

The importance of Global value chains in International Trade and their consequences for Trade Policy

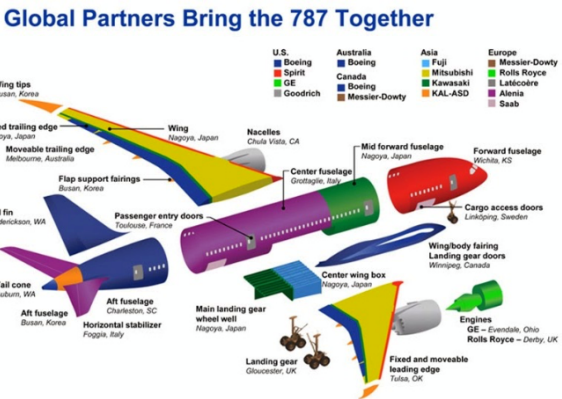
Harvard professor Pol Antràs came to Paris to give a lecture as part of the [Summer School](#) on trade organized by the Paris School of Economics from 26 to 30 June 2023. He presented his work focusing on the measurement of global value chains (GVCs) and the way they have shaped economics research in the field of international trade. This policy brief, written by Pamina Koenig, presents an overview of the results, which includes the difficult quantification of global value chains, their impact on the complexity of production processes and the expected consequences of trade policies.

Global value chains (GVCs) are currently attracting growing interest, mainly because this phenomenon has gained in importance over the last forty years. Global value chains are defined as a series of stages in the production of a product or service sold to consumers, with each stage adding a value and at least

two stages being produced in different countries. It should be noted that foreign value added can be incorporated into production in various forms: raw materials, semi-processed inputs or tasks. GVCs appear in various configurations: spider-like structures (illustrated in *Figure 1* by the case of Boeing's 787 Dreamliner, in

which multiple parts and components converge on an exporting assembly plant) or snake-like structures (in which value is created sequentially in a series of stages that may cross borders several times). A company participates in a global value chain if it contributes value in at least one stage of that chain.

Figure 1.
Boeing's Dreamliner



Given that each stage of the production process adds value to the good, the distribution of production stages in different countries means that trade in inputs is much more widespread in this configuration than in a world where trade is exclusively in final goods. As a direct consequence of the rise of GVCs, it is currently estimated that input trade accounts for two-thirds of world trade.

The disintegration process associated with global value chains (GVCs)

The emergence of global value chains has been made possible by three major developments. Firstly, the revolution in information and communication technologies, that has led to profound socio-economic transformations resulting in a spectacular drop in the cost of transmitting and processing information since the early 1990s. The second element is the deepening liberalization of trade (from the signing of the General Agreement on Tariffs and Trade - GATT - in 1947 to the signing of multiple preferential trade agreements and China's accession to the WTO in 2001), and the continuing reduction

in transport costs. Together, these developments have enabled Western companies to include foreign workers abroad in their production processes, increasing the demand for labor at long-distance. Finally, various political developments (such as the fall of communism in Eastern Europe) allowed the reach of globalization to expand, enabling a growing proportion of the world's population to participate actively in the process. As a result of these three factors, production boundaries have gradually disintegrated, allowing companies to organize production on a global scale. This phenomenon, often referred

to as the “fragmentation of the production process” or the “disintegration of production”, is more than just an intensification of trade. Business relationships within global value chains are often initiated by importers or leading firms seeking to source inputs from foreign suppliers, but not without cost. Setting up GVCs usually entails significant up-front costs for companies, due to search and matching frictions. Also, global value chains necessarily require intensive contracts between parties subject to different legal systems.

The challenge of quantifying GVCs

Global value chains involve production processes that cross borders several times over, often involving more than two countries. This poses significant **challenges for measuring GVC activity worldwide**. Customs data, the standard source for international trade flows, provides information on the location of final production, its destination and the value of the exported product.

