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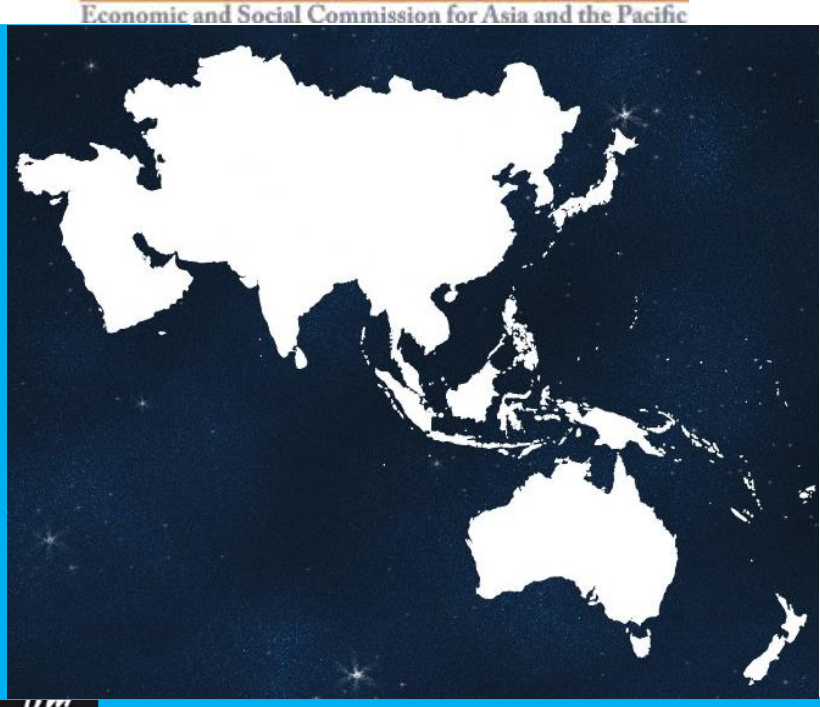
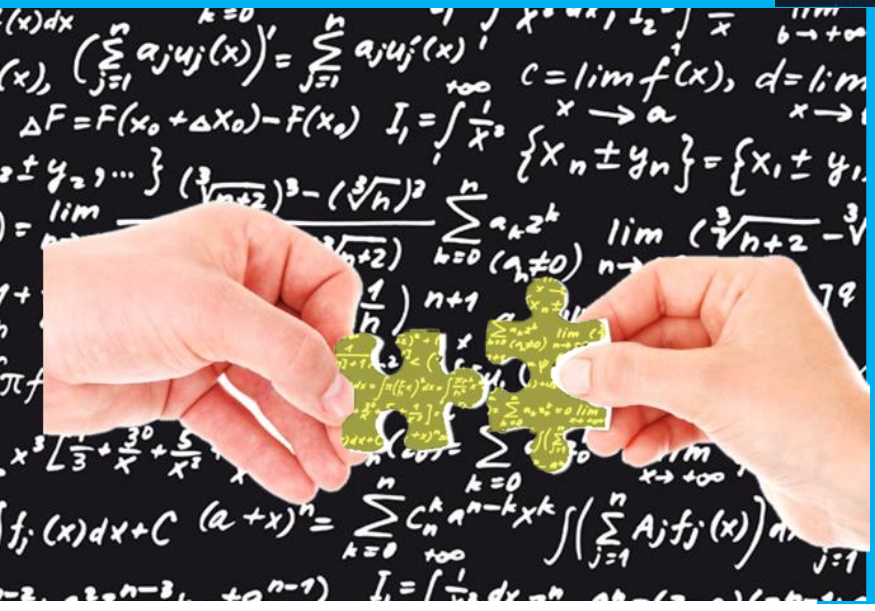
# A quantitative assessment of economic impact of trade wars and the 'Make in India' program





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ASIA-PACIFIC RESEARCH AND TRAINING NETWORK ON TRADE

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ASIA-PACIFIC RESEARCH AND TRAINING NETWORK ON TRADE

WORKING PAPER

# A quantitative assessment of economic impact of trade wars and the 'Make in India' program

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## Abstract

In a unique attempt, our paper aims to provide a quantitative economic assessment of the impact of "*Make in India*", a flagship program for industrialization, launched by the Government of India in 2014, combining it with the global trade war of 2017-18. We analyze whether the expected favourable impact of the former was reversed due to its reactive policies compared its pro-active policies, and whether it worsened due to the trade war, whose effects continue to aggravate in a post-COVID recalibration of global supply chains. The question assumes significance as Make in India program's proactive measures to boost investment may have a favourable impact on the industries at large in terms of output and employment. In contrast, its protectionist measures involving tariff barriers may have an ambiguous effect on the same. We utilize an applied general equilibrium analysis, exploring the impact of Make in India and the global trade war in a combined way. Our results suggest that the combined effects of both policies, while being beneficial for the Indian economy, yields negative ramifications for exports, jobs, and investment growth. Specific sectors are also unable to increase domestic output despite being a part of Make in India, such as the Chemical, Rubber, and Plastics industries, and those that use it as raw materials.



