic or surgical instruments	Electric machinery	-67	2.0%
Germany import tariff %	6.2	1.8	0.0	1.6	2.5		
US import tariff %	3.1	1.2	0.2	1.1	1.5		
Italy	Nuclear reactors, boilers, machinery	Vehicles	Beverage and spirits	Pharmaceutical products	Footwear	-33	2.0%
Italy import tariff %	1.8	6.2	4.3	0.0	11.1		
US import tariff %	1.2	3.1	1.8	0.2	10.5		
Korea	Vehicles	Electric machinery	Nuclear reactors, boilers, machinery	Articles of iron and steel	Rubber and articles	-21	2.4%
Korea import tariff %	7.6	5.8	5.9	4.6	7.0		
US import tariff %	3.1	1.5	1.2	1.2	1.6		
France	Nuclear reactors, boilers, machinery	Beverage and spirits	Perfume, Cosmetic and Beauty Products	Works of Art	Pharmaceutical products	-17	2.0%
France import tariff %	1.8	4.3	2.4	0	0.0		
US import tariff %	1.2	1.8	1.5	0	0.2		
Canada	Mineral fuel, oil	Wood and articles of wood	Aluminium and articles	Vehicles	Natural pearls, precious metals and stones	-13	1.0%
Canada import tariff %	0.7	1.1	1.2	3.6	1.4		
US import tariff %	0.5	1.1	3.5	3.1	2.1		

Source: UN Comtrade, WITs, WTO, Morgan Stanley Research; Note: We focus on the G-20 economies in this exercise. For more details on which sub-sectors are contained in the different product categories; see here. Sectors with a high bilateral tariff difference are shaded in blue.

implemented in 2H18 at the earliest. The majority of the impact from higher tariffs would come through a disruption of domestic and international supply chains (almost 80% of the total impact). Note that taking into account second-round income effects on domestic demand due to an increase in prices and uncertainty could raise the impact on GDP above the estimates resulting from our model. On the other hand, a smaller-than-assumed pass-through of tariff hikes to import prices and policy responses in major countries could provide some offset.

Country perspective: Among the countries currently involved in trade tension, China and the US would be affected most by an escalation, followed by the EU, and particularly Germany (labelled as DEU in the charts below). China would see the largest drag (from 0.16pp in the status quo up to 1.5pp in the full-blown escalation scenario) as the broadest tariff measures are being implemented on China and also due to its larger industrial/manufacturing base relative to services – which implies larger domestic supply chain effects – and a greater relative dependence on exports to the US.

In terms of the composition of the tariff impact, NAFTA members, China and Germany would see the largest drag coming from the repercussions on the domestic supply chain. Other countries which are closely integrated in the global and respective regional supply chain networks of China and the EU would see the largest impact via the international supply chain. Outside this group, the economies which are closely integrated in the regional supply chain networks of the US, China and the EU (i.e., Canada, Mexico, Taiwan, Korea and Switzerland) would take a significant hit as well. Russia and Norway also rank among the top countries affected due to their role as key suppliers of mining and quarrying products.

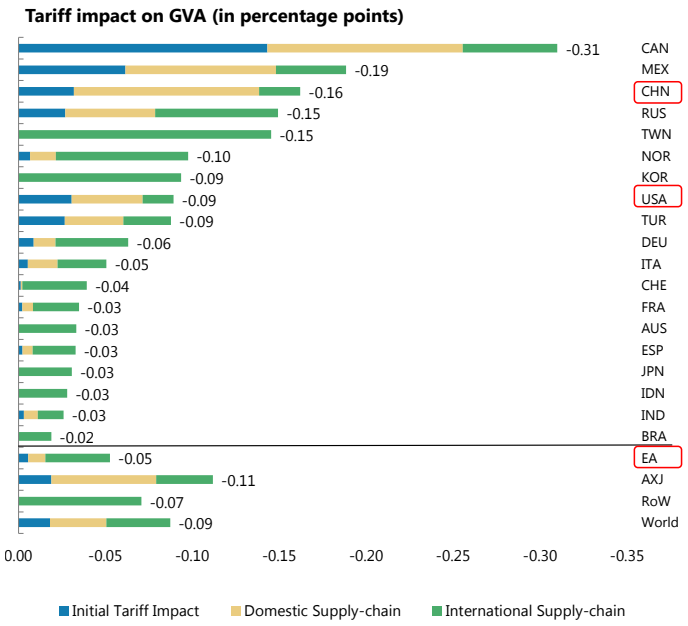
Sector perspective: From a sector perspective, the impact from tariffs varies with the scenarios. In our scenario 1 the basic metals sector is most exposed, driven largely by the direct initial impact from US steel and aluminum tariffs on major countries. The impact is largest in Canada and Mexico, which both have highly integrated domestic supply chains that are geared towards the initially affected sectors. Sectors with elevated exposure to recent US-China tariff hikes include computers, electronic & optical products and chemicals as well as products thereof. In scenarios 2 and 3, the manufacturing sector of motor vehicles, trailers and motorcycles climbs up the ranks to the top five exposed sectors due to our assumptions of an increase in tariffs of US car imports from Europe. In the severe scenario (scenario 4), machinery and equipment also ranks among the top five exposed as trade tension between the US, China and EU escalates further (**Exhibit 13** - **16**).

Notably, mining and quarrying as well as wholesale trade rank among the top five exposed in all four scenarios, which is another symptom of domestic and international supply chain effects following the initial impact from tariffs. A major decline in demand in mining and quarrying as envisaged in the most extreme scenario would have significant negative repercussions for global commodity prices. Finally, we would note that besides wholesale trade, other services categories rank among the most affected sectors as well, which again underscores the importance of looking beyond the impact on directly affected manufacturing sectors.

Exhibit gallery: Impact on countries and sectors in four scenarios

Exhibit 9:

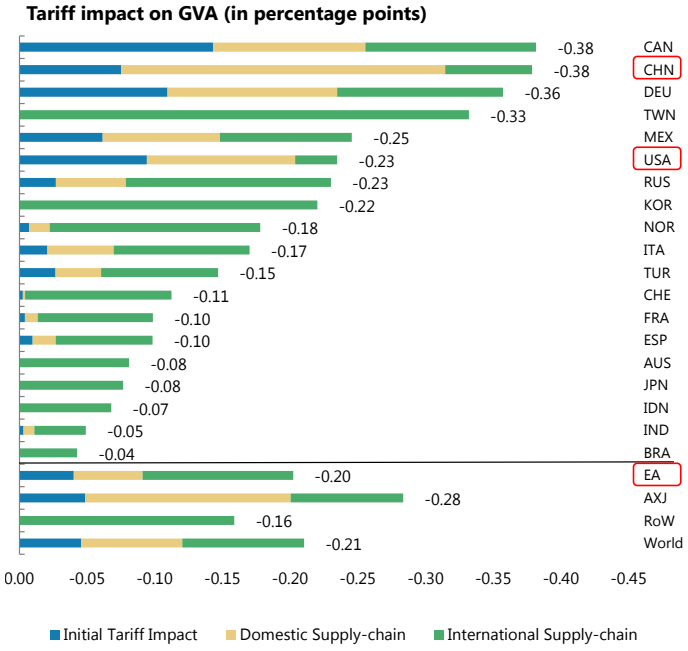
Status quo (scenario 1) – impact on countries