In cases where this production required intermediate consumption imported from elsewhere, the exported value overestimates the value added generated in the exporting country. Customs data do not reveal the domestic

value added contained in the product's exports, nor which other countries contributed how much. In order to trace trade flows of value added between countries, a body of work has combined information from customs offices with national input-output tables to construct global input-output tables. These tables list value-added flows and reflect the dependencies between different sectors in different countries. An example of such a table is shown in *Figure 2*. Value added accounting using the information contained in World Input Output tables makes it possible to devise measures to document the

extent to which production processes have become globalized, and the intensity with which various countries and sectors participate in global value chains. One can namely compute the share of a country's exports that flow through at least two borders: according to this measure, the overall share of GVC trade in total world trade grew very significantly in the 1990s and early 2000s and appears to have stagnated in the 2010 decade, with **about one-half of world trade that appears to be related to GVCs**.

Figure 2.
The Structure of a World Input-Output Table

		Input use & value added								Final use			Total use	
		Country 1				Country J				Country 1	...	Country J		
		Industry 1	...	Industry S	...	Industry 1	...	Industry S	...					
Intermediate inputs supplied	Country 1	Industry 1	Z_{11}^{11}	...	Z_{11}^{1S}	...	Z_{11}^{1J}	...	Z_{11}^{1S}	F_{11}^1	...	F_{1J}^1	Y_1^1	
		Z_{11}^{rS}	Z_{11}^{rS}	
	Industry S	Z_{11}^{S1}	...	Z_{11}^{SS}	...	Z_{11}^{SJ}	...	Z_{11}^{SS}	F_{11}^S	...	F_{1J}^S	Y_1^S		
		...	...	...	...	Z_{ij}^{rS}	...	...	...	F_{ij}^S	...	Y_j^S
		Country J	Industry 1	Z_{J1}^{11}	...	Z_{J1}^{1S}	...	Z_{J1}^{1J}	...	Z_{J1}^{1S}	F_{J1}^1	...	F_{JJ}^1	Y_J^1
			Z_{J1}^{rS}	Z_{J1}^{rS}	
		Industry S	Z_{J1}^{S1}	...	Z_{J1}^{SS}	...	Z_{J1}^{SJ}	...	Z_{J1}^{SS}	F_{J1}^S	...	F_{JJ}^S	Y_J^S	
Value added			VA_1^1	...	VA_1^S	VA_1^S	VA_J^1	...	VA_J^S					
Gross output			Y_1^1	...	Y_1^S	Y_j^S	Y_J^1	...	Y_J^S	...				

Source: Antràs and Chor (2018)
 Note: Schematic version of a World-Input-Output Table

Implications for trade policy repercussions

The fragmentation of production processes prompts us to understand the impact of traditional trade policy instruments that countries apply both to intermediate and final goods. How should tariffs, quotas and standards be used in a world of global value chains versus a world where trade is exclusively in final goods?

A major regularity is that in almost all countries, protection tends to be lower on intermediate inputs than on final products. This corresponds to the case where, for example, the import duty on imported shoes is higher than that on imported leather. This **escalation of tariffs down the value chain** (that runs from raw materials to finished products) is illustrated in [Figure 3](#), which shows applied bilateral tariffs on final goods versus intermediate goods for 37 countries in 2007. The consequence of tariff escalation is that the effective rate of protection of the final