**Keywords:** Make in India, GTAP model, Trade war, COVID-19 pandemic, employment

**JEL codes**: F15, F61, O53

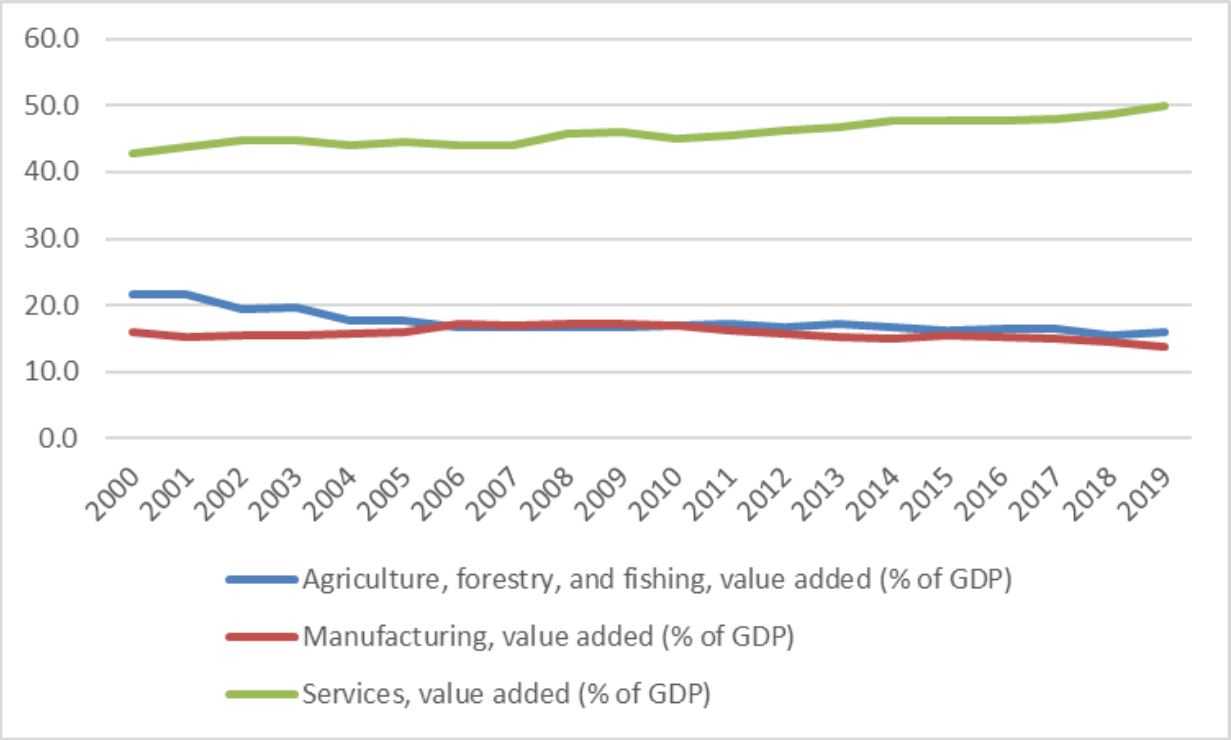
# Contents

# 1. Introduction

India, the world's third-largest economy in purchasing power parity (PPP) terms as of 2018, has undergone an economic transformation over the past few decades. Since economic liberalization in 1991, its economy has grown at an average of 6-7% annually. Since 2014 except for 2017, India's economy has been the world's fastest-growing major economy, surpassing China. Notably, this growth was achieved in the presence of an increasing share of services as a % of India's GDP and declining share of agriculture. Concomitantly, India's manufacturing sector (% of GDP) ratio has been almost stagnant at 16% on an average over 2000-2018 (figure 1).[6]

**Figure 1**

**Composition of key sectors to India's GDP**




Source: The World Bank (2018)

[6] Banga (2014) argues that while the manufacturing export share has declined, that of imports has increased in India. This observation indicates evidence of the hollowing out of the manufacturing sector. It suggests that there is an urgent need to enhance the value-added growth in manufacturing in India, linking it into Global Value Chains (GVCs), as well as strengthening links between the manufacturing and services sector.

To address this policy constraint, the Government of India conceptualized a 'Make in India' initiative, its flagship industrialization strategy, since 2014. The aim of the initiative was to attract investments from businesses around the world and develop India as the next global manufacturing hub, focussing on investment, ease of doing business, innovation, and skill development. The key objectives were to i) enhance the share of India's manufacturing in gross domestic product from 16% to 25% by 2022, ii) creating 100 million jobs, besides boosting domestic and foreign investment, iii) creating opportunities for skill development and innovation in this sector. The Make in India initiative (MiI) has focussed on 25 sectors of the Indian economy for job creation and skill enhancement.[7]

Unfortunately, two external shocks following this initiative delivered an unexpected blow to the growth prospects of Indian economy. The first was the global trade war, involving India's bilateral tariff escalation with the US from 2017 onwards.[8] The second is the onset of the COVID-19 global pandemic since 2020, which dealt a further blow to India's growth trajectory, as it declined from around 8% in Q4 FY18 to a 4.5% in Q2 FY20 (Rajan and Gopalan, 2020). This has led the government of India to announce the 'Atma-Nirbhar Bharat Abhiyan,' a mix of macroeconomic stabilization and structural reform policies since June 2020[9]. The announced structural reform policies being supply-side in nature will help the Make in India initiative.

The initiative, as mentioned earlier, has two broad types of features. The first is proactive and business-friendly to reduce transaction costs and improve doing business in India through a range of policies that aims to foster innovation, skill, and infrastructure development, improving institutional quality and governance and job

[7] See https://www.peoplematters.in/article/jobs/is-the-lion-moving-backward-hits-and-misses-of-make-in-india-program-18308 for a full list of the Make in India sectors.

[8] While US and China were the main direct players in the global trade war, India was also affected indirectly due to the fact that as of 2017, the United States accounted for US$51.6 billion (16% of total Indian exports) and China accounted for US$16.4 billion (5.1%) respectively and was the 1st and 3rd largest export destination respectively for India.

[9] Mani et al., (2020) point out a contradiction that is evident in the call for self-reliance or 'Atma-Nirbhar Bharat Abhiyan' and the announced structural reform policies. Most of the supply-side reforms announced are either long-pending ones or been reported before. Pushing these measures in the current context of demand slowdown in the Indian economy indicates that Indian policymakers subscribe to the long-held belief that India is a supply-constrained economy.

creation. The second involves reactive protectionism against import competition for domestic manufacturing firms. The reactive policies were shaped in the last couple of years, in response to the trade wars triggered by the US tariff hikes on imports from India in several commodities, some of them as recent as June 2019. Therefore, we may observe a link between the global trade wars and Make in India, though both have their effects separately on the Indian economy.

We note that empirical studies have not yet addressed a few important unanswered questions in the above context. The first is the extent to which proactive or reactive policies[10] within MiI contributed to output growth and job creation opportunities in the key sectors identified under this initiative. Second, since MiI was conceptualized in an environment wherein a global trade war situation was non-existent, whether the overall and sectoral impact of "Make in India" on its economy, was adverse due to the onset of the global trade war from 2017. The empirical literature is scant, with ESCAP (2018) being the only existing study that attempts to analyze the trade war impact broadly for the Asia-Pacific region, but not specifically focussed on country and sector-specific impacts on India.

