

## PANORAMA



## US Trade Protectionism: what are the knock-on effects on global value chains?

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**PROTECTIONISM  
HAS BECOME  
A GLOBAL TREND  
SINCE 2008**

**6**  
**US PROTECTIONISM  
TRIGGERS  
SIGNIFICANT  
KNOCK-ON EFFECTS  
ON INTERNATIONAL  
VALUE CHAINS**

**W**hile policies to open up trade have been a standard feature since the creation of the World Trade Organization (WTO) in 1995, the 2008-2009 crisis proved a turning point. The crisis boosted protectionism, which then climbed to new levels with the arrival of Donald Trump as President of the United States. Since early 2018, the US government has kept its word on several of its threats in terms of trade protectionism by launching customs duties on imports for various products: solar panels and washing machines (January), as well as steel and aluminium (March, then in June for the EU, Mexico, and Canada, concluding with Turkey in August). Over the first three quarters of 2018, the US government then started officially taxing Chinese imports (worth USD 50 billion in July, plus another 200 billion in September). The US government therefore decided to restrict trade affecting 12% of imports to the United States. Meanwhile, retaliation policies hit 8% of US exports.

The most obvious effects of this radical change of direction in US trade policies will clearly be felt by the trade partners

specifically targeted by these policies. These direct effects must be evaluated, but this approach is not enough to appraise the scale of the impact on world trade. The aim of this study is to attempt to quantify the knock-on effects of US policies for the trade partners of the countries targeted.

The moderate negative impact of US customs duties on exports is brought to light thanks to our estimation of value-added exports in 12 business segments from 63 countries from 1995-2011: increasing US tariffs by one percent for any given country leads to a 0.46% decrease in value-added exports from a partner country to the country targeted by the customs duties, all things being equal. If our estimation is limited to manufacturers, which are generally more incorporated in international value chains, increasing US tariffs by one percent will decrease value-added exports by 0.6%. This indirect impact is particularly high for segments such as transport (including the automotive sector), machines and equipment, and electronics. In contrast, this effect is less significant for food products, whereas metals, chemistry, mining, textiles, and agriculture are not severely affected.



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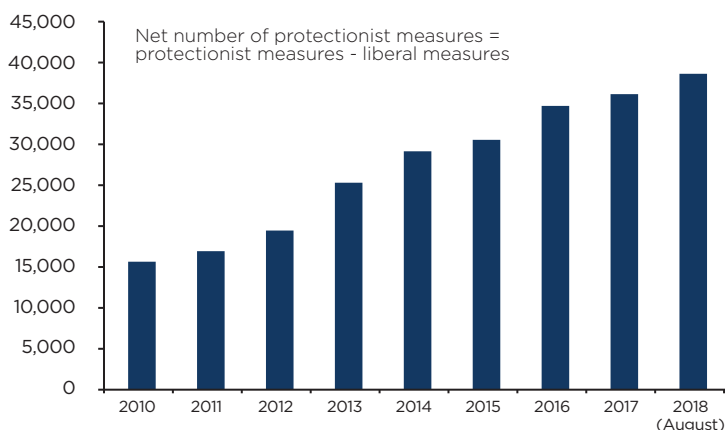
## 1 PROTECTIONISM HAS BECOME A GLOBAL TREND SINCE 2008

### More and more countries have opted for protectionism since the 2008 crisis

Countries use protectionist policies to defend national companies against competition from foreign firms. In real terms, protectionist policies can take many forms: safeguards (which temporarily prohibit or limit imports based on import quotas or by enforcing additional tariffs, aiming to protect a struggling local segment), anti-dumping policies<sup>1</sup>, export subsidies and related compensation<sup>2</sup>.

The reasons for protectionism are known: these policies allow a country to protect employment in the short-term by protecting business segments that have been left fragile due to the slowdown in international business and/or a less competitive position. Rises in protectionism are also due to new growth strategies (particularly within emerging markets), which involve promoting the success of business segments based on internal demand. Protectionist policies aim to protect these developing segments on this basis. Some emerging markets apply tighter restrictions to exports of raw materials or agricultural products to limit local market prices and stimulate household consumption. This approach also helps reduce the production costs of local firms who are facing a business slowdown due to the crisis.

**Chart 1:**  
Net number of protectionist measures in place



Source: Global Trade Alert

Global Trade Alert<sup>3</sup> (GTA) was launched in November 2008 and lists all policies worldwide that restrict or boost trade. The net impact of protectionist policies in each country since that time can be calculated by deducting the boosts from the restrictions. This net impact was a positive figure every year between 2009 and the 23<sup>rd</sup> August 2018, indicating that the scales are tipping towards protectionism on a global scale. This figure continues to increase, a sign that protectionism is expanding: the net impact is currently 2.5 times higher than in 2010 (**Chart 1**). 73% of exports by G20 countries are expected to face restrictive trade policies in 2017 according to the GTA, i.e. 10 times more than the WTO figure (which does not take into consideration some types of protectionist policies covered by the GTA)<sup>4</sup>.

1 When a company exports a good or service at a lower price than that applied on its domestic market, it is said that the company is practising “dumping”, which may lead governments to decide on “anti-dumping” measures to protect their own national companies.

2 Subsidies and related compensation: some subsidies granted by a country to one of its companies or sectors are considered as trade barriers, as are compensatory measures provided by countries to companies suffering from the negative effects of these subsidies.