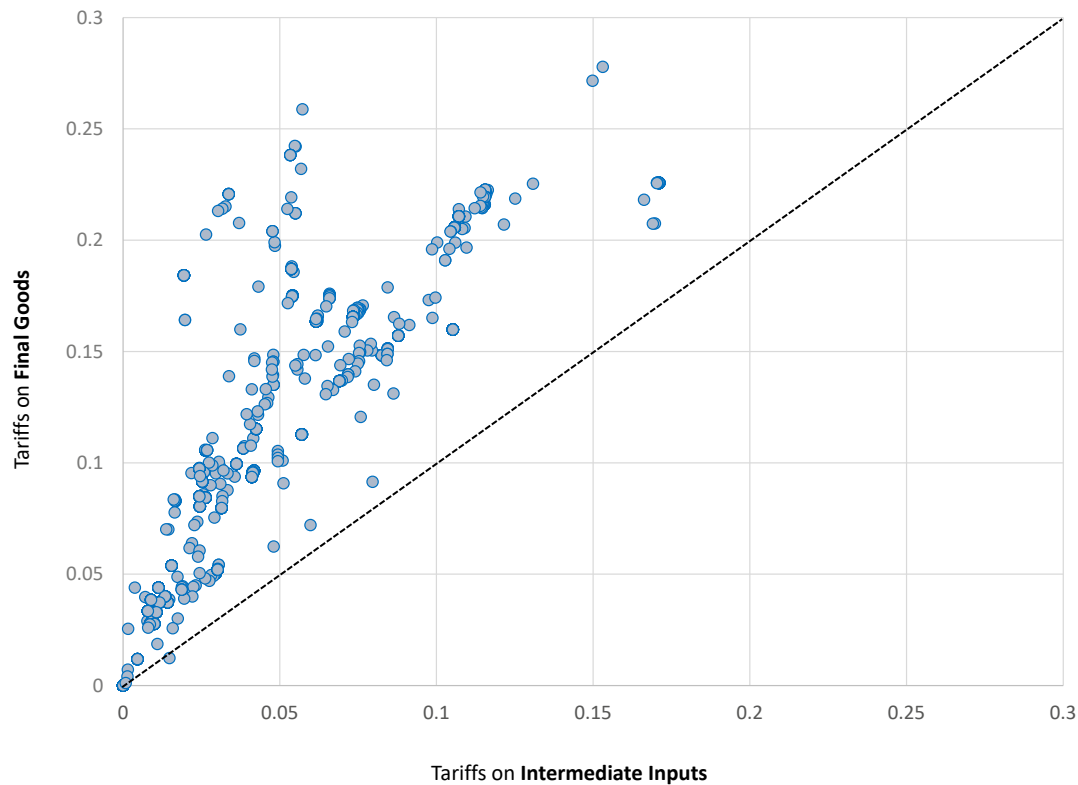
good is higher than the applied nominal rate of protection: final goods producers are helped to be more competitive on global markets since they face no tariff on their inputs and a protection on their final product.

Is this situation desirable from a welfare point of view? The question of whether existing disparities between tariffs applied to final and intermediate goods are good or bad for economic well-being is a subject of both empirical and theoretical research.

There are currently two sets of empirical answers. First, empirical evidence shows that lower tariffs on inputs increase productivity. The increase in the number and volume of imported inputs created by the tariff change indeed allows firms to boost their productivity through accessing more and cheaper inputs. Second, it has been shown that the effect of tariffs on intermediate

goods propagates along supply chains, with firms in downstream industries suffering from protection upstream due to the cost increase. Recent evidence shows that this effect has been exacerbated by US tariffs against China, which for the past few decades and even more so under the Trump administration, have been biased in favor of intermediate goods.

Figure 3.
 Tariffs on Final Goods versus Intermediate Inputs (by country pair in 2007)



Source: Simple averages of country-pair tariffs by UN-BEC good types for the year 2007 from Shapiro (2020)

Theoretical explanations of the rationale for tariff escalation and theoretical predictions of its effects on income and corporate welfare are addressed in multiple frameworks and still have not given rise to a one and only justification. Hence our understanding of the theoretical effects of tariff escalation on societies' welfare largely depends on the assumed market structure and theoretical rationale for tariffs. Let us look at **two existing explanations for tariff escalation along the value chain**, illustrated in *Figure 2*. A leading theory adopts a political economy logic whereby all firms lobby for protection to be applied to their products, but producers of final goods counter-lobby to prevent tariffs

being applied to their imported inputs. Difficulties in organizing collective action prevent consumers from lobbying against tariffs on finished goods, even though they would obviously prefer low tariffs on finished goods.

Another line of theory argues that tariff escalation emerges as a welfare enhancing policy. Both the final and intermediate goods sectors seek to impose tariffs on the goods they produce in order to increase their size and productivity. However, demands from input producers are less taken into account as tariffs on input goods which are purchased by local firms have negative side effects. Tariffs on inputs can increase the size of the

intermediate sector, but they also push producers of final goods to relocate their activities abroad. This relocation reduces the size of the downstream sector, which is detrimental to welfare. During the recent US-China trade war, 60% of 2018-2019 US tariffs were on inputs, affecting around 20% of all US imports of intermediate products. Estimates suggest that, in the absence of retaliation, this protection would have increased US welfare by 0.12%, the positive effect being due to higher tariffs on final products. Indeed, the **welfare effect would have been negative if input tariffs had been used alone**.

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