In a unique attempt, our paper aims to provide a quantitative economic assessment of whether the impact of Make in India was aggravated due to its own reactive policies as well as the ongoing global trade war of 2017-18. We utilize an applied general equilibrium (AGE)[11] analysis, which is our preferred methodology here compared to the gravity models of trade. The preference is also on the account of the fact that gravity models are more appropriate while dealing with past trends related to the impact of trade policy measures, and do not apply to an economy-wide context. Our study analyses a futuristic impact of both MiI and trade war on the overall economy

[10] As we discuss in the literature review, Nagaraj (2019) finds no impact of Make in India on the industrial performance of the country.

[11] It is standard practice to use applied general equilibrium (AGE) models to analyze the likely impact of trade deals or conflicts. Due to the economy-wide nature of trade, it hardly makes sense to examine any given sector in partial equilibrium isolation. Their explicit incorporation of bilateral trade flows, thus, makes AGE models well-suited to analyzing the consequences of trade wars instead of any econometric techniques. The neoclassical theoretical foundations of AGE models explain the analysis of trade-off between greater openness on the one hand, and potential trade diversion on the other. Compared with a simple equation econometric model or the partial equilibrium analysis method, the GTAP model has the advantage of capturing the input-output relationship between industry and other sectors in the open global economy scenario, thus improving the robustness of the results of the estimates (Hertel, 1997).

and specific sectors, thereby generating tariff barriers that simulate both scenarios, while concomitantly attempting to simulate the expected investment boost from Make in India.

Since most general equilibrium studies that analyze trade policy impacts for India utilize the Global Trade Analysis Project (GTAP) model and database, we follow a similar approach, updating the model to 2017. Our study is, therefore, a unique attempt on two counts; first, we put together the details relevant for global trade wars and Make in India in a policy modelling exercise, which is a fresh attempt. Second, this is the first time to capture all these contemporary policies in an economy-wide global modelling framework, as all previous CGE studies on India have typically focussed on the impact of one or more preferential trade agreements.[12]

We organize the remainder of the paper as follows. Section 2 presents a broad overview of the relevant literature on MII, trade wars, and its expected impact on the Indian economy. Section 3 analyzes the modelling framework and methodology. Section 4 identifies the policy scenarios and details of the simulations. Section 5 analyzes the results, while the final section provides policy implications and concludes the paper.

## 2. Literature review

### 2.1 Make in India

There are no specific quantitative assessment studies of the MiI initiative to the best of our knowledge, partly because all MiI related policies are not very clearly laid out in one document, but instead captured by a slew of policy measures and announcements over the past years. Anand et al., (2015) observed that India's manufacturing and service exports hold huge potential for diversification, and that Make in India policies that proactively encourage infrastructure development, innovation and foreign investment will be beneficial in this aspect. They also note that less reactive policies

[12] These include Narayanan and others (2019), Gilbert and others (2018), Narayanan and Sharma (2016) and Hiro and Itakura (2014).

that include trade policy reforms reducing trade restrictiveness, improving trade facilitation and regional integration will also be crucial towards a structural transformation in production and exports in the Indian economy through reallocation of resources.

Nagaraj (2019) finds that until 2018, the Make in India (MiI) initiative had made little progress since it is premised on the view that excessive regulations constrain factories and firms; hence deregulation could augment investment and output. To achieve this, the government benchmarked its regulatory reforms to the World Bank's Ease of Doing Business Index; a higher rank will signal India's attractiveness to investors and will help investment in the country to rise. India's rank in the index did go up from 142 in 2014 to 77 in 2018. However, improvement in rankings failed to improve industrial performance in the country, as the share of manufacturing and the industrial sector in India’s GDP remained stagnant during the period 1991-2018. The underlying reason the paper identifies for this is that MiI lacked a strategic vision for industrialization and failed to make the required investments in technology and organization. The study does not evaluate reactive or proactive policies under MiI separately, and does not provide a sectoral perspective, which we contribute to the literature in our analysis.

## 2.2 Trade conflicts and trade wars

Johnson (1953) presents an economic analysis of trade conflict, modelled as a two-person non-cooperative game in which countries choose their optimal tariffs, knowing that they would be subject to retaliation. The results show that a country can gain from increasing its tariffs even if the action leads to retaliatory tariffs from its partners. Although it was not possible to derive the general conditions under which the result holds, in the particular case where the reciprocal demand curves have constant elasticities, the model uses numerical methods to determine the values of the elasticities under which one country will be better off in a trade conflict. The use of numerical or computational methods to assess retaliatory non-tariffs has since been a feature of the trade conflict literature. Abrego et al., (2006) and Baldwin and Clarke (1987) did seminal work on this, focussing on the Tokyo round negotiations. Cronshaw (1997) models trade conflict as a repeated game, while Deardorff and Stern (1987)

and Foreman-Peck et al., (2007) explain optimal tariffs during the inter-conflict years. Other studies focusing on tariffs are by Hamilton and Whalley (1982), Harrison and Rutstrom (1991), Markusen and Wigle (1989), and He et al., (2017), which discuss optimal tariffs between Canada and the United States. Bagwell and Staiger (2002) examine the trade conflict framework in which countries choose optimal political tariffs which differ from standard multilateral applied tariffs. Grossman and Helpman (1995) present the idea of politically optimal tariffs and suggest that governments do not always maximize social welfare since they may receive contributions from interest groups.

The recent trade war between the United States and China has spurred interest in examining the likely magnitude of U.S. tariffs, and the retaliatory tariffs by its major trading partners and comparing actual tariffs with the Nash (cooperative and agreed) tariffs predicted by models of trade conflicts (Bouet and Laborde, 2018). More recently, Nicita and others (2018a, 2018b) calculated politically optimal tariffs where multilateral cooperation breaks down, and countries choose optimal tariffs. Since the optimal tariffs depend on the inverse of the export supply elasticity, the study uses the estimated elasticities from Kee et al., (2008) to calculate these optimal tariffs. The findings are that the optimal tariffs would represent a 32-percentage point increase over current levels of tariff protection faced by the average world exporter.