3 [www.globaltradealert.org](http://www.globaltradealert.org)

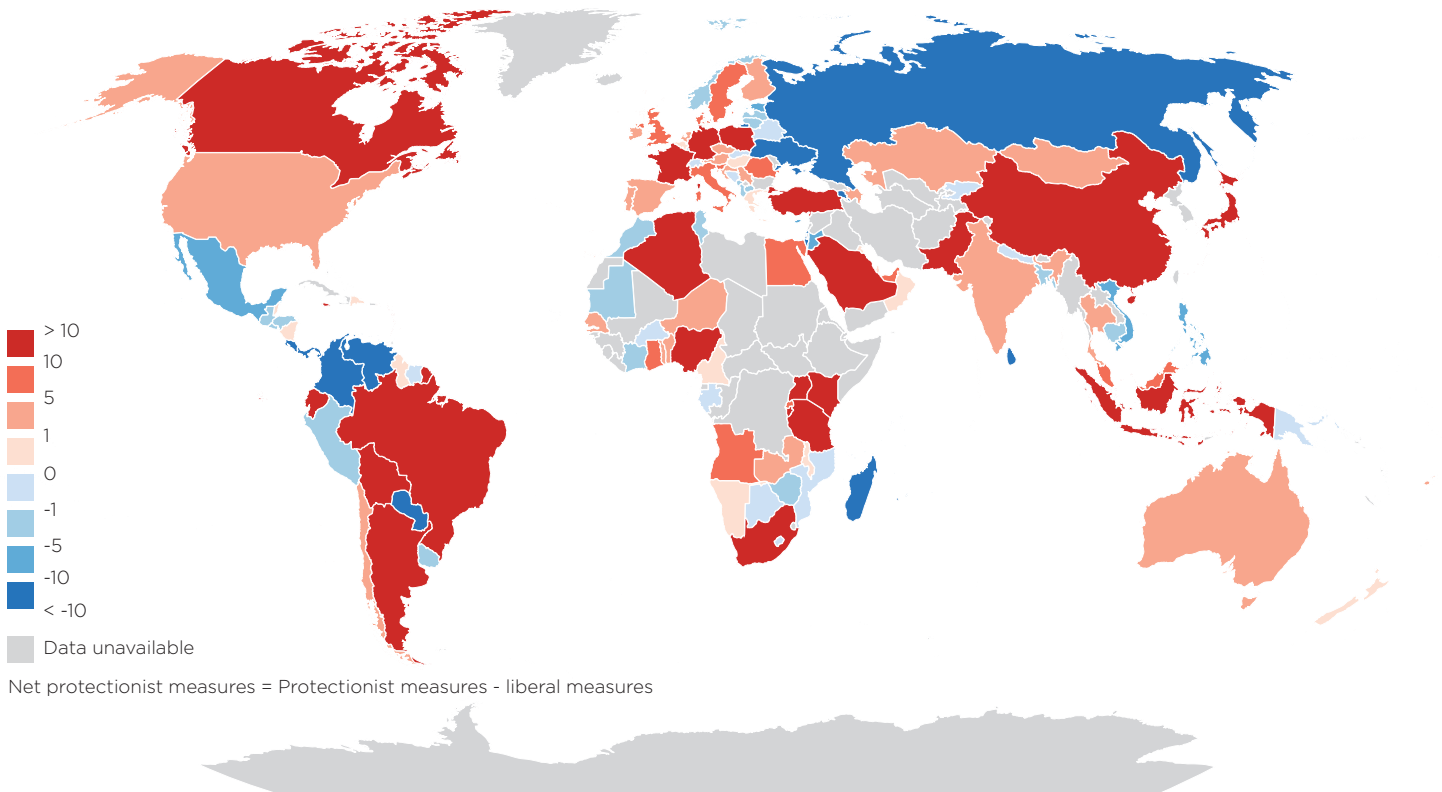
4 Evenett S. J., & Fritz, J. (2017, July 4). Will Awe Trump Rules? The 21<sup>st</sup> Global Trade Alert Report. Accessed 20 september, 2018, on Global Trade Alert: [www.globaltradealert.org/reports/download/42](http://www.globaltradealert.org/reports/download/42)

Examining in further detail, it is clear that this trend towards expanded protectionism affects a large number of countries. These countries are shown in red on **Map 1**, which reflects the difference between the percentage of imports expected to face existing protectionist policies (enforced by the importing country) and the percentage of imports benefiting from beneficial trade policies. If the score is positive, restrictions outweigh beneficial policies, reflecting a protectionist trend in trade policies – which is the case for most countries, notably the United States, despite the fact that the 2017 data does not incorporate all of the protectionist policies announced this year by President Donald Trump (affecting 12% of US imports in total). Most other developed economies (Western Europe, Japan, Canada, Australia) also reach a positive score and their configuration can be considered to be similar. This is also the case for many large emerging markets, such as Brazil and Argentina, who in recent years have both implemented tariffs (**Chart 2**) and other trade barriers aiming to protect local manufacturers from Asian competition (particularly Chinese firms). India was also in the top three G20 countries with the highest customs duties in 2015. In March 2018, India announced its plans to increase these duties

for around fifty products, confirming this trend. Multiple rules and regulations complement these tariffs as trade barriers (particularly sanitary and phytosanitary standards).

However, other countries are bucking this trend towards protectionism (shown in blue on the **Map 1**). This group notably includes Mexico, Colombia, and Peru in Latin America, all of which contributed to the launch of the Pacific Alliance<sup>5</sup> in 2011, aiming to promote regional integration. Several countries in South East Asia have also decided to opt for open trade policies: Vietnam, the Philippines, and Cambodia. Russia also falls into this category: in 2017, 76% of Russian imports benefited from free trade policies (compared with a mere 6% in 2009). This trend towards an open market matches Russia joining the WTO in 2012 and the creation of the Eurasian Economic Union in 2015. This approach has led to a reduction in the average tariffs applied to imports. These tariffs were divided by three between 2012 and 2015, falling from 9.1% to 3.1%, which is well below many other large emerging markets (**Chart 2**). Despite these improvements, it is worth highlighting that 50% of imports still faced protectionist policies in 2017.