Source: Morgan Stanley Research estimates

Exhibit 10:

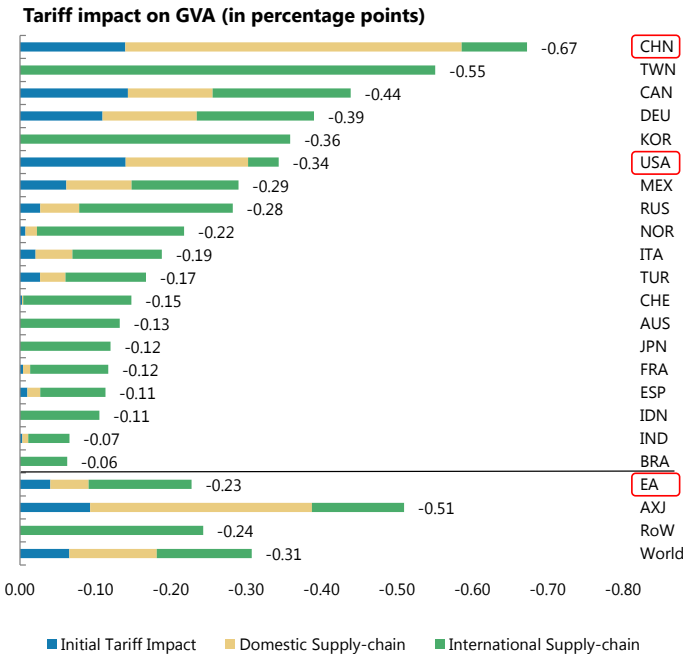
Escalation (scenario 2) – impact on countries



Source: Morgan Stanley Research estimates

Exhibit 11:

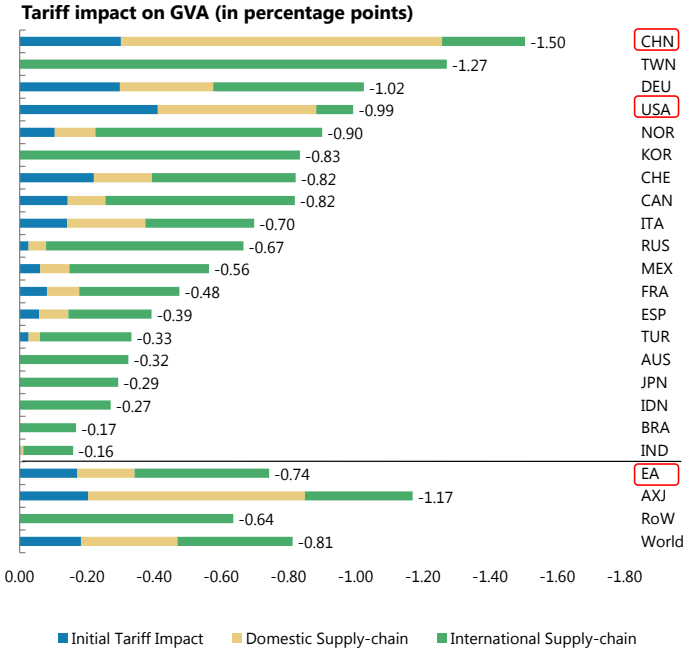
Significant escalation (scenario 3) – impact on countries



Source: Morgan Stanley Research estimates

Exhibit 12:

Full-blown escalation (scenario 4) – impact on countries

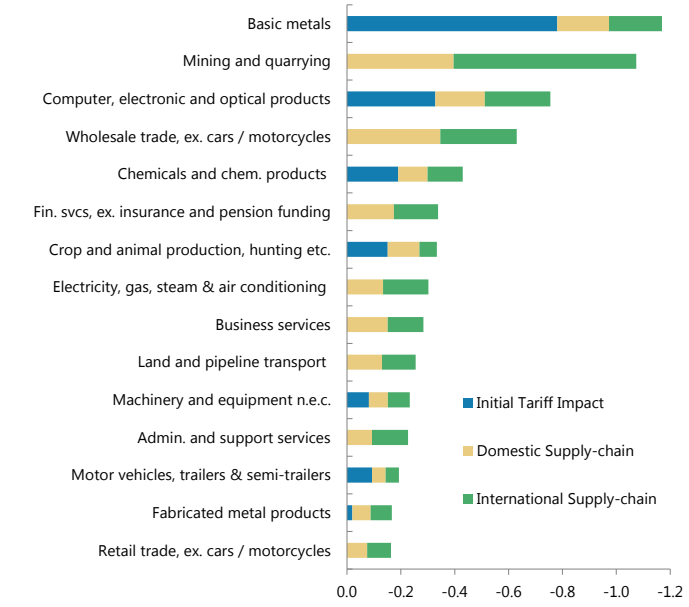


Source: Morgan Stanley Research estimates

Exhibit 13:

Status quo (scenario 1) – impact on sectors

Top 15 industry contributions to global GVA impact (in basis points)

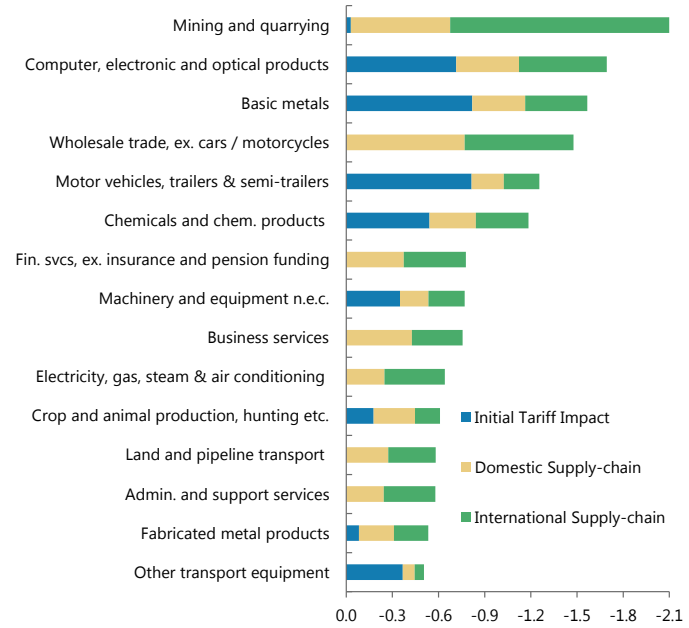


Source: Morgan Stanley Research estimates

Exhibit 14:

Escalation (scenario 2) – impact on sectors

Top 15 industry contributions to global GVA impact (in basis points)



Source: Morgan Stanley Research estimates

Exhibit 15:

Significant escalation (scenario 3) – impact on sectors

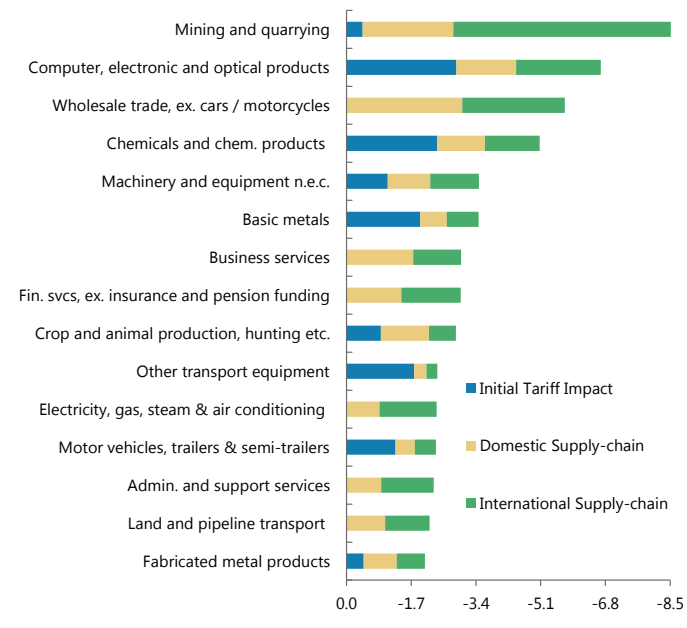
Top 15 industry contributions to global GVA impact (in basis points)

Source: Morgan Stanley Research estimates

Exhibit 16:

Full-blown escalation (scenario 4) – impact on sectors

Top 15 industry contributions to global GVA impact (in basis points)



Source: Morgan Stanley Research estimates

What our model does not capture

Other indirect effects and mitigating factors

While our approach enables us to estimate global supply chain effects from import tariffs, there are other indirect and longer-term effects on growth which cannot be captured by our model. These include second-round effects on domestic demand (lower margins, higher prices and increased uncertainty translate into weaker corporate investment, hiring and household consumption) and the longer-term impact on productivity and potential GDP growth (from lower investment and possible dislocation of supply chains). Also, as trade tensions linger for longer, the greater the impact on business confidence and capex, which would in turn weigh on global growth.

On the flip side, a smaller-than-assumed pass-through of tariff hikes to import prices and other mitigating factors such as some policy response (subsidies, monetary policy and fiscal policy response) could also partly offset the global drag on GDP. Another mitigating factor could be some substitution of the affected imports with imports from other countries (e.g., China being able to partially substitute soybeans imports from US with imports from other countries) and exporters may find alternative buyers (e.g., the US may export more soybeans and LNG to the EU instead).

Finally, from a country perspective, exchange rate dynamics can play an important role in terms of the pass-through to domestic prices and impact on financial conditions. In the case of the US, for example, a further escalation of trade tension would likely be accompanied by continued USD strength and tightening of financial conditions which would worsen the impact. In the case of China, we could see a further weakening of CNY, which would partly help to offset the impact on exports. We discuss these factors in the respective country sections.

Inflation impact

With regards to inflation, we would expect an escalation of trade tension to be stagflationary in terms of its impact, i.e., leading to higher inflation and lower growth at the margin. Our bottom-up estimates suggest that the direct impact on inflation would be moderate in scenarios 1 to 2, adding between 0.04pp and 0.1pp to global inflation. This is also because tariffs in the first two scenarios mostly affect capital goods, which means that the impact could be largely absorbed by companies rather than passed on to end consumers. In scenario 3, the impact is higher at 0.2pp. In scenario 4, the direct impact of tariff hikes on global inflation would be 0.4pp. From a country perspective, the composition of products and exchange rate dynamics in China would likely lead to a larger initial rise in inflation than in the US and euro area across all four scenarios (see country sections for details).

Policy response

Trade tensions pose a conundrum, particularly for monetary policy as central banks would have to balance rising inflationary pressures with demand destruction. At the current juncture, given the relatively modest impact from the measures which have been implemented to date, we do not expect any changes in policy relative to our base case expectations. This has been corroborated by recent commentary by policy-makers at the Fed and ECB, who are of the opinion that the impact from trade measures would have to be meaningfully higher for them to take action.

If further tariffs are implemented, we would expect the Fed to first be more cautious about raising rates, particularly if financial conditions tighten. Meanwhile, policy-makers in China could allow a modest rebound in broad credit growth to accommodate fiscal easing, with a continued boost to banks' on-balance sheet lending capability and slower pace of shadow bank tightening. Aside from the monetary policy response, policy tools such as export subsidies and fiscal policy (both automatic stabilisers and discretionary) could kick in too to support and mitigate the downside risks to growth. Subsidies to specific sectors affected by trade measures could also be a potential policy tool. For instance, the *Wall Street Journal* reports that the US administration would provide emergency aid to farmers.

What's next?

Upcoming key actions to watch include: i) Steps related to the proposed list of tariffs on US$200 billion worth of goods (likely around end-August as the public consultation period ends); ii) Steps related to the Section 232 investigation on auto imports and any subsequent actions; and iii) The response and countermeasures by China and other trade partners. In addition, after this week's US-EU negotiations, we will watch closely whether EU heads of state will affirm European Commission President Jean-Claude Juncker's 'deal', as well as subsequent actions by the US administration.

Exhibit 17:

Key dates to watch

Upcoming Agenda on Important Trade Policies		
Tariffs	**Date**	**Agenda**
US$16bn of imports from China	July 31	Post-hearing rebuttals due
	August	**Likely tariff implementation**
		Potential response from China
US$200bn of imports from China	August 17	Public written comments due
	August 20-23	Public hearing
	August 30	Post-hearing rebuttals due
	September	**Likely tariff implementation**
		Potential response from China
Auto imports	Late July / August	Likely release of investigation results
	October	**Likely tariff implementation**
		Potential response from Canada, euro area, Mexico, etc.

Source: USTR, Reuters, Morgan Stanley Research

China: Assessing the impact of tariffs

Robin Xing, Jenny Zheng, Zhipeng Cai

While existing US tariff measures may only generate a modest drag of 0.2pp on China's GDP growth, the cumulative impact could increase to 0.4pp if the US were to implement the US$200 billion tariff list, or 0.7pp should the US impose an additional 10% tariff on a total of US$500 billion of Chinese goods. This could bring downside risks to our current growth forecast of 6.4%Y in 2019. On the inflation front, in light of downside risk to our annual CPI forecast (2.4%Y in 2018 and 2.5%Y in 2019) due to sluggish pork prices, a transitory price impact from China's import tariff hikes on American goods (0.2-0.7pp in the three scenarios) would not constrain policy flexibility in the cycle. We believe that policy-makers could take up fiscal and monetary easing in the event of escalated trade tensions, which combined with a modest CNY depreciation could mitigate some of the downside risks.

In the unlikely event of a full-blown escalation, we assume that the US would impose 25% tariffs on all imports from China and the EU, and China and the EU would respond to match the tariff amount. In this severe case (scenario 4), we see a drag of 1.5pp on China's headline growth, and a one-time 1.7pp boost to inflation. In turn, policy-makers might resort to a meaningful stimulus package, and CNY will likely depreciate, partly cushioning the growth impact.