Studies by Ciuriak and Xiao (2018) and Bollen and Rojas-Romagosa (2018) apply a computable general equilibrium model to examine the effects of increased protectionism mainly on the United States and China, in terms of trade and welfare reduction. Their analysis focused on economic effects in countries directly involved in the trade war and other potential targets, generally developed countries. The countries studied included the European Union, or those geographically close to the United States of America (Canada and Mexico), with emphasis on those sectors that were initially affected by the measures (steel and aluminium).

Bekkers and Teh (2019) employ the WTO Global Trade Model to project the medium-run economic effects of global trade conflict and find that projected macroeconomic effects in the medium run are considerable. The study finds that a global trade conflict in 2019 would lead to a reduction in world GDP in 2022 of about 1.96% and a reduction

in world trade by about 17% compared to the baseline. Second, behind the single-digit aggregate production effects there are much larger, double-digit sectoral production effects in many countries, leading to a painful adjustment process. Third, the large swings in sectoral production lead to substantial labour displacement. On average, 1.15% and 1.74% of high-skilled and low-skilled workers, respectively, would leave their initial sector of employment.

Carvalho, Azevedo, and Massuquetti (2019) examine the effects of the US-China trade war on both countries and some emerging economies. Results show that, on the one hand, the trade war would lead to a reduction in the US trade deficit and an increase in domestic production of those sectors affected by higher import tariffs, and Chinese producers and consumers would bear the lion's share of the burden of the trade war. However, both countries and the world would lose in terms of welfare, due to the significant reduction in allocative efficiency, especially in the US, and the loss of terms of trade in the Chinese case. With the increase in protectionism between the two largest global economies, some critical emerging countries, not directly involved in the trade war, would benefit by the shift in demand to sectors where they have comparative advantages.

ESCAP (2018) summarizes the possible economy-wide effects from the perspective of a trade war, that usually starts with two large economies, that can influence world prices of their goods sold globally, escalating import tariff barriers as a reaction to each other. At the outset, the scale and scope of the trade wars and policy uncertainties created often determine the overall economy-wide outcome. Further, those directly involved in tariff escalation in a trade war suffer the most, while positive or negative spillovers may impact their trading partners (3rd party economies). Positive spillovers for third party economies are generated due to market opportunities created by redirection of trade and investment, for example, Brazil filling in the blocked import demand for soybeans in China due to higher tariffs on the US import of soybeans into China. Such redirection may generate terms of trade improvements for Brazil if the loss of import demand because of trade wars decreases the global price level of their imports more than their exports (ESCAP, 2018). However, as a trade war prolongs and extends beyond the domain of tariffs into services and investment restrictions, there is an increasing likelihood of negative spillovers on even third-party economies

due to a slowdown in global demand. The adverse impact is likely to be fuelled by uncertainties that lead consumers to delay spending and businesses to hold on to their investments. In the Indian context, the effect is expected to be a combination of i) a direct hit due to tariff escalations with the US; and ii) an indirect effect due to the US-China tariff escalations redirecting trade and investment flows between them. This what we expect to find in our simulation results.

# 3. Model, data, and methodology

## 3.1 Model

We utilize an augmented version of the standard Global Trade Analysis Project (GTAP) model and database (Corong, et al., 2017), that features sectoral and economy-wide details for India, similar to ESCAP (2018). The database is updated to 2017, using World Bank macroeconomic data and the GTAP Adjust tool (Horridge, 2011). The updated model has three unique features. First, it draws upon McDougall and Golub (2010) to compute region-specific CO2 emissions that links with various economic activities. Second, the model estimates inequality by utilizing the differential between the growth rates of unskilled and skilled labour. Third, we relax standard closures assumptions of full employment or sticky real wages by introducing a 45-degree labour supply elasticity curve, ensuring both labour supply (employment) and real wages for India are endogenous in the model. The chosen closure is consistent with the Monash model and is well supported by econometric literature on labour supply elasticities, like ESCAP (2018).

The GTAP model[13] uses a three-level structure in the specification of the production function. At the first level, the production function assumes zero substitutability between primary production factors and intermediate inputs (Leontief technology). As a result, the optimal mix of primary factors is independent of prices of intermediate inputs, while the optimal mix of intermediate inputs is invariant with respect to the price of primary factors; at the second level, it involves a constant elasticity of substitution

[13] The standard GTAP model is composed of equations based on microeconomic fundamentals that portray the behaviour of families and firms belonging to each of the modelled regions, as well as interregional flows, considering global transportation costs, with a typically neoclassical closure.

between inputs and between factors of production. Imported intermediates are assumed to be separable from domestically produced intermediate inputs, that is to say, that firms first determines the optimal mix of domestic and imported goods and only then decide the sourcing of their imports (Armington assumption); and at the third level, we assume a constant substitution elasticity between inputs imported from different origins (Hertel, 1997).

In our model, the investment grows based on the rate of return, and this new investment is added to the productive capital in the production process. While this assumption is simplistic and different from the standard Dynamic GTAP model (Ianchovichina and McDougall, 2000), it does offer more flexibility in terms of data requirements and simulation processing time.[14]

To establish the impact of trade wars, we begin by developing a baseline to show what the world economy would look like without trade war or any other policy scenario is imposed. The baseline development gives us two time paths for each variable of interest: firstly, a path that shows how the variable would change over time without the free trade agreement, and secondly, a path that shows how the variable would change with the free trade agreement. The difference between the two paths shows the effect of trade wars. Typically, these differences are cumulated and then plotted against time to illustrate the impact of trade wars on a given variable.

The baseline scenario used in this paper follows the approach of Chappuis and Walmsley (2011) at the Center for Global Trade Analysis, based on input from the World Bank and several other international organizations. It contains information on macroeconomic variables as well as expected policy changes over the 2007- 2050 period. The macroeconomic variables in the baseline include observations or projections for real gross domestic product, gross investment, capital stocks, population, skilled and unskilled labour, and total labour.