**Map 1:**  
Share of each country's imports affected by net protectionist measures in 2017

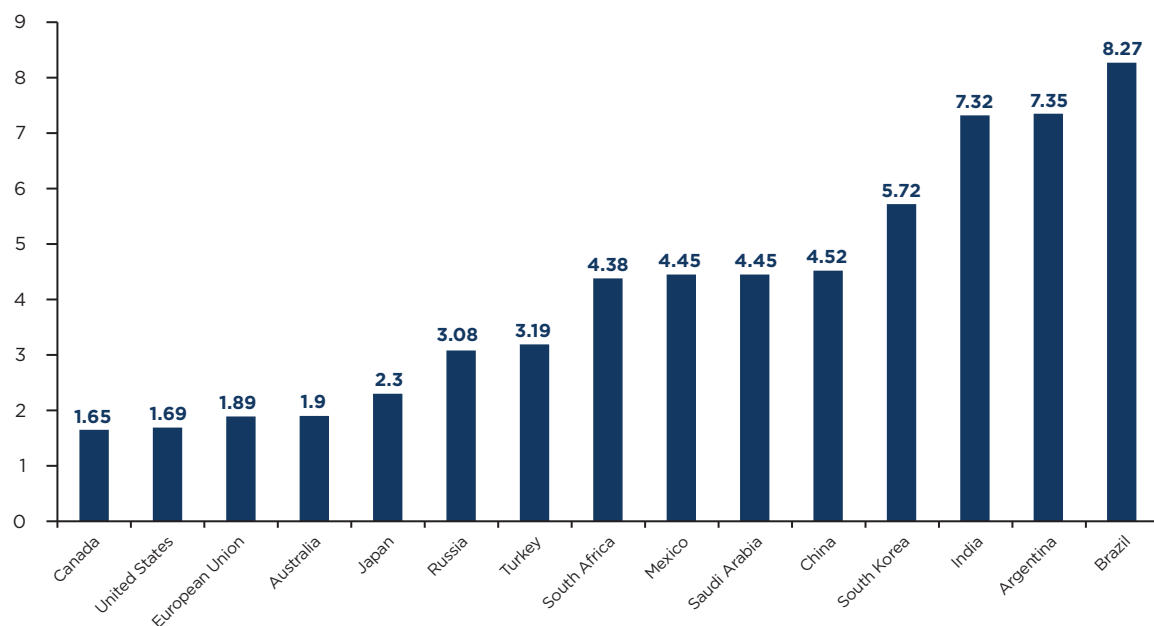


Source: Global Trade Alert

5 Chile is the 4<sup>th</sup> member of the Pacific Alliance



**Chart 2:**  
Weighted Average of Effectively Applied Rate on Imports in 2015 (%)



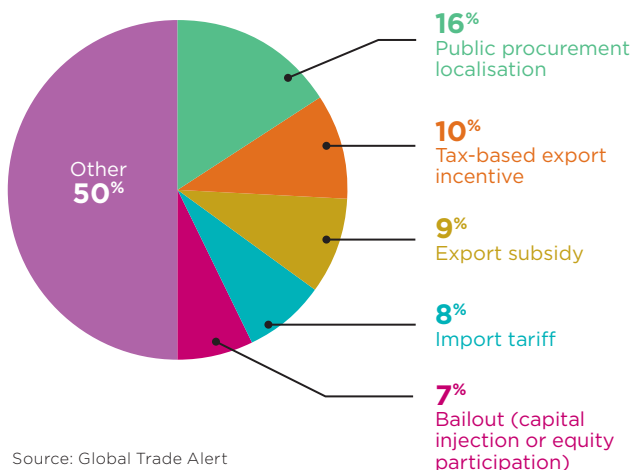
Source: WITS - UNCTAD Trains

China appears to be the prime target for the various protectionist policies applied to the benefit of local markets when considering the countries most affected by this increasing trend of protectionism. As of late August 2018, the number of existing clear protectionist policies applicable to Chinese products was twice as high as the equivalent figure for other top ranking countries (Germany, France, Italy, and Canada). India and South Korea also appear among the Top 15 countries affected, although most of the other countries on this list are “developed”.

**Customs duties/tariffs: a protectionist instrument that is increasingly enforced, but remains a minority policy**

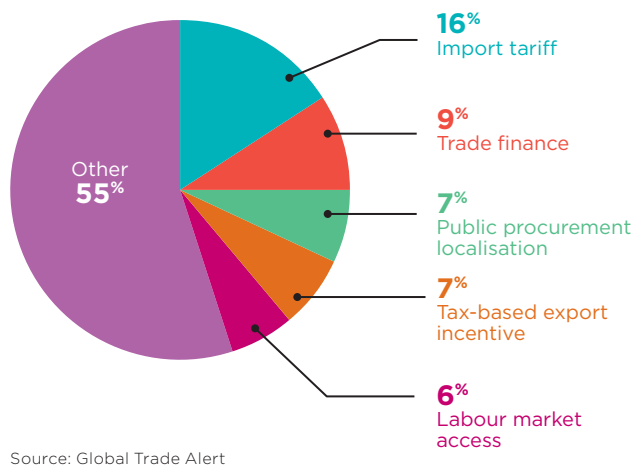
Tariffs are increasingly applied or increased for imports in this drive for protectionism. According to GTA data, which is broken down per type of policy, tariffs have indeed gained ground since the crisis. The use of tariffs as trade barriers represented 8% of protectionist policies worldwide in 2009<sup>6</sup>. This figure had risen to 16% by early September 2018 (Charts 3 & 4).

**Chart 3:**  
Top 5 instruments used for existing harmful measures in 2009



Source: Global Trade Alert

**Chart 4:**  
Top 5 instruments used for existing harmful measures in 2018



Source: Global Trade Alert

<sup>6</sup> Existing policies = total new trade policies applied during the year and all policies enforced in the past and still valid on the 31<sup>st</sup> December of the year in question

While all of the leading countries appear to be affected by the increase (except Japan, where tariffs on imports represented 12.3% of policies implemented in 2009 compared with 4.4% end-August 2018), the scale of the duties varies substantially between countries. Germany has seen its customs duties increase from 0.7% to 5.7% over the last decade, just like the rest of the European Union, while the equivalent figure for China has climbed from 2.6% to 9%. This figure appears stable in Brazil, at around 20%. It comes as no surprise to learn that the United States stands out with its significant upsurge in applicable tariffs (2.3% of policies enforced in 2009 vs. 12.5% late-August 2018). This increase was mainly applied between 2016 and 2018 (vs a mere 5.4% in 2016), reflecting the turning point in the trade policies of the United States with the arrival of Donald Trump in the White House.

