

# Labor market effects of trade policies in GVC terms: Disentangle trade integration and productivity

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## *Abstract*

During the last decades, trade has changed substantially. From final goods trade to increasing intermediates and value-added trade, by today the trade network is highly complex and the sectoral structure of goods production has changed dramatically. Technological change and lower trade costs have induced geographic fragmentation of production processes and have led to substantial economic and political dislocations of employment. To explain increasing polarization of labor markets, recent literature has mainly focused on two opposing approaches by explaining expanding international trade by the rise of newly emerging markets like China on the one side, and technological change on the other. This study expands the discussion in a new direction towards a more comprehensive examination of labor market transitions.

The contributions of this study to the literature are two-fold. First, I provide new measures for trade integration by calculating the ad valorem equivalents of cumulative tariff rates and global value chain (GVC) related non-tariff barriers (NTBs) to trade. Second, by using these measures in combination with the Chinese productivity shock in value added terms, I provide a method to disentangle the role of trade integration on productivity shocks.

New data allows to estimate trade policy effects in GVC terms. I use the design of trade agreements (DESTA) database on global value chain (GVC) specific trade policy changes in over 600 preferential trade agreements (PTAs). I estimate a structural gravity model for bilateral international trade in value added. The estimated trade costs changes are then translated in bilateral ad-valorem trade cost equivalents. I feed these estimated trade cost equivalents in a multi-sector, multi-region GE model. This approach enables to observe changes in job requirements and sectoral distribution of labor induced by the GVC specific trade policy changes. The developed framework and extended database allow to disentangle different drivers of labor market transitions in the context of highly integrated supply chains.

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## *Introduction*

The opening of China between the years 2000 and 2007 (the China shock) has been used extensively to measure the effect of productivity shocks on the US labor market (Autor et al., 2013, ADH henceforth). Several studies provide evidence for the China shock being one of the main drivers of US manufacturing employment reduction.

With the increase in trade network complexity, new measures of trade flows have gained in popularity (Johnsen and Noguera, 2012). Gross trade flows do not account for value added that travels through several countries until the final good is assembled or consumed. The decomposition of trade flows into domestic (DVA), foreign (FVA) and double counted value added (DCV) traces value added embedded in trade flows back to its origin or forward to its destination.

To create a more precise measure of local labor market exposure, Jakubik and Stolzenburg (2018) use this information to decompose the impact of the China shock on US employment. They find that increase Chinese import competition explains less of the US manufacturing decline when controlling for value added.

However, reduced form approaches lack to account for third country effects within the complex global trade setting. Caliendo et al. (2019) provide a model to identify the impact of the China shock in a general equilibrium (GE) setting and find a relocation of the manufacturing employment toward services employment in the US and an overall increase in welfare due to the China shock.

However, these studies do not provide information on the actual driver of the China shock. The China shock can be driven by a productivity increase in China or by a higher integration of China within the global trade network.

A well-established measure for trade integration are differences in granted preference margins between two countries. They do not only differ in terms of covered products and tariff rates but also in commitments beyond tariffs (non-tariff barriers, NTBs). Egger et al. (2015, TTIP study henceforth) a method for estimating magnitudes of trade costs in terms of their ad valorem equivalents (AVEs), covering both tariffs and NTBs. They use the gravity model of trade to provide estimates of ad valorem tariffs that would have the same effect as NTBs.

The contributions of this study to the literature are two-fold. First, I provide new measures for trade integration by calculating the ad valorem equivalents of cumulative tariff rates and global value chain (GVC) related NTBs to trade. Second, by using these measures in combination with the Chinese productivity shock in value added terms, I provide a method to disentangle the role of trade integration on productivity shocks.

My approach rests on four pillars. First, in addition to measures of cumulative tariff rates<sup>2</sup>, I estimate the levels of non-tariff measures by the gravity model of bilateral international trade. I use a newly established depth measure of preferential trade agreements (PTAs), which captures the coverage of GVC related provisions. This yields the impact of the depth of PTAs on DVA, FVA, and DCV, which serves as a proxy of trade integration of a country pair between the years 2000 and 2007. Second, I estimate the local labor market exposure in the US on Chinese imports in value added terms. This serves as proxy for the Chinese productivity shock over the years 2000 to 2007. Third, I take the estimated trade cost changes due to trade integration and the estimated Chinese productivity shock to gauge potential changes in ad

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<sup>2</sup> To account for the fact that value added is affected by different tariff rates when crossing borders in an intermediates state compared to final goods state, I use the concept of cumulative tariffs introduced by Rouzet and Miroudot (2013)

valorem trade costs associated with a world with and without trade integration and China shock. Finally, I employ the estimated trade cost changes in a value-added multi-sector, multi-region computable general equilibrium (CGE) model (GTAP-VA<sup>3</sup>) to quantify the impact of trade integration on the impact of the Chinese productivity shock on US labor markets and other key economic indicators of third countries.

By running four different scenarios, I will be able to disentangle the role of trade integration on US local labor markets.

|              | China shock                                                               | No China shock                                                                                        |
|--------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Deep PTAs    | <u>Actual world</u><br>Manufacturing most down<br>Services most up        | <u>No productivity shock in China</u><br>Manufacturing less down<br>Services less up                  |
| No deep PTAs | <u>No deep integration</u><br>Manufacturing less down<br>Services less up | <u>No deep integration and no productivity shock</u><br>Manufacturing least down<br>Services least up |

The paper is structured as follows. The next section presents the approach to estimating trade costs and gauging the scope for reduction by trade integration and Chinese productivity shock and describes the GTAP-VA model. Section three presents the local labor market effects in the four scenarios (*to be added*) and section four concludes (*to be added*).

#### *Methodology (to be added)*

1. Gravity: Ad valorem equivalents
  - a. Cumulative tariff rates
  - b. Desta GVC depth

2. China shock in value added terms

Data on local labor markets in the US I will use from Caliendo et al. (2019).

3. GTAP-VA

I use the GTAP-VA model of 2007 aggregated to 3 regions (USA, China, and rest of the world) and 3 sectors (manufacturing, services and agrifood).

#### *Results (to be added)*

#### *Conclusion (to be added)*

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<sup>3</sup> A new module introduced to the Global Trade Analysis Project (GTAP) implements this decomposition of trade flows. Antimiani et al. (2018) show that this extension makes a useful contribution to trade policy analysis.

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