[14] Note that apart from this, our model does preserve all the standard features of GTAP -- perfect competition, Armington trade flows, disaggregated import usage by activity, non-homothetic consumer demands, and explicit modelling of international trade and transport -- while enhancing the investment theory to incorporate international capital mobility and ownership.

We capture the economic impacts of Make in India and trade war policies through deviations from the baseline for (a) gross domestic product (GDP), output and trade flow for India; (b) demand for labour, which affects employment on a sectoral level, and captures the social effect of these policies. As in ESCAP (2018), the model assumes trade balance is endogenous, along with all prices and quantities. The only exception is capital, land, and natural resources, which are all fixed and exogenous in our model.

Our study simulates two policy modelling scenarios for Make in India (MiI) and the trade war. The first step in this direction is designing the policy simulation scenario for Make in India (from now on referred to as MiI). For analyzing such policies, CGE models are much more relevant than standard econometric methods because of two reasons. First, only CGE models capture detailed structural characteristics of the economy and its linkages with multiple sectors together. Second, only CGE models can model 'what if' scenarios for policies like these, which are still ongoing, while we are interested in their futuristic impacts.

## 3.2 Make in India: Data and policy design

To ascertain the reactive policy impact of Make India involving protectionism on imports, 14 Make in India sectors were first identified, which concorded with 20 GTAP sectors. Note that since GTAP sectors are more disaggregated than those announced under the MiI scheme, the tariff shocks in terms of Ad Valorem (AV) equivalent for one MiI sector involves a corresponding tariff barrier on more than one GTAP sectors (Table 1).

We then computed the escalated tariff for Make in India sectors, which is a unique and complex exercise on the following counts. First, the Government of India announced a list of 24 industries where it intended to implement the Make in India policy. There are few sectors in this list – information technology and business process management, construction, ports, tourism and hospitality, media and entertainment, wellness, biotechnology, space, thermal power, and roads & highways – which do not map onto the existing trade-related Harmonized System of Classification (HS) codes.

Second, some MiI sectors like automobiles, aviation, pharmaceuticals, electrical machinery, railways, automobile components, renewable energy, and electronics systems had one to one mapping with trade-related two-digit HS codes (in this case, 2012). Finally, the remaining sectors had one to many mappings with the trade-related two-digit HS codes mapped onto GTAP. As an example, as can be seen in Table 1 for the chemicals sector, 2 two-digit HS codes mapped to the chemicals sector. Then, we computed the average tariff of four-digit HS codes within the two-digit HS code for each HS code. In the chemical example, we calculate the average tariff for HS code 28 using the individual tariffs of the four-digit HS code from 2801 till 2853 (for the Indian case).

Similarly, we computed the average tariff for HS code 29. Tariffs of HS code 28 and 29 were averaged to calculate the tariff for the chemicals sector. The Make in India sector of textiles and garments had 14 two-digit HS codes mapping onto it. Tariffs for 2017-18 were obtained from the Central Board of Indirect Taxes[15] & Customs, Department of Revenue, Ministry of Finance, Government of India.

The tariff shocks in our model are calculated as the power of tariff shocks for 20 GTAP sectors for 46 trading partners, generating a total of 920 shock statements. As an example, when modelling tariff impact due to MiI tariffs on automobile sector imports from China, we first obtain the initial AV tariffs from *tms (mvh, China, India)* value from GTAP database, which is 12.2%. Based on Table 1, the MiI tariffs on automobiles is now 28.1%; this translates to a calculated tariff power shock in the model of 14.2. For multiple MiI GTAP sectors, we take the average values of AV tariffs across each sector before calculating the power shocks.

**Table 1**

**Mapping of selected Make in India (MiI) sectors to the GTAP database**

| **Make in India sectors** | **HS code 2012** | **Average tariff %)** | **GTAP sector code** |
|---|---|---|---|
| Automobiles | 87 | 28.1 | 38 |
| Aviation | 88 | 8.3 | 39 |

[15] http://www.cbic.gov.in/htdocs-cbec/customs/cst1718-010718/cst1718-0107-idx. Accessed on 1st May, 2019.

| | | | |
|---|---|---|---|
| Chemicals | 28,29 | 9.5 | 33 |
| Pharmaceuticals | 30 | 10.0 | 33 |
| Defence manufacturing | 87,88,89,93 | 14.6 | 38,39,33,35,37,41 |
| Electrical machinery | 85 | 8.8 | 41 |
| Food processing | 16,17,18,19,20,21,22 | 48.5 | 19,20,21,22,23,24,25,26 |
| Textiles and garments | 50,51,52,53,54,55,56,57,58,59,60,61,62,63 | 23.4 | 27,28 |
| Leather | 41,42,43 | 10.6 | 29 |
| Mining | 25,26,27 | 8.2 | 15,16,17,18 |
| Railways | 86 | 10.0 | 39 |
| Automobile components | 87 | 28.1 | 38 |
| Renewable energy | 85 | 8.8 | 41 |
| Electronics systems | 85 | 8.8 | 40 |

Source: Customs tariff as on 01-07-18, Central Board of Indirect Taxes & Customs

Since investment promotion through Foreign Direct Investment (FDI) is one of the key proactive policies of MiI, we also incorporate a policy shock of capital stock growth by 2% (based on the average growth of gross capital formation of 6.6% over 2014-2017 (Make in India period) compared to that over 2010-2013. The data source for this is the World Bank (2018).

We demarcate the proactive and reactive impacts of MiI by using subtotals to identify how much of output, trade, investment, job changes compared to the baseline, are impacted by rising protectionism (reactive policy in MiI), compared to the investment push (proactive policy in MiI).