However, in parallel, customs duties have also been used as a means of promoting business, to the extent that the average tariffs at the international level dropped from 14.1% in 1990 to 4.8% in 2016<sup>7</sup>. Reducing tariffs became the primary means of promoting free trade in 2018, representing 38% of all policies in force, compared with 13% in 2009. This trend reflects the constantly growing number of regional trade agreements concluded over the period (Chart 5). The aforementioned example of the Pacific Alliance is a good illustration of this approach.

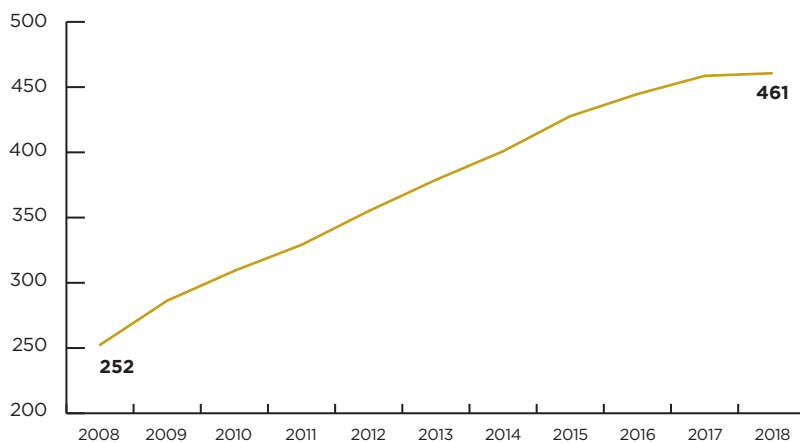
Nevertheless, while customs duties are increasingly enforced, they remain a minority policy: 84% of the protectionist policies identified worldwide by the GTA are not tariffs. Most protectionist policies involve public subsidies for exports, decisions on where to award government contracts, and other non-tariff policies (Charts 3 & 4). Phytosanitary rules intended to protect consumers, different labelling procedures, or administrative procedures implemented by governments can also prevent trade if rules are not harmonised.

Schmidt et Steingress<sup>8</sup> demonstrate that if rules are harmonised, business flows between the two regions concerned will be boosted. According to their estimations, harmonisation is equivalent to reducing customs rights by 1.8 points between the two regions in question. Another example of the importance of these non-tariff policies can be seen in the steel and aluminium segments: recently targeted by the US government, tariffs have not been the main instrument used to protect domestic business over the period; the key feature is the obligation to use local products in order to obtain government contracts.

### Metallurgical segments: a priority target

The main industry affected by the new protectionist policies since November 2008 is manufacturing, with the metals sector being the main target, ahead of the automotive, aeronautic, and organic chemical sectors (Chart 6). While this new drive in protectionism in the manufacturing sector must be highlighted, such segments are relatively unprotected compared with the agricultural world, which faces higher tariffs and more restrictive regulations (average tariffs at international level of 17.2% for crop and livestock products in 2015, and 13.3% for food products, despite the large number of phytosanitary standards). Food and textile products were more affected by protectionist policies early on in the period (2009-2011), while the new policies from 2016 onwards have focused on the metal, wood and paper, and automotive sectors.

Chart 5:  
Existing Regional Trade Agreements

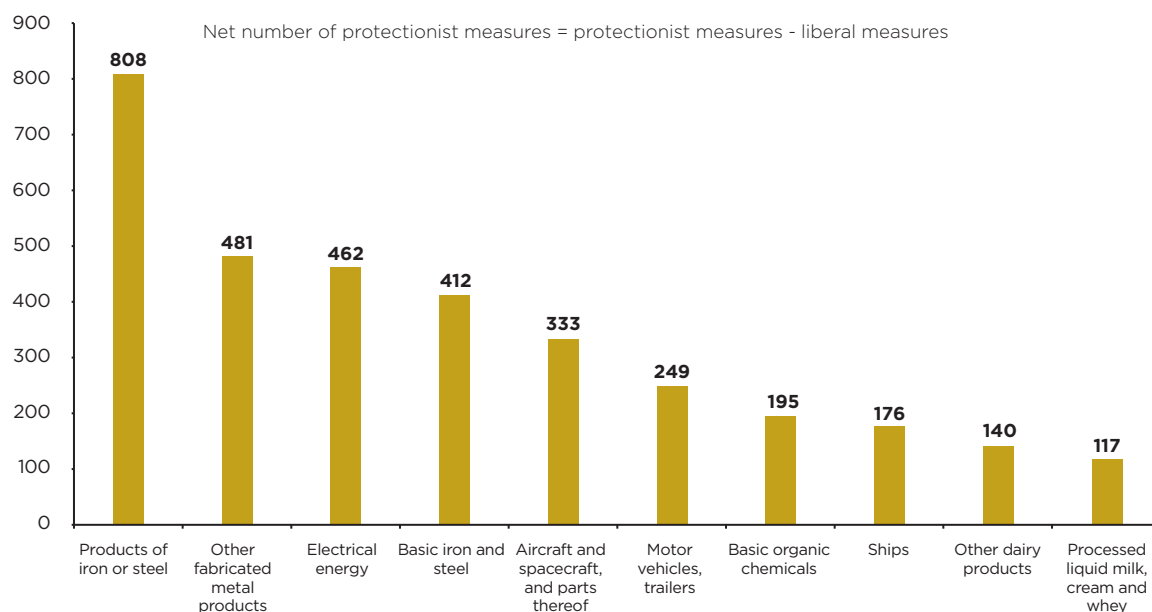


Source: World Trade Organization

<sup>7</sup> Weighted average customs duties actually applied in each country

<sup>8</sup> Schmidt, J., & Steingress, W. (2018, July 17). *Obstacles au commerce : au-delà des droits de douane*. (Preventing trade: looking beyond customs duties), Accessed September 20, 2018, from Banque de France - Bloc-notes Eco: <https://blocnotesdeleco.banque-france.fr/billet-de-blog/obstacles-au-commerce-au-dela-des-droits-de-douane>

**Chart 6:**  
10 sectors most affected by net protectionist measures between 2009 and 2018



Source: Global Trade Alert

On this basis, according to sector-based analysis, while protectionist policies initially focused on the metal sectors, intermediate products – i.e. the central components of the current multi-national production system – are also widely affected. Given the development of international value

chains, requiring multiple exchanges and border crossings to complete the finished product, considering the consequences of this rise in protectionism on sectorial value chains is of utmost importance.