Scenario 1: Status quo

Growth impact: The announced US tariff measures on US$50 billion of Chinese goods, combined with Section 232 tariffs on steel and aluminum, mean a 0.2pp drag on China's GDP growth. We estimate that the initial demand impact from the affected sectors (mainly parts and components in machinery and electronics sectors) would drag down China's growth by merely 0.03pp. That said, the impact from repercussions along the domestic and global supply chain would weigh down growth by another 0.11pp and 0.02pp, respectively. [2] In this scenario, we believe that the modest impact could be partly offset by

2. A caveat: the growth impact estimated by the global input-output model does not take into account second-round impact on consumption and investment. Therefore, the actual impact on growth could be even larger. See Appendix: The global input-output approach .

Exhibit 18:

Impact of trade tension on China's growth and inflation, and China's policy response

Scenario	Growth Impact	Inflation Impact	Policy Response
Status quo - US: 25% tariff on US$50bn of Chinese goods; Section 232 tariffs on steel and aluminum - China: 25% tariff on US$50bn of US goods	Total impact: -0.2ppt Initial: -0.03ppt Domestic supply chain: -0.11ppt Global supply chain: -0.02ppt	+0.2ppt	- **Policy stance turning neutral** - A milder deceleration of credit growth
Escalation - US: additional 10% tariff on US$200bn of Chinese goods - China: additional 25% tariff on US$80bn of US goods	Total impact: -0.4ppt Initial: -0.08ppt Domestic supply chain: -0.24ppt Global supply chain: -0.06ppt	+0.4ppt	- **Some fiscal and monetary easing** - **Fiscal:** Widen fiscal deficit to stablize infrastructure investment and provide tax cut to corporates, consumers - **Monetary:** Modest rebound in broad credit growth to accommodate fiscal easing
Significant esclation - US: additional 10% tariff on US$500bn of Chinese goods - China: Broad-based 40% tariff on all US goods	Total impact: -0.7ppt Initial: -0.14ppt Domestic supply chain: -0.45ppt Global supply chain: -0.09ppt	+0.7ppt	- **Meaningful policy easing** - **Fiscal:** To cut VAT, corporate tax and consumption tax; boost infrastucture investment - **Monetary:** Suspend the financial clean-up process and alllow a more significant rebound in broad credit growth
Full-blown escalation - US: 25% tariff on all Chinese/EU goods - China: Broad Based 100% tariff on all US goods	Total impact: -1.5ppt Initial: -0.3ppt Domestic supply chain: -0.95ppt Global supply chain: -0.25ppt	+1.7ppt	- **Stimulus package similar to '08 and '15** - **Fiscal:** Significantly widen fiscal deficit to provide tax cut; aggressive infrastructure investment - **Monetary:** Meaningful rebound in broad credit growth to accommodate fiscal easing

Source: Morgan Stanley Research estimates

the still above-trend global growth and China's domestic policy fine-tuning. In turn, China's GDP growth could moderate from 6.8%Y in 1H18 to 6.5%Y in 2H18 and 6.4%Y in 2019.

Inflation impact: China's commensurate import tariff hikes in response to US tariffs on US$50 billion of Chinese goods could lift domestic CPI inflation by 0.2pp, assuming full pass-through of the 25% tariff rate hike into domestic prices. The key driver would be a tariff hike on soybeans (25% of China's US$50 billion list), as ~90% of China's soybean consumption is imported, and it could be difficult to fully shift away to other suppliers given that China's soybean imports (97 million tonnes) exceeded the world ex-US exports (94 million tonnes) in 2017. On the other hand, China's import tariff hike on other American goods (such as energy and autos) could have a negligible impact on domestic inflation, given relatively small shares of these imports in domestic consumption.

Domestic policy response: In this cycle, we have held the view that policy tightening has been flexible and countercyclical in nature, and our determining measure of China's monetary policy stance is broader credit growth, with a growth slowdown pointing to tightening and vice versa. We believe that the policy stance is turning towards neutral from a tightening bias in the past two years in the face of increased trade tensions. Policy-makers could mitigate the pace of slowdown in credit growth by adopting more open market injections, RRR cuts, higher loan quotas and faster local government bond issuance. However, a policy easing to stimulate stronger credit growth is less likely, given that the growth impact from the US tariff hike remains manageable.

Scenario 2: Escalation

Growth impact: The US's proposed tariffs on an additional US$200 billion worth of Chinese goods (released July 11), if implemented, could raise the cumulative drag on China's growth to 0.4pp. Within this, the initial tariff impact remains relatively modest, at 0.08pp. That said, the indirect impact from the interconnected domestic and global supply chain would bring down China's growth by another 0.24pp and 0.06pp, respectively. Combined, this may pose downside risks to our current baseline growth forecast of 6.4%Y in 2019.

Inflation impact: In this scenario, we assume that China would match the US tariff amount by imposing a 25% tariff on the remaining US$80 billion of American goods which have not been included in the original US$50 billion tariff list. Combined with China's initial US$50 billion tariff list, this would be equivalent to a universal 25% import tariff on all American goods, which could translate into a 1.8% increase in China's headline import prices (the share of the US in China's total imports was 7% in 2017). Our econometric model suggests that this could lift China's CPI inflation by 0.4pp cumulatively.

Domestic policy response: In this scenario, we expect policy-makers to take up some fiscal and monetary easing to mitigate the growth impact. The government could widen the fiscal deficit (currently at around a three-year low of 3.3% of GDP on a 12-month trailing basis), to stabilise infrastructure investment and provide tax cuts/subsidies to the corporate sector and/or consumers. It could also lift the issuance quota of local government special bonds (part of China's quasi-fiscal support) in 2019 (versus Rmb 1,350 billion in 2018). Meanwhile, policy-makers could allow a modest rebound in broad credit growth to accommodate fiscal easing, with a continued boost to banks' on-balance sheet lending capability and slower pace of shadow bank tightening.

Scenario 3: Significant escalation

Growth impact: In this scenario where the US imposes a 10% tariff on another US$450 billion (total US$500 billion) of Chinese goods, the cumulative drag on China's growth could increase to 0.7pp. Within this, the initial tariff impact would edge up to 0.14pp, while the cumulative drags from the repercussive effect along the domestic and global supply chain would pick up to 0.45pp and 0.09pp, respectively. Consequently, such a major growth correction would complicate policy-makers' plan for China to double 2010 real GDP by 2020 (which requires a 6.3% CAGR during 2018-20).

Inflation impact: In this scenario, we assume that China could respond with a universal 40% tariff on all goods imports from the US. This could translate into a 2.8% increase in China's headline import prices, lifting China's CPI inflation by 0.7pp.

Domestic policy response: In order to avoid a major growth correction, policy-makers could adopt more meaningful fiscal and monetary easing measures. On the fiscal front, the government could widen the fiscal deficit further with more cuts in VAT/corporate tax and consumption tax, higher fiscal subsidies to private corporates and a boost to infrastructure investment (particularly those related to government-led regional integration plans). On the monetary front, policy-makers could suspend the financial clean-up process, and allow a more significant rebound in broad credit growth to accommodate the expansionary fiscal policy.

Scenario 4: Full-blown escalation

Growth impact: In this severe scenario, the US would impose a 25% tariff on all goods imports from China and the EU. The total drag on China's real GDP growth would be 1.5pp. Within this, the initial tariff impact would rise to 0.3pp, while the cumulative drags from the repercussive effect along the domestic and global supply chain would pick up to 0.95pp and 0.25pp, respectively. Such a major growth shock would likely prevent China from achieving its plan to double 2010 real GDP by 2020.