## 3.3 Global trade war: Data and policy design

In this scenario, we attempt to model tariff hikes by the United States and retaliation that have already occurred in 2018 (the "Implemented tariffs"), based on official notifications to the WTO. More specifically, 33 GTAP sectors, 11 individual countries (the United States of America, China, Japan, Republic of Korea, Indonesia, India, UK, Turkey, Canada, Mexico, and France) raised their tariffs against each other, with tariff escalation rates ranging from 10% to 140%.[16] We also attempt to further model the impact of all tariff escalations that include the above mentioned "implemented" as well as threatened tariffs, said in the concerned economies' official communications, not yet notified to WTO.[17]

The detailed data sources for all official communications that incorporate tariff escalations as paper our policy scenario are provided in Kravchenko et al. (2019). Specifically, for India, the tariff escalations are modelled on the 18 May 2018 notification to the WTO. For the US, the data comes from the USTR Documents, including the September 2018 Press release on finalizing tariffs on the US $ 200 billion worth of imports from China. The Ministry of Commerce, PRC September 2018 Announcement on Tariffs on Certain Goods Originating in the United States, is another important data source to model tariff escalations from the Chinese perspective.

From India's perspective, we observe that tariff escalations as of 2018 involving the US took place across several key manufacturing sectors, some of whom also constitute MiI sectors. Table 2 provides the power tariff values of the escalations across the key sectors. Note that there have been no tariff changes in imports from China into India or vice-versa during this period. 4 GTAP sectors (33, 35, 37, and 39) that also concord to MiI sectors Railways, Chemicals, Pharmaceuticals, and Defence manufacturing are subject to these tariff escalations, specifically when imported from the US. However, the highest tariff escalations are for non-MiI agricultural products. Metal products, including Aluminium and articles thereof, Automobiles and Auto-parts

[16]Turkey imposed this high an additional tariff on US America Beverages and Tobacco Products exports to it.

[17]These include tariffs on cars and car parts, and other selected items by US imported from China whose tariffs were increased from 10% to 25% as of 2019, as well as any potential retaliatory tariffs from China on imports originating in the United States.

as well as Iron and Steel, are MiI sectors that face higher tariffs in the US due to the trade war, which suggests that their exports to the US would decline.

**Table 2**

**Summary of tariff escalations as part of a trade war involving India and the US in 2018**

| GTAP sector code | The direction of escalation and sector description | *Escalated power of tariffs tms* (%) |
|---|---|---|
| | **India's exports to the US** | |
| 36 | Metals, including Aluminium | 50.0 |
| 38 | Motor vehicles and parts | 22.1 |
| 35 | Iron & Steel | 13.4 |
| 41 | Machinery and equipment nec | 5.5 |
| 40 | Electronic equipment | 4.9 |
| 30 | Wood products | 4.6 |
| 34 | Mineral products nec | 3.7 |
| 37 | Metal products | 3.3 |
| 33 | Chemical, rubber, plastic prods | 0.1 |
| | **The US's exports to India** | |
| 4 | Vegetables, fruit, nuts | 50.0 |
| 10 | Animal products nec | 50.0 |
| 37 | Metal products | 32.4 |
| 35 | Iron & Steel | 9.4 |
| 33 | Chemical, rubber, plastic prods | 4.7 |
| 39 | Transport equipment nec | 1.1 |

Source: Author's calculations based on policy simulations. The power of tariffs in the GTAP database is likely to be higher or lower than the actual percent point increase in tariff escalations. Hence, a 50% value of *tms* more likely represents a very high tariff escalation of 100% or beyond.

Based on the above, we analyze results for three scenarios. Scenario 1, a Make in India implementation without the trade war, Scenario 2, which is the trade war itself, and Scenario 3, which brings in the combined impact of MiI and the trade war. For

each of these three scenarios, from the baseline year of 2017, our model estimates the overall economic impacts from each of these policy changes. The economic losses or benefits, and any estimated sectoral effects on output and employment may not happen instantaneously, as it is likely to take some time for the impact, with other policy measures interacting with the above-mentioned combined effect that we analyze.

In our model, similar to that in GTAP, any changes in tariffs (due to Make in India and/or trade war) affect bilateral import prices and costs, insurance, freight (CIF) prices of imports from the source country, assuming transportation prices do not change. Equation (1) shows this relationship, wherein *tms (i,r,s)* and *pcif (i,r,s)* are percentage changes in tariffs and CIF prices of bilateral imports of a commodity 'i' from region 'r' to region's':

*pms(i r, s) = tms( i,r,s )+ pcif ( i,r, s, )….(1)*

Tariff induced changes in bilateral import prices affect export and import demand in terms of trade creation (expansion effect) and trade diversion (substitution effect) through equation (2)

*qxs (i, r, s) = qim (i s) [Trade Creation]- ESUBM (i)* pms (i ,r, s)- pim (i,s) [Trade Diversion] = - - (2)*

Where, *qxs(i,r,s)* and *pms(i,r,s)* are percentage changes in quantities and prices of bilateral imports of a commodity 'i' from region r to region s and *qim (i,s)* and *pim (i,s)* are percentage changes in total quantities and prices of aggregate imports of a commodity 'i' by region s, respectively. *ESUBM (i)* refers to the (Armington) elasticity of substitution among imports from different sources for commodity 'i.'

Changes in *qxs(i,r,s)* in this model, affects domestic demand and import demand and hence total output *qo* for industry *i* in region *r* through the following equation:

*qo(i,r)= SHRDM(i,r) * qds(i,r)+ sum(s,REG, SHRXMD(i,r,s) * qxs(i,r,s)) + tradslack(i,r) ….(3)*

Wherein *SHRDM (i.r)* and *SHRXMD (i, r, s)* refers to share in domestic demand and import demand respectively for good *i* in region *r*.

The employment effects are analyzed as follows. Changes in total output affect sector demand for primary factor composite good *j* used in an industry *i* in region *r* through the following equation in the model

*qva(j,r) = -ava(j,r) + **qo**(j,r) - ao(j,r) - ESUBT(j) * **[**pva(j,r) - ava(j,r) - ps(j,r) - ao(j,r)**]** --- (4)*

The above changes in value added (*qva*) in use of factor *j* in region *r* affects demands for endowment commodities (*qfe*) *i* for use in industry *j* in region *r* and hence employment of factors of production in this model, through the following equation:

*qfe(i,j,r) = - afe (i,j,r)+ qva (j,r)- ESUBVA(j) * **[**pfe(i,j,r) - afe(i,j,r) - pva(j,r)**]**…(5)*

## 4. Results

The estimated effects of Make in India, trade war, and the combined effects of both on welfare, output, trade, investment, and employment and the reasons therein are analyzed respectively, including a detailed analysis of the specific sectoral impacts on production and trade under each scenario. All reported results are medium-term estimates as we utilize a static CGE simulation in our modelling process.