## 2 US PROTECTIONISM TRIGGERS SIGNIFICANT KNOCK-ON EFFECTS ON INTERNATIONAL VALUE CHAINS

### The value chain boom since the creation of the WTO in 1995

Free trade policies have become a dominant feature over the last two decades, under the guidance of the WTO since its creation in 1995. In 2016, average customs duties represented a mere 4.8% worldwide<sup>9</sup>, and 1.67% and 1.60% for the United States and the European Union respectively. This drop in tariffs encouraged the launch of multi-national production systems, allowing each country to specialise in fields where they hold a competitive advantage. Producing an item in today's world generally requires contributions from several companies from different countries, producing various components before assembling the final product. Value chains mainly focus on the manufacturing

sector, and therefore bring together all companies or subsidiaries contributing to a product at various production sites, ranging from raw materials to the finished product. These production structures can be particularly long or extensive in some sectors, such as the automotive or information and communications sectors, and the different contributors are interdependent. In this respect, any impact on one contributor within this production network will have a knock-on effect for the other stakeholders, and so the launch of trade barriers – such as tariff increases, which raise production costs – could affect all business within the production network. Furthermore, economic theory<sup>10</sup> underlines that the knock-on effects for the rest of the value chain will be proportional to the role played by the link affected in the network,

<sup>9</sup> Weighted average of effectively applied customs duties per country.

Source: World Bank. (n.d.). *AHS Weighted Average % By Region*. Accessed September 20, 2018, on World Integrated Trade Solution: <https://wits.worldbank.org/>

<sup>10</sup> Diakantoni, A., Escaith, H., Roberts, M., & Verbeet, T. (2017). *Accumulating trade costs and competitiveness in Global Value Chains*. World Trade Organization - Working Paper.



as key links are connected to many flows in the segment. Consequently, given the leading role played by the countries involved in the current rise in trade wars (the United States, China, and to a lesser extent the European Union), the risk of a knock-on effect for a large number of stakeholders in international segment-based value chains is high.

### Beyond direct effects: the indirect effects of an increase in US customs duties

Since the initial announcements made by President Donald Trump in January 2018, various studies have attempted to evaluate the potential impact of the new policies on bilateral trade with the United States, and the effects on each segment. According to the CEPII<sup>11</sup> (leading French institute in international economics) study by Agnès Bénassy-Quéré, Matthieu Buijsière and Pauline Wibaux (2018)<sup>12</sup>, focusing on 110 countries and covering the period from 1989 to 2013, increasing customs duties by one percent for products from one country will decrease imports from this country by 1.4%, all other things being equal. In an article from June 2018, Keith Head and Thierry Mayer<sup>13</sup> analysed the consequences of the different trade policy decisions, reached in the context of Brexit, the North American Free Trade Agreement (NAFTA), and the Trans-Pacific Partnership, on multi-national production in the automotive sector. They concluded that dissolving NAFTA would lead to catastrophic effects based on the renewed application of WTO tariffs for Canadian and Mexican automotive output (respective losses of national output of 44% and 29%), due to dependent production systems and national consumption (relations between subsidiaries and head offices, dependence on the US market for sales, etc.). Economic texts widely confirm the negative effect of tariffs on business. However, beyond the direct effects of customs duties, knock-on effects for the rest of the value chain have remained largely unexplored.

On this basis, this study attempts to identify the existence of an impact of an increase in US tariffs on the entire value chain for each sector,

in addition to the direct impact on the product flows targeted by the increase. If the United States enforces higher tariffs on imports from country j (e.g. China or any other country affected by US customs duties), exports from country j to the United States will fall, as confirmed by the CEPII study. However, due to the organisation of the production system into value chains, country j is likely to produce the item exported using intermediate goods manufactured by other countries (e.g. South Korea for the ICT segment in China). Therefore, if exports from country j to the United States decrease due to the increase in US tariffs, this is likely to lead to a fall in demand for the intermediate products manufactured by other countries, and therefore a slowdown in exports from these countries to country j. In real terms, with the current trade war between the United States and China, US tariffs will harm exports from China's trade partners to China in addition to exports from China to the United States. This is considered as an indirect effect<sup>14</sup>.

To test for the existence of this indirect effect, we implemented a strategy for estimating and testing its existence for the 1995 - 2011 period, covering 12 sectors<sup>15</sup>. We focused on exchanges of added value. This methodology, where the volumes of intermediate products imported are deducted from gross exports, is preferable to gross bilateral exchanges for the purposes of appraising value chains, so as to identify the value produced by each country without including output from other countries. We assessed the direct impact of US customs duties on domestic value-added (DVA) exports for a series of countries affected by the tariff increase (**Insert 1**) based on a variant of the gravity model<sup>16</sup>.

Thanks to our estimation, we can highlight the average negative impact of US customs duties on value-added exports in the rest of the value chain: increasing US tariffs by one percent for any given country j (in a given segment) will lead to a 0.46% decrease in value-added exports (in millions of US dollars) from a partner country i to the country j, all things being equal. If we limit our estimation to manufacturing sectors (9 out of the total 12 segments covered by our analysis<sup>17</sup>), with more extensive value chains



11 Centre d'Études Prospectives et d'Informations Internationales (Centre for Prospective Studies and International Information)

12 Bénassy-Quéré, A., Buijsière, M., & Wibaux, P. (2018, Juin). Trade and currency weapons. *CEPII - Documents de travail*.

13 Head, K., & Mayer, T. (2018). Brands in Motion: How frictions shape multinational production. *Centre for Economic Policy Research - Discussion Papers*.