Inflation impact: We assume that China could respond with a universal 100% tariff on all goods imports from the US, so as to match the tariff collection by the US from its imports from China. This could translate into a 7% increase in China's headline import prices, lifting China's CPI inflation by 1.7pp.

Domestic policy response: In order to maintain overall employment, policy-makers could adopt a meaningful stimulus package and considerable monetary easing, similar to what they did in 2008 and 2015. The fiscal authority could widen the fiscal deficit significantly with large cuts in VAT/corporate tax and consumption tax, a higher subsidy to private corporates and more aggressive infrastructure investment. Meanwhile, the PBOC could adopt more measures to engineer a material rebound in broad credit growth.

Potential impact on China's FX policy

Some further currency depreciation likely if trade tensions escalate further... While our base case remains that USDCNY could reach 6.65 by 3Q18 and 6.60 by end-2018, the shifting market expectation on growth and the policy stance amid increased trade tensions could lead to overshooting risks in the near term. For instance, if the trade-weighted CNY index were to reverse its gain relative to the USD TWI from February to mid-June, USDCNY could reach 6.8-6.9. We expect the PBOC to step up intervention if depreciation risk intensifies. That said, in the worst case of trade tensions, where the US tariff hike could lead to a major growth correction in China, policy-makers may allow some CNY depreciation to offset the impact, and impose stricter restrictions on capital outflows.

...but material currency depreciation/one-off devaluation is unlikely: We do not think that policy-makers would pursue this approach. While a weaker CNY may partly offset the potential impact from US tariff hikes, significant currency depreciation could raise the risk of self-fulfilling stress on outflows and financial conditions tightening, as suggested by the lesson from August 2015. At that time, while the PBOC re-emphasised that the policy intention of changing the fixing rate mechanism was not to conduct a meaningful one-off CNY depreciation, the market's self-fulfilling expectations imposed challenges for the PBOC to intervene and stabilise the currency. Meanwhile, disorderly currency depreciation would also jeopardise China's efforts to promote RMB internationalisation and capital account liberalisation, in our view.

US: Assessing the impact of tariffs

Ellen Zentner, Robert Rosener

Tariff measures put in place to date are likely to lead to only a modest drag on US GDP growth of around 0.1pp. The cumulative effects could increase to a more significant 0.2pp drag if the additional US$200 billion tariff list is implemented on top of tariffs on EU auto exports. In a more severe scenario we consider (scenario 3), where tariffs are applied nearly across the board against China, tariffs are applied against EU auto exports, and both China and the EU respond proportionately, the cumulative growth impact could increase to 0.3pp. Finally, in the most extreme scenario we consider, where 25% tariffs are applied on all goods imports from China and the EU, and a proportionate response is applied against US exports, the cumulative growth impact could be as much as 1.0pp.

Consequently, further escalation of trade tension raises downside risks to our baseline growth forecast of 2.2%Y in 2019, all else equal. The 2018 growth profile remains largely intact right now, as upside in 1H18 growth tracking, due in part to some stockpiling effects ahead of the implementation of the tariffs, should offset a potentially slower rate of growth in 2H18. Impacts on inflation are somewhat more contained. We estimate that tariffs will lift core PCE inflation by 0.4pp in the most severe scenario which we consider (scenario 4). As downside risks to the outlook increase, policy-makers will likely feel even more cautious about pushing interest rates far beyond a neutral policy setting.

Scenario 1: Status quo

Growth impact: China's announced measures in response to the US$50 billion in US tariffs would have a negative impact on US GDP growth of 0.1pp. The direct impact from reduced demand for affected US exports would amount to 0.03pp, and would be seen most significantly in agricultural sectors and in manufacturing of chemicals and chemical products. Indirect impacts would be transmitted through the domestic and global supply chain, and we estimate that these secondary effects would reduce GDP growth by an additional 0.06pp.

Exhibit 19:

Impact of trade tension on US growth and inflation, and the policy response

Scenario	Growth Impact	Inflation Impact	Policy Response
Status quo - US: 25% tariff on imports of steel and 10% on imports of aluminum; 25% tariff on US$50bn of Chinese goods - China: 25% tariff on US$50bn of US goods	**Total impact: -0.1pp** Initial impact: -0.03pp Domestic supply chain: -0.04pp Global supply chain: -0.02pp	+0.01-0.02pp	Limited near-term implications; Fed's message of gradual removal of accommodation remains intact
Escalation - US: Additional 10% tariff on US$200bn of Chinese goods; 22.5% tariffs on EU auto exports - China: Additional 25% tariff on US$80bn of US goods - EU: Response on US manufacturing exports to EU, matching size of auto exports to US	**Total impact: -0.2pp** Initial impact: -0.09pp Domestic supply chain: -0.11pp Global supply chain: -0.03pp	+0.1pp	Fed likely feels continued gradual rate hikes are appropriate; increases policy-makers' caution about how far and how fast to push rates into restrictive territory
Significant escalation - US: Additional 10% tariff on US$500bn of Chinese goods; 22.5% tariffs on EU autos - China: Response to obtain back same level of tariff collections - EU: 8% tariff on US manufacturing exports	**Total impact: -0.3pp** Initial impact: -0.14pp Domestic supply chain: -0.16pp Global supply chain: -0.04pp	+0.1pp	Fed guards against a more pernicious tightening of financial conditions that could occur in a potentially non-linear way as more tariffs are introduced. Policy-makers grow even more cautious about pushing interest rates beyond a neutral policy setting
Full-blown escalation - US: 25% tariff on all goods imports from China and EU - China & EU: Response in kind to obtain same level of tariff collections	**Total impact: -1.0pp** Initial impact: -0.41pp Domestic supply chain: -0.47pp Global supply chain: -0.11pp	+0.4pp	While the Fed might feel pressured by higher inflation, a full percentage point reduction in the growth outlook, and looming downside risks from financial market volatility and risk-aversion would raise the risk that the Fed pauses its policy tightening indefinitely, and reverts to a more dovish policy stance.

Source: Morgan Stanley Research estimates

In this scenario, we believe that the net impact may be modest, but could be more noticeable in the quarterly growth pattern in 2H18 and early 2019. GDP growth in 2Q18 is tracking at a strong 4.7% pace, boosted by a combined 2.2pp contribution from net trade and inventories – factors we believe are partially explained by some stockpiling behaviour that occurred in 2Q before these tariffs were implemented. US exports of soybeans, for example, have risen at a nearly 9,400% annualised pace over the past three months. Some payback is likely to occur in 2H18 as a result, although smoothing through this volatility in the headline GDP growth rate, the net effects are likely to remain quite modest, especially with respect to the private domestic economy.

Pass-through into financial conditions is another important channel we consider in this scenario, particularly as this initial round of tariffs has contributed to recent USD strength and financial market volatility that together have acted to tighten financial conditions in turn. While the tightening in financial conditions has been fairly modest to date, all else equal these factors could amount to an additional 0.1pp drag on GDP growth.