### 4.1 Make in India

Table 3 presents the estimated effects of MiI on the Indian economy and confirms that the investment push (proactive policies) contribute significantly to the overall positive impact of the policy, contributing to about 1% in terms of additional real GDP and investment growth , and about 1.2% in exports growth. Notably, and as expected by theory, reactive policies of protectionism through tariff barriers hurts economic growth,

export growth and investment growth. The overall impact of Make in India policies contributes to a US $ 4.2 billion gain in terms of welfare, translating to 0.25% in terms of real GDP. In contrast, the reactive policies within MiI hurt the overall growth of India's trade, with exports growth estimated to decline by 1.5% and imports by 2.9%. As tariff barriers also affect imported intermediate inputs growth, they also negatively affect investment growth.

**Table 3**

**Estimated effects of Make in India policies on the Indian economy**

| | ***Welfare change (US $ million)*** | ***Real GDP (% change)*** | ***Exports growth (% change)*** | ***Import growth (% change)*** | ***Investment (% change)*** | ***Terms of Trade (tot)*** | ***Trade balance (US $ million)*** |
|---|---|---|---|---|---|---|---|
| Protectionism (reactive) | *-15235.2* | *-0.75* | *-2.73* | *-3.63* | *-1.92* | *0.71* | *19483.44* |
| Investment (proactive) | *19451.27* | *1.00* | *1.24* | *0.75* | *0.88* | *-0.29* | *-138.65* |
| Overall | *4216.18* | *0.25* | *-1.49* | *-2.88* | *-1.03* | *0.42* | *19344.77* |

Source: Author's calculations based on policy simulations.

Note: Welfare changes refer to the Equivalent Variation (EV) measure in our model that measures the additional dollar of income that a regional household (India in this case) would need to obtain at the new level of utility if goods were still to be valued at initial prices.

We analyze the above changes due to Make in India policies through the following economic mechanisms that work in our CGE model. First, there are "allocative losses," where governments collect more tax revenues. Second, there is a large "endowment gain" due to the investment push, due to which higher economic activities result, leading to higher real GDP growth. Third, capital stock growth (due to FDI push in Make India), substitutes for skilled and unskilled labour, and this technological change impact adversely affect job growth, with growth in skilled and unskilled labour falling by -0.43% and -0.64%, respectively. Finally, there are improvements in terms of trade (for India, export prices rise more than import prices in response to reactive policies, but the opposite happens due to the proactive investment push. As the two opposite forces of protectionism and investment combine under Make in India, real net exports

growth increases, generating a favourable outcome of improving real trade balances by US $ 19 billion.

It is therefore evident that MiI policies would have had a more favourable impact on the Indian economy if reactive policies of protectionism are avoided, as that adversely affect exporters, as imports grow faster than exports, reducing the trade surplus.

### 4.1.1 Sectoral output effects

Since MiI policies are aimed to enhance domestic output growth in the targeted sectors, we next analyze the output changes in the top 10 sectors wherein output rises, or falls due to this policy impact, based on the combined effects of protectionism and investment shocks. We present these in Table 4.

**Table 4**

**Summary of estimated sectoral output effects in top 10 GTAP sectors due to Make in India**

| GTAP Sector code | Sector | Output rises by (%) | GTAP Sector code | | Output falls by (%) |
|---|---|---|---|---|---|
| 29 | *Leather products* | 2.73 | 3 | Cereal grains nec | -0.01 |
| 21 | *Vegetable oils and fats* | 2.53 | 36 | Metals nec | -0.18 |
| 38 | *Motor vehicles and parts* | 2.52 | 44 | Gas manufacture, distribution | -0.23 |
| 54 | Business services nec | 2.52 | 48 | Transport nec | -0.26 |
| 27 | *Textiles* | 2.05 | | Skilled Labour (fop) | -0.43 |
| | Capital (fop) | 2 | 50 | Air transport | -0.45 |
| 39 | *Transport equipment nec* | 1.97 | 33 | *Chemical,rubber,plastic prods* | -0.62 |
| 37 | *Metal products* | 1.67 | | Unskilled labour (fop) | -0.64 |

| | | | | | |
|---|---|---|---|---|---|
| 28 | *Wearing apparel* | 1.6 | 46 | Construction | -0.86 |
| 16 | *Oil* | 1.54 | | Capital Goods | -1.03 |

Source: Author's calculations based on policy simulations. We report these for the combined proactive and reactive effects of the policy.