14 With this study, the assumption is made that the United States plays a key role in the existing value chain in each segment, based on the high number of business flows to or from the country or the volume of these flows. Consequently, a significant percentage of intermediate goods exported by other countries to country j will be used to produce goods to be sold in the United States (intermediate items used for US output or finished products for the US market).

15 Complete list of segments: [http://www.oecd.org/sti/ind/tiva/TiVA\\_2016\\_ISIC3\\_Industries.pdf](http://www.oecd.org/sti/ind/tiva/TiVA_2016_ISIC3_Industries.pdf) (excluding services)

16 The gravity model, based on Newton's law of gravity, expresses the volume of trade between two countries as the product of the GDP of the two partner countries times the distance between the two countries

17 Manufacturing segments: "Food, drinks and tobacco", "Textiles, clothing, leatherwear and shoes", "Wood, paper and cardboard production, printing and publishing", "Chemicals and non-metal minerals", "Base metals and the production of metal structures", "Machines and equipment, absolute non-consumer", "Electronic devices", "Vehicles and transport equipment", "Other manufacturing activities, absolute non-consumer, recovery activities".



than the farming sector or the mining sector, increasing US tariffs by one percent leads to a 0.6% decrease in value-added exports from a partner country *i* to the country *j* targeted by the customs duties, all things being equal. This result therefore confirms our assumption, highlighting a significant indirect effect from US tariffs, although this effect is far less substantial than the direct effects estimated by economists (1.4% according to Bénassy-Quéré et al.). This reduced

impact may be due to the fact that, in most cases, not all national production output from country *j* is intended for the United States. This allows companies in country *j* to replace some of the exports to the United States with sales to another market. Thus, production does not diminish in the same proportion as the slowdown in exports to the United States, limiting the fall in demand for intermediate goods exported by partner countries.

Insert 1:

## Methodology used to estimate the indirect impact of US customs duties

We have estimated the following<sup>18</sup>:

$$\log(1 + DVA_{ijst}) = \beta_1 \log(1 + Customs\_duties_{USjst}) + \beta_2 \log(GDP_{jt}) + \beta_3 Crise_{jt} + Y_{ist} + \delta_{js} + \mu_{ij} + \varepsilon_{ijst}$$

$DVA_{ijst}$  is equal to domestic value-added exports from country *i* to partner country *j*, which is affected by US customs duties. This variable can be obtained using OECD TivA data, and reflects the domestic added value for the gross exports from 63 countries to 62 partner countries<sup>19</sup> (direct exports and intermediate products transformed by other countries and subsequently forwarded to the partner country).

$Customs\_duties_{USjst}$  represents the combined weighted average per sector for US tariffs enforced for country *j* (all countries in the TivA base) for a given sector *s* in year *t* obtained from the UNCTAD Trains<sup>20</sup> database.

$GDP_{jt}$  represents the gross domestic product of the country *j* for year *t* and is obtained from the CEPII "Gravity" database.

$Crise_{jt}$  is an indicator that is equal to 1 if a crisis is underway in country *j* for year *t* (systematic bank crisis, monetary crisis, sovereign default or restructuring of the national debt using the methodology set up by Valencia and Laeven<sup>21</sup> (2013) and used by Bénassy-Quéré et al.).

The  $Y_{ist}$ ,  $\delta_{js}$  et  $\mu_{ij}$  variables represent all of the latent variables such as origin-sector-time, origin-destination and destination-sector dimensions, to check the effects of these latent variables on domestic added value and avoid an underestimation. The destination-time dimension is taken into consideration when using the aforementioned GDP and crisis variables, given that a fixed destination-sector-time effect would simply parallel our tariffs variable.

$\varepsilon_{ijst}$  represents the error term.

Standard errors are combined for each origin-destination pair to integrate any potential heterogeneity within these groups, which could reduce the level of significance of results.

This estimation was carried out bilaterally over the 1995-2011 period, covering a total of over 500,000 data lines (the results are presented in detail in **Table 1** and **Chart 8**).

18 This equation was inspired by the equation used by Bénassy-Quéré et al to measure direct impact, applied in the context of indirect effect measurement. Bénassy-Quéré, A., Buijsière, M., & Wibaux, P. (2018, Juin). Trade and currency weapons. *CEPII - Document de travail*.

19 The United States is excluded from the estimation as a source country for DVA and a partner country. Complete list of 62 countries: [http://www.oecd.org/sti/ind/tiva/TiVA\\_2016\\_CountriesRegions.pdf](http://www.oecd.org/sti/ind/tiva/TiVA_2016_CountriesRegions.pdf)  
Only the European Union is included as a region.

20 United Nations Conference on Trade and Development: Trade Analysis Information System

21 Laeven, L., & Valencia, F. (2013). Systemic Banking Crises Database. *IMF Economic Review*, 61(2), pp. 225-270.



**Indirect impacts mainly depend on the production structure of the business segment**

A sector-based analysis is required for an exhaustive appraisal of the consequences of renewed trade barriers on production systems. The impact will vary depending on the structure and organisation of the production chain. Implementing tariffs on intermediate goods produced by Country 1 as part of a networked production system (Image 1), where the goods are assembled in the United States, in order to promote the production of these same intermediate goods in the United States, will have no effect on exports from other countries in the same value chain. In fact, each satellite country produces the intermediate goods independently, and then exports to the United States, so disturbing business with one of the countries will have no effect on the other countries, if the intermediate goods required for production purposes are manufactured in the United States. At the other end of the spectrum, if the same

tariffs are enforced as part of a linear network, where the entire output of each country is used to produce another item in another country (Image 2), and where the United States is downstream from the production chain, the direct impact on other members of the production chain will be equal to the direct impact on the country affected by the tariff policies (this direct impact itself will depend on the elasticity of imports in response to customs duties). In reality, no sector corresponds to either of these two extreme cases, with each having both snake and spider tendencies. The scale of the indirect effects of tariffs on a country *i* in a segment *s* will therefore be determined by the role played by the United States in the production chain for the segment (downstream involvement will have a greater impact than upstream involvement), the key role of the country targeted by the tariffs in the value chain (in terms of the number and scope of transiting goods), the United States' share of exports country *j* facing the new trade barrier, and the percentage of intermediate products in the segment.