Inflation impact: Inflationary impacts would primarily be transmitted through the higher costs of imported goods that the US has placed under tariffs. Scenario 1, which entails US tariff measures against US$50 billion in imports from China, covers very few consumer goods. Indeed, only about 1-2% of the products on the US$50 billion Chinese goods list are consumer goods. Other products represent more intermediate inputs and capital goods where cost changes are more likely to be absorbed in the production chain or substituted away from. Consequently, we estimate the inflation impact to be very small, lifting core PCE inflation by only about 1-2bp.

Domestic policy response: Implications for monetary policy remain limited for the near term. As the June FOMC minutes noted, economic growth remains "solid", but downside risks to the outlook from trade have risen. We believe that most policy-makers still see the upside from fiscal stimulus counteracting the downside from trade and so the message of gradual removal of accommodation remains intact.

Over the medium term, downside risks to growth and upside risks to inflation from tariffs would create a conundrum for the Fed, which has to balance near-term inflation pressures and long-term threats of demand destruction. But regarding trade tensions thus far, Fedspeak suggests that it will take a significant inflation impact to sway the Fed from its gradual path of policy tightening.

Scenario 2: Escalation

Growth impact: Potential action from China in response to additional tariffs the US has proposed against US$200 billion of imports from China, together with potential EU action against US manufacturing exports in response to auto tariffs, would lead to a more significant drag on growth. If implemented, these measures in response would raise the cumulative drag on US growth to 0.2pp. We estimate that the direct effects would amount to a 0.09pp drag on growth, felt in a wider-ranging set of industries including the agricultural sector, food manufacturing, manufacturing of chemicals, manufacturing of computers, electronic & opticals and manufacturing of transportation equipment. Secondary indirect effects propagated through the domestic and global supply chain would bring down US growth by another 0.14pp.

As the bulk of these tariffs would not likely be implemented before late 2018, the effect on US growth would be felt mostly in 2019, raising some downside risk to our baseline forecast for 2.2%Y growth in 2019.

If these tariffs are implemented, we would expect that the effects on financial conditions via USD strength, financial market volatility and equity market valuations might become more significant. Further tightening of financial conditions could result in an additional drag on growth that magnifies downside risks to the economic outlook. Moreover, we expect the effect of these tariffs on core PCE inflation to be modest, so further USD strength would act to counter any upside on core PCE inflation, and could lead to a net neutral impact on inflation. Hence, the predominant concern for the Fed would be downside risks to the growth outlook, while any upside risks to the inflation outlook would be attenuated by the USD response.

Inflation impact: The proposed tariffs on US$200 billion worth of Chinese imports include about 33% consumer goods. Together with tariffs on EU auto imports, there would be meaningfully greater channels for potential pass-through into higher prices. We estimate that this could lift core PCE inflation by about 0.1pp by the end of 2019.

Domestic policy response: In this scenario, the conundrum facing the Fed would be somewhat more pronounced, with downside risks to growth and upside risks to inflation pushing the dual mandate in opposite directions. Some positive fiscal impulses will remain in place in 2019, however, primarily through higher government spending caps. As a result, even after accounting for the drag on growth from the tariffs, GDP growth is likely to remain above poten-

tial, and with rising inflation, the Fed would likely feel that continued gradual rate hikes are appropriate. These trade-related downside risks to the growth outlook may increase policy-makers' caution about how far and how fast to push rates into restrictive territory.

Scenario 3: Significant escalation

Growth impact: In this more severe scenario, with tariffs applied nearly across the board against China, and against EU auto exports, and both China and the EU responding proportionately, the impact on US growth would be more significant, amounting to a cumulative 0.3pp drag on GDP growth, with a direct demand impact of -0.14pp adding to a secondary indirect drag of -0.20pp as the effects of the tariffs ripple through the domestic and global supply chain.

Inflation impact: This scenario includes a more expansive list of products under tariffs, and increases the channels for inflationary pass-through into consumer prices. We estimate that this scenario could raise core PCE inflation by 0.13pp by the end of 2019.

Domestic policy response: Greater restraint on growth would raise downside risks to the outlook, making policy-makers even more cautious about pushing interest rates beyond a neutral policy setting. Moreover, policy-makers may lean towards a more dovish stance to guard against a more pernicious tightening of financial conditions that could occur in a potentially non-linear way as more tariffs are introduced. Such a tightening of financial conditions could raise the downside risks for growth even further beyond what is considered here.

Scenario 4: Full-blown escalation

Growth impact: In this severe scenario, where 25% tariffs are applied on all goods imports from China and the EU, and a proportionate response is applied against US exports, the impact on US growth would be much more material, amounting to a cumulative 1.0pp drag on GDP growth, with a direct demand impact of -0.41pp adding to a secondary indirect drag of -0.58pp amplified through the domestic and global supply chain. In this scenario, positive fiscal impulses from tax reform and higher government spending would be more than fully offset by the negative effects from trade frictions.

Inflation impact: In this most expansive tariff scenario, we see the greatest possibility for pass-through into consumer prices, and we estimate that this scenario could raise core PCE inflation by 0.4pp by the end of 2019.

Domestic policy response: It is likely that a worst-case scenario for trade policy would come alongside a meaningful tightening of financial conditions and dampening of risk sentiment that would put further pressure on growth. While the Fed might feel pressured by higher inflation, a full percentage point reduction in the growth outlook and looming downside risks from financial market volatility and risk-aversion would raise the risk that the Fed pauses its policy tightening indefinitely, and reverts to a more dovish policy stance.

Euro area: Assessing the impact of tariffs

Daniele Antonucci, Jan Kozak

Tariff measures put in place to date are likely to lead to only a minimal drag on euro area GDP growth. However, while the magnitude of the immediate impact on output should be minimal, a higher degree of business uncertainty and an extension of tariffs to other sectors could alter the macro outlook. It's the possibility of large tariffs on things like cars that could have a bigger effect on the economic trajectory, mainly due to the impact on German industry and its suppliers. Taking into account domestic and global supply chain spillover effects, the intermediate scenarios of escalation from scenario 1 to scenario 2 or 3 would lead to an extra GDP decline of 0.2pp based on our analysis and to some small upward pressure on inflation. We think that the ECB would turn more dovish, but it won't likely act. 'Passive' fiscal tools, such as unemployment benefits and automatic stabilisers, would cushion some of the negative impact.

In the event of the most bearish scenario materialising in the near term, which we label full-blown escalation, the pace of GDP growth in 2019 would likely slow to about half the current pace, coming in at ~1%Y. We would envisage some more visible upward pressure on inflation but, given that the economy would grow below trend in that scenario, by no more than 30bp higher than our current forecast. A sudden escalation may force the ECB to revise its plans to end QE from next year, even though only a substantial re-design of the programme would allow the central bank to buy in large sizes for much longer. A more protracted but shallower escalation would probably result in the ECB postponing the first rate hike and reinstating long-term liquidity operations to the banks. Economies with sound public finances, such as Germany, could also implement a more expansionary fiscal policy.