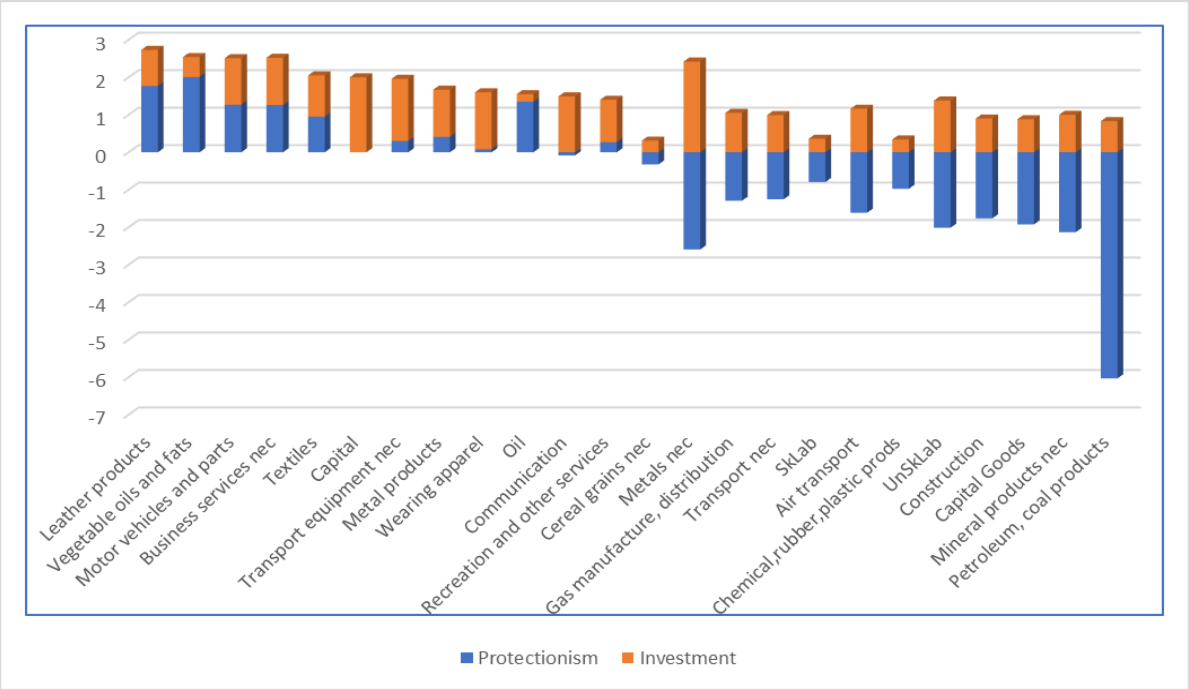
We note that 8 out of the top 10 sectors that experience an increase in domestic output are all linked to MiI sectors (Table 1) and that Chemical Rubber and Plastic products are the only MiI linked sectors to experience a negative output growth of -0.6%. As per Table 1, a decline in output in this sector is likely to affect Chemicals, Pharmaceuticals directly, and indirectly Defence manufacturing (that receives Chemical sector inputs) among the MiI sectors.

The investment in capital stock due to MiI strongly contributes to the buoyant domestic output growth compared to the reactive protectionism in two MII sectors, Textiles and Garments, as well as the Defence manufacturing sector (in terms of inputs of transport equipment and metal products) (figure 2). The top GTAP MiI related sectors that experience domestic output growth benefit mostly from reactive protectionism policies (these include Leather, Automobiles, and Food processing). We also observe reactive elements of Make in India to be contributing to the decline in output of GTAP MiI related sectors (most notably, Chemicals) (figure 2).

To ascertain whether MiI also affected the key industrial sectors that later experienced a tariff escalation in the US market due to the trade war (Table 2), Figure 3 presents the estimated impact on output and exports of these sectors.

**Figure 2**

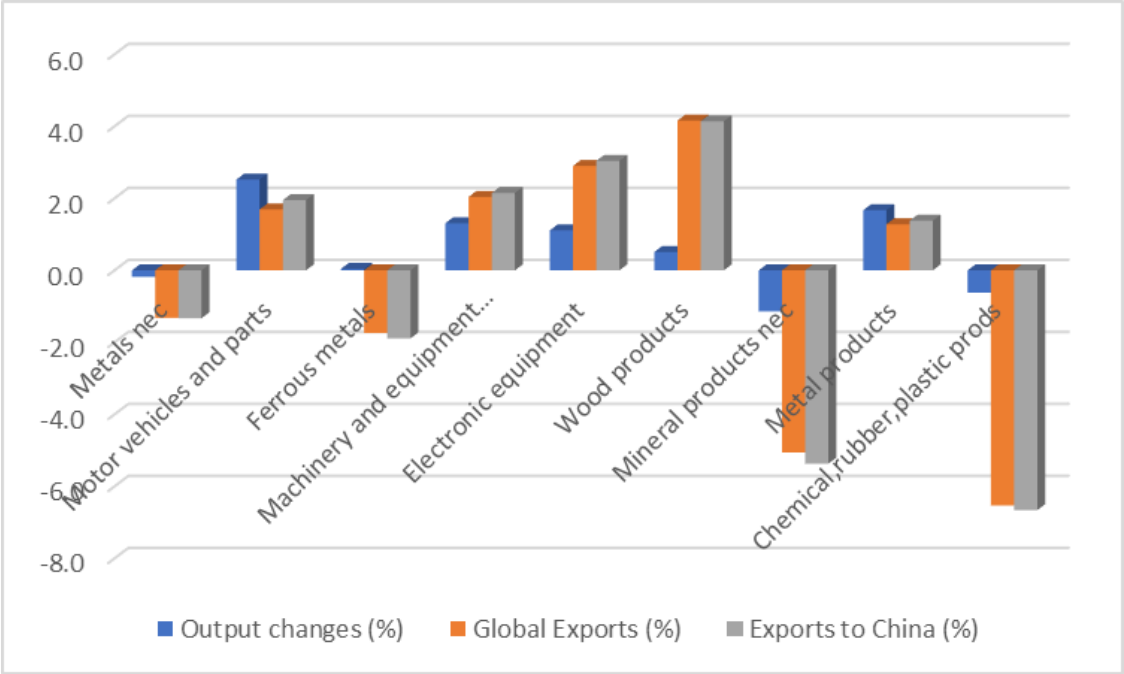
**Contribution of investment and protectionism shocks to domestic output changes (Due to Make in India (%))**




Source: Author's calculations based on policy simulations.

**Figure 3**

**Impact of Make in India on selected Industrial sectors**




Source: Author's calculations based on policy simulations.

On a sectoral basis, MiI hurts the Chemical Rubber and Plastics industry in terms of falling output (Table 4), which reduced its global exports growth by - 6.5%, and even specifically to China[18]. Mineral products also suffered a negative output growth of -1.1%, reducing its exports to China, and the United States, by about -5%. We observe a similar trend but at a smaller scale for the metals n.e.c sector. Iron and Steel (Ferrous metals sector) does not witness an output decline, but its exports to China and the United States fell by -2%. In the absence of a trade war, MiI sectors, including Automobiles, Machinery, and Electronic equipment, as well as metal products, including Aluminium, shows a domestic output growth, also translating to higher export growth of these industries globally, and China and other major trading partners.[19] These results are indicative of the fact that reactive protectionism in MiI has contributed to lower potential output growth, and had it been avoided, proactive investment push would have delivered a higher growth outcome.

### 4.1.2 Sectoral employment effects