Image 1:  
Spider production structure (network)

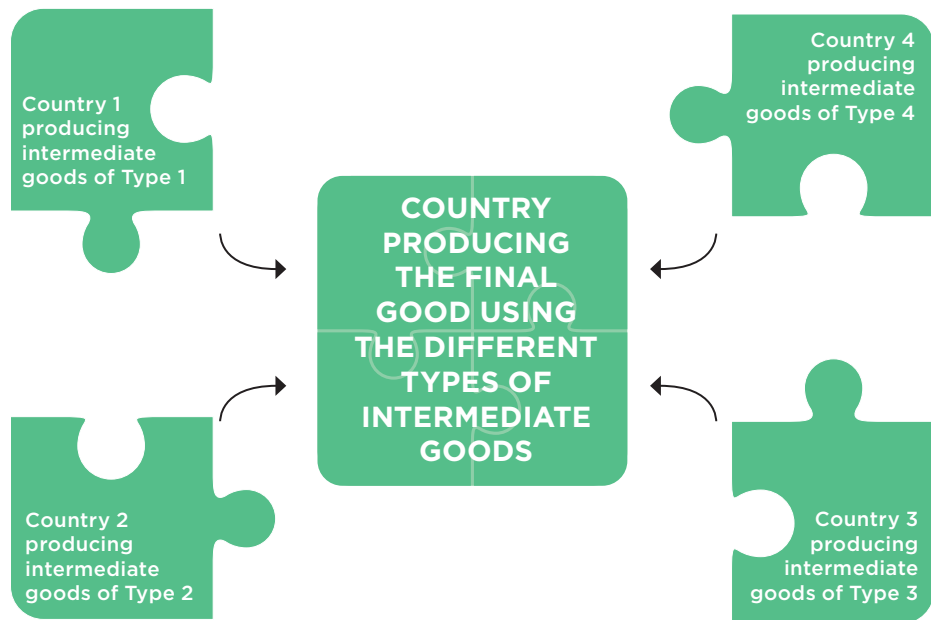


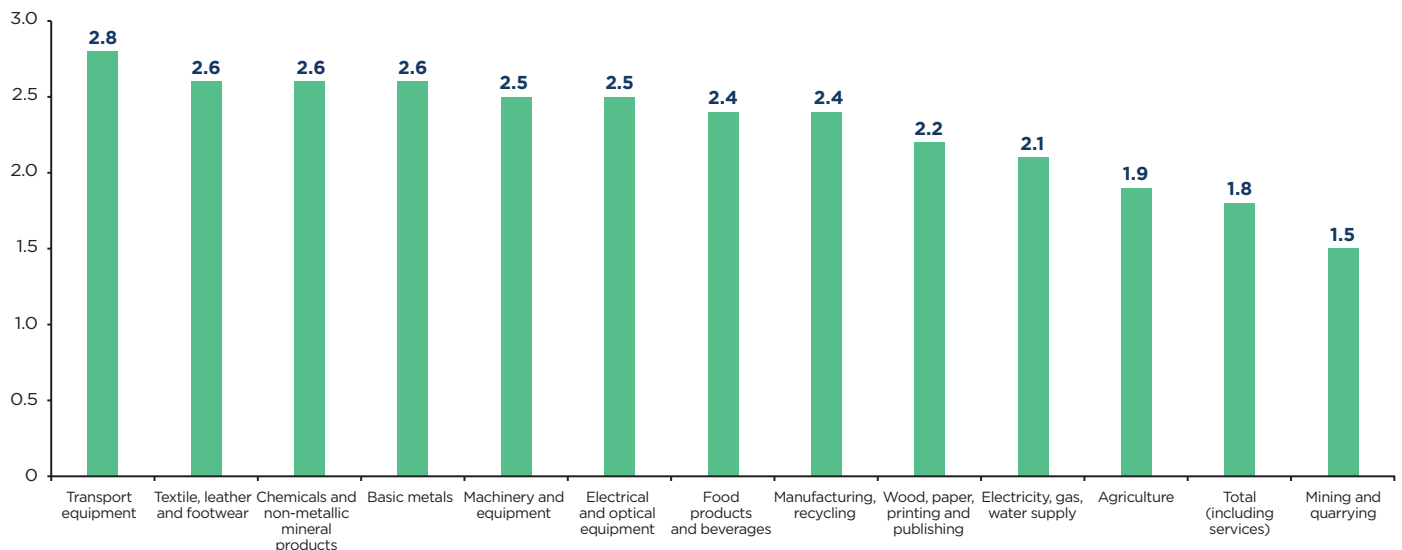
Image 2:  
Snake production structure (linear)



Most of these segment-based characteristics are incorporated in our estimation using fixed partner-sector and source-sector-time effects (**Insert 1**). Thanks to a sector-based estimation, we were able to highlight which value chains, and hence sectors, are the most vulnerable to the tariffs enforced by the United States on its partners. The sector the most affected by the indirect effects of tariff increases is transport, including automotive firms, among others. If US tariffs are increased by one percent in the sector for country *j*, the domestic added value (in million

USD) exported by a partner country *i* to country *j* will drop by 4.4% on average, all other things being equal. This result confirms the importance of value chains within the transport sectors. In fact, the transport equipment segment has the highest number of production phases, beating the average figure for all sectors by a long way (**Chart 7**). In addition, the United States operates from a relatively downstream position in the transport sector value chain (relatively low OECD<sup>22</sup> distance to final demand index compared with the average value for the sample<sup>23</sup>).