Scenario 1: Status quo

Growth impact: The US administration has imposed tariffs of 25% on steel and 10% on aluminum imported from the EU. While this is a negative, we believe that the immediate impact of both tariffs on the EU and euro area economies should be quite small, practically negligible even taking domestic and global supply chain spillovers into account. For the euro area as a whole, the negative impact on gross value added would amount to 0.05pp, a really small effect, with indirect, global effects playing the biggest role, albeit one that's

Exhibit 20:

Impact of trade tension on euro area growth and inflation, and the policy response

Scenario	Growth Impact	Inflationary Impact	Policy Response
Status quo - US: 25% tariff on imports of steel and 10% on imports of aluminum; 25% tariff on US$50bn of Chinese goods - China: 25% tariff on US$50bn of US goods	**Total impact: -0.05pp** Initial impact: -0.01pp Domestic supply chain: -0.01pp Global supply chain: -0.04pp	Negligible	- **Monetary:** Limited implications for the ECB in the near term - **Fiscal**: Automatic stabilisers can cushion part of the downward drag
Escalation - US: Additional 10% tariff on US$200bn of Chinese goods; 22.5% tariffs on EU auto exports - China: Additional 25% tariff on US$80bn of US goods - EU: Response on US manufacturing exports to EU, matching size of auto exports to US	**Total impact: -0.2pp** Initial impact: -0.04pp Domestic supply chain: -0.05pp Global supply chain: -0.11pp	less than +0.1pp	- **Monetary:** More visible downside risks to growth may cause some concern for the ECB, but unlikely to trigger shift in the policy path - **Fiscal:** Active fiscal support by countries with fiscal headroom (e.g., Germany)
Significant escalation - US: Additional 10% tariff on US$500bn of Chinese goods; 22.5% tariffs on EU autos - China: Response to obtain back same level of tariff collections - EU: 8% tariff on US manufacturing exports	**Total impact: -0.2pp** Initial impact: -0.04pp Domestic supply chain: -0.05pp Global supply chain: -0.14pp	less than +0.1pp	- **Monetary:** Slightly more visible downside risks to growth may cause some more concerns for the ECB, but still unlikely to trigger a shift in the policy path - **Fiscal:** Slightly more active fiscal support by countries with fiscal headroom (e.g., Germany)
Full-blown escalation - US: 25% tariff on all goods imports from China and EU - China & EU: Response in kind to obtain same level of tariff collections	**Total impact: -0.7pp** Initial impact: -0.17pp Domestic supply chain: -0.17pp Global supply chain: -0.40pp	+0.3pp	- **Monetary:** A sudden escalation could force the ECB to extend its net asset purchase programme into 2019. A slower unfolding would likely result in no rate hike in 2019. Reinstallation of LTROs could improve short-term liquidity - **Fiscal:** Headroom in public finances should allow for coordinated fiscal policy support.

Source: Morgan Stanley Research estimates

nevertheless quite small overall. That said, it's clear to us that, while medium-term risks are probably still balanced as fiscal policy may pose small upside, they're more skewed to the downside in the short term, as trade frictions could lead to a more general decline in confidence throughout the global economy, beyond any direct effects from the imposition of tariffs.

Inflation impact: This would primarily be transmitted through the higher costs of imported goods that the euro area has placed under tariffs. This scenario, which entails EU tariff measures against US$3.2 billion in imports from the US, covers just a few consumer goods – the rest represents more intermediate inputs and industrial goods where cost changes are more likely to be absorbed in the production chain or substituted away from. Consequently, we estimate the inflation impact to be negligible, lifting headline HICP inflation by not even 0.02pp, a rounding error from our point of view.

Domestic policy response: Implications for monetary policy remain limited for the near term. Regarding trade tensions up to now, several ECB speakers have so far suggested that it would take a bigger impact for the central bank to change course. However, if large tariffs on things like cars and/or more elevated business uncertainty not captured in our quantitative approach were to materialise, this could have a bigger effect on the economic outlook, for the region as a whole but especially for Germany. With regards to fiscal policy, the euro area and many of its member countries run a primary budget surplus and, by simply allowing automatic stabilisers such as unemployment benefits to operate, they could cushion such a small trade impact.

Scenario 2: Escalation

Growth impact: We estimate that the negative impact on gross value added would amount to about 0.2pp, with more than half stemming from global supply chain effects. In terms of total impact, this is about four times the negative effect compared to scenario 1, with an overproportional impact on the German industry. For one, German car manufacturers have the largest exposure in the euro area to the US, relative to their national GDP. Another risk for carmakers, relying on car components from across the world, may be that supply is hit by tariffs. However, major suppliers of German car manufacturers are well matched geographically to the plants they serve, as production requires a just-in-time supply business. Finally, thinking outside of our quantitative model, the risk is that business confidence could be dented further as a result, which may have a broader impact on investment across sectors.

Inflation impact: Upward pressures through the complex supply chains in and beyond the car industry should still be relatively muted, likely amounting to less than 0.1pp. As in scenario 1, the key issue to consider is a potential escalation. Looking at car tariffs specifically, they would have a far greater (relative) price impact on lower-priced models due to ex-ante lower sales margins. However, American car imports are a relatively small niche in the European car market, i.e., serve a mainly higher-priced market segment. In addition, we would not expect any significant change in US car parts sale prices in Europe, as most parts are sourced locally. Moreover, should consumer credit slow in the future, manufacturers may not have much room to recoup the cost increases they will face as a result of this trade action. Finally, it is important to note that part of the EU-Japan free trade agreement finalised recently will remove 10% car import duties (3% for car parts) from cars imported to Europe from Japan, i.e., mostly lower-priced models, and thus counteract any potential tariffs on US cars.

Domestic policy response: The more material downside risks to growth may cause some concern for the ECB in this scenario, as they exacerbate the tension between a gradual increase in inflation paired with more subdued growth. That said, it would remain unlikely that these hypothetical developments trigger a material change in the monetary policy outlook, assuming limited negative spillovers from a decline in business confidence.

Scenario 3: Significant escalation

Growth impact: In this scenario, we envisage that the bilateral tariff structure between the US and EU would remain unaffected relative to our 'escalation' scenario. Thus, any incremental effects on growth, adding to the 0.2pp negative drag from the previous scenario, would come from somewhat more pronounced frictions in the global supply chain, thus cutting an extra 0.03pp from growth.

Inflation impact: Given no additional measures by the EU in response relative to the 'escalation' scenario, upward inflationary pressures should remain relatively muted, i.e., likely less than 0.1pp.

Domestic policy response: Similarly, more material downside risks to growth may cause some concern for the ECB in this scenario, but it would likely require a more significant escalation for the ECB to act, while it would of course become explicitly more dovish, all else equal.

Scenario 4: Full-blown escalation

Growth impact: The headwinds to an already gradually slowing, but still solid growth environment would be significant. In this severe scenario, the EU raises tariffs across goods by 40pp which, together with the US tariffs, translates into a cumulative drag of more than 0.7pp, with a direct demand shock of -0.17pp adding to a secondary indirect drag, also negative, of 0.57pp amplified through the wider supply chains. While the exact transmission into quarterly growth numbers depends on both the initial timing and the trajectory of shocks, a quick escalation would equate to a sequential contraction for one quarter in euro area GDP, or two subsequent quarters of zero growth.