**Chart 7:**  
Length of Global Value Chain - Index of the Number of Production Stages in 2009



Source: OCDE

The machinery value chain comprises a fairly long multi-national production chain, and is relatively sensitive to US tariffs, with -3.1% elasticity shown by bilateral trade in response to customs duties. It is also worth pointing out that value-added exchanges in the electronic equipment sector are exposed to US tariffs with elasticity of -1.43%. In this specific case, it is important to highlight that our estimation is based on the 1995 - 2011 period; this indirect impact is likely to have increased over the last decade with the growing success of value chains for electronic components. Furthermore, given the key role played by China in the production network for the sector, the impact of the most recent tariff increases applied to Chinese electronic products by the United States

will probably be even higher than our estimation, which only reflects a moderate impact on all types of partners.

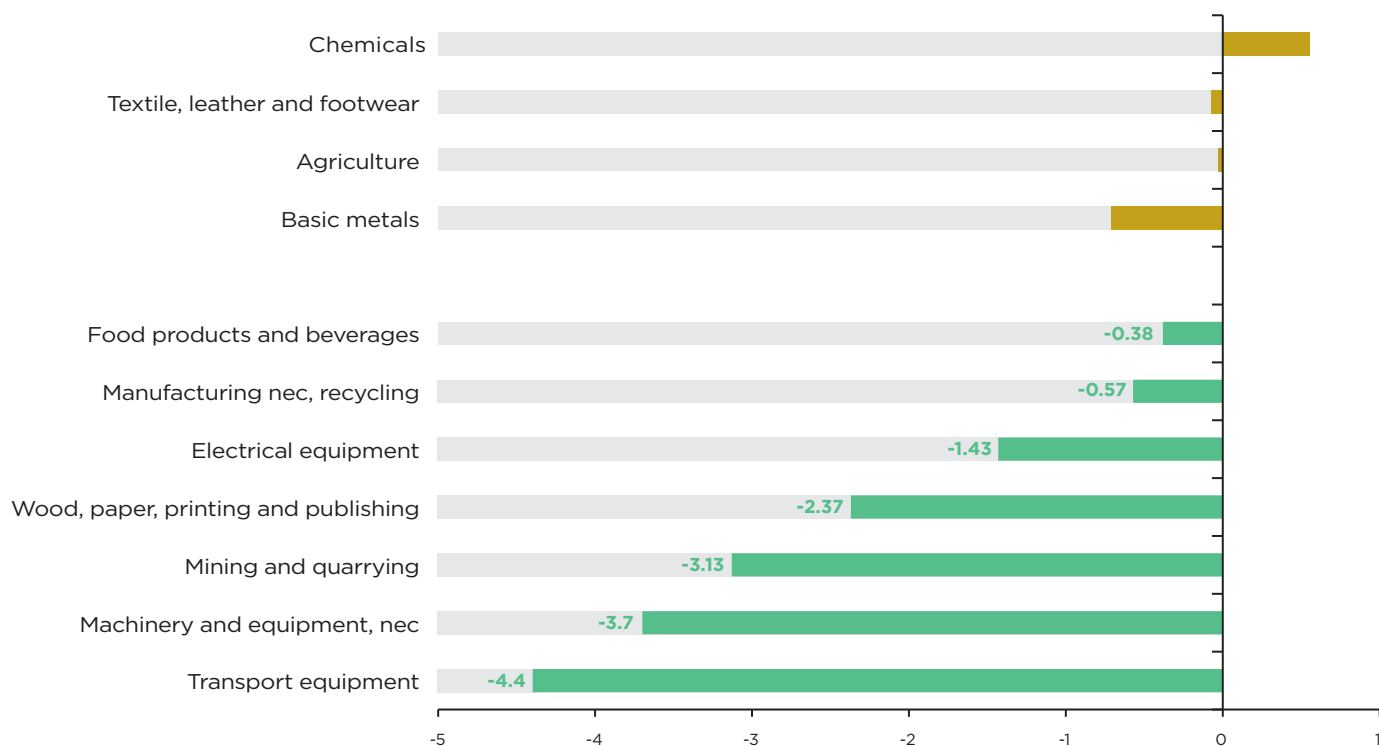
According to our estimations, the sectors of wood-paper and mining also face a relatively strong indirect impact from US tariffs, with elasticities of -3.1% and -2.4% respectively. These results are more surprising for segments with comparatively limited value chains. Finally, thanks to our estimation, we were able to highlight the agricultural, chemical, textile, and metal sectors, which are relatively unaffected by the indirect effects of a potential increase in US tariffs (insignificant impact; see **Chart 8**).

<sup>22</sup> Organisation for Economic Co-operation and Development

<sup>23</sup> De Backer, K. and S. Miroudot (2013), "Mapping Global Value Chains", *OECD Trade Policy Papers*, No. 159, OECD Publishing, Paris, <https://doi.org/10.1787/5k3v1trgnbr4-en>.

**Chart 8:**  
Domestic Value Added Flows Elasticity to US tariffs by sector

■ Coefficient not significant ■ Coefficient significant at 5%



Source: Coface

**Table 1:**  
Indirect impact of US custom duties

	Dependent variable	
	All sectors	Manufacturing sectors
US customs duties for country j	-0.46*** (0.08)	-0.60*** (0.11)
Country j's GDP	0.047*** (0.02)	0.50*** (0.02)
Crisis in country j	-0.005 (0.01)	-0.01 (0.01)
Observations	572,520	470,400
Fixed effects country i-sector-year	Yes	Yes
Fixed effects country i-country j	Yes	Yes
Fixed effects country j-sector	Yes	Yes
R <sup>2</sup>	0.88	0.91
Adjusted R <sup>2</sup>	0.88	0.91
Residual Std. Error	0.67 (df = 556428)	0.60 (df = 457538)

Note: \*p<0,1; \*\*p<0,05; \*\*\*p<0,01

Beyond the direct effect of US customs duties on gross exports to the United States, our estimation also emphasises the impact of these customs duties on the rest of the value chain. This indirect impact is strongly dependent on the structure of the production network, and is particularly high for sectors such as transport, machines and equipment, and electronics. However, as our estimation is

limited by data, it is important to highlight that some structural changes to production networks in recent years, particularly for the electronics sector, could imply a greater impact than that suggested in this study. A more detailed breakdown with information for each segment could help to identify production structures more precisely.

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