Inflation impact: The inflation impact should be more substantial, as EU tariffs on US goods are raised considerably across the board. We pencil in a +0.3pp impact on our numbers. This accounts for some degree of margin absorption of higher prices by firms as well as an extension of (potential) trade agreements with other countries. Both effects limit the pass-through of import tariffs into consumer prices. What's more, as the economy would be growing way below trend, this would be a disinflationary impulse, partly counteracting the inflationary one from the increase in tariffs.

Domestic policy response: A quick escalation towards our severe scenario would likely lead to an extension of the ECB's net asset purchase programme into early 2019, as QE will remain part of the available policy toolkit. Should events unfold more slowly, we envisage that the central bank won't hike at all next year versus our current base case of a 15bp depo rate hike to -0.25% in October 2019. If the issue was lack of liquidity for banks and/or a desire to prevent excess liquidity from falling too rapidly out of the system, the ECB could perhaps reinstate its long-term refinancing operations. On the fiscal front, euro area member countries with remaining fiscal headroom (for instance Germany) could front-load spending initiatives, and thus help to buffer growth shocks. Export subsidies in one form or another, to the extent that they're compatible with the EU state aid rules, could be part of the toolkit too.

The global input-output model explained

Georgi Deyanov

A note on methodology: Our approach is based on an input-output matrix summarising the inter-dependencies among different sectors of the economy, i.e., it tracks to what extent the output of one sector becomes an input in another sector. This model can be used to simulate how the change in final demand for one product can be traced back through all the sectors and countries that provide inputs into the final product, or how the increase in the price of an intermediate input can be traced back to all the final products it directly and indirectly contributes to.

Want to know more? Specifically, our work is based on World Input-Output Tables (WIOD) and underlying data, covering 43 countries, and a model for the rest of the world for 2000-14. Data for 56 sectors are classified according to the International Standard Industrial Classification revision 4 (ISIC Rev. 4). The key reference is: Timmer, M. P., Dietzenbacher, E., Los, B., Stehrer, R. and de Vries, G. J. (2015), An Illustrated User Guide to the World Input-Output Database: the Case of Global Automotive Production, *Review of International Economics*, 23: 575-605.

What are the advantages of this approach? The benefit of this method is that it can help to understand the detailed process of production, and so reveal how trade changes propagate throughout the system. Following our first publication based on the input-output approach, we have updated our model to capture the supply chain effects on a global scale. We now capture three main effects for each economy and its subsectors:

1. **Domestic impact on the economy:** The increase in import tariffs from one country affects the exporting country negatively as it increases the prices of the exported goods and thus translates into a negative demand shock. The demand shock impacts the exporter's economy through two main channels – the intra and inter-industry effects. **The intra-industry effect** has to do with the initial change. As one firm's turnover falls in one sector, other firms, e.g., suppliers of clients in the same sector, will likely be affected too, which magnifies the initial change. The inter-industry effect has to do with repercussions along the domestic supply chain, i.e., other sectors may be affected as well.
2. **Initial impact on supply chain partners:** As production declines in the tariff-affected countries, their demand for imports of intermediate goods from their main trading partners declines as well. Looked from the angle of the supply chain partners, it means fewer exports and thus also a decline in demand for the local economy. The demand shock also passes through the two main channels of magnification – the intra and inter-industry effects.
3. **Global supply chain impact:** Now that the main supply chain partners of the tariff-affected countries have also suffered a decline in production, the same logic applies to their own supply chain partners where one can also find the tariff-affected countries and thus the global supply chain effect can additionally impact their economies in a negative way.

Another major advantage of input-output analysis is that it also **allows us to distinguish between gross output** (turnover) **and value added** (turnover less cost of intermediate goods and services bought), recognising that it is value added, and not gross exports, that matters for overall GDP. Thus, once we calculate the size of the three main effects, in our model we focus on gross value added by stripping out intermediate consumption to gauge the impact on the overall economy.

Our approach allows us to identify vulnerable sectors: As we model a one-time change that works via multiple channels in the production and global supply chain, we move away from the complexity and 'black box' characteristics of large dynamic general equilibrium models. It also allows us to zoom in on the effects sector-by-sector and outline not only the obvious sectors which would be more vulnerable to an upturn in trade frictions but also the ones that would be affected by spillovers from the impact on the global supply chain.

What are the potential drawbacks? A potential pitfall is that the database we use, given how extensive the data collection is, tends to lag by three years (currently WIOD data cover 2000-14) and updates infrequently. However, considering that the structure of an economy changes very slowly, we believe this to be an acceptable trade-off.

The income effect on consumption and investment is not captured: Our framework allows us to capture the full extent of how trade shocks propagate through the global supply chain. Yet, although theoretically possible, we do not include any second-round effects from the decline in economic activity on employment, household consumption and investment. Why? Because while global supply chains can be assumed to be less flexible and slow-evolving,

it is less obvious to assume that firms and households will behave in a linear way as trade in goods does. Moreover, policy-makers in each country can take measures to offset the negative impact and thus mitigate the impact on consumption and investment.

No behavioural reaction functions: In response to exogenous changes, our model does not consider dynamic shifts in the economic relationships, such as changes in economic agents' behaviour. This also applies to financial market impacts, such as adjustments in exchange rates in response to shifts in trade patterns, or any impact via changes in financial conditions. Another assumption that falls in this category is that we assume producers transfer to the full extent the increase in prices along the supply chain as a result of the increase in tariffs. While this assumption is convenient for modelling purposes, in reality producers can absorb some of the price increases through lowering their profit margins. This could be especially true in regions where profit margins are higher than the rest of the world due to higher levels of productivity or relatively lower labour costs.

Scenario assumptions: Our status quo scenario is designed to capture all the significant tariff increases in the recent past that have already been or are almost certain to be implemented in the near future as the scenario's aim is to be realistic in nature yet not exhaustive. In this scenario, we mapped the list of known products affected by tariff increases for all countries to the sectorial classification used in WIOD (ISIC Rev. 4).

Further on, we consider three escalation scenarios that build on the status quo scenario. These escalation scenarios are hypothetical in nature and are based on information circulated by the media and to some extent by the authorities of the respective countries. Once we calculate the value of the goods with imposed tariffs for each sector in the economies, we then calculate a weighted tariff increase based on their share of the sector's total exports to the respective countries. The calculated weighted tariff increase represents the price increase in our model, which we use in combination with price-demand elasticities to calculate an initial trade shock for each country.

Price-demand elasticities: For price elasticities of China's export demand, we mainly adopt results from a previous IMF study entitled China's Changing Trade Elasticities, which finds a generally elastic response of Chinese exports to price changes. In our simulation, we use the following price elasticities for seven broad categories of products: agriculture (-1), manufacturing by material (-1), chemicals (-1.3), transportation machinery (-1.6), commodities (-2), electrical & electronic products (-2.2) and others (-1). For the US, we mainly adopt similar estimates of elasticities from the same IMF study, focused on the response of Chinese imports to price changes. For agricultural products that are covered under tariffs but not covered in these studies, we assume an elasticity of -1, but the effects could be larger for certain categories where substitution towards imports from other countries is much easier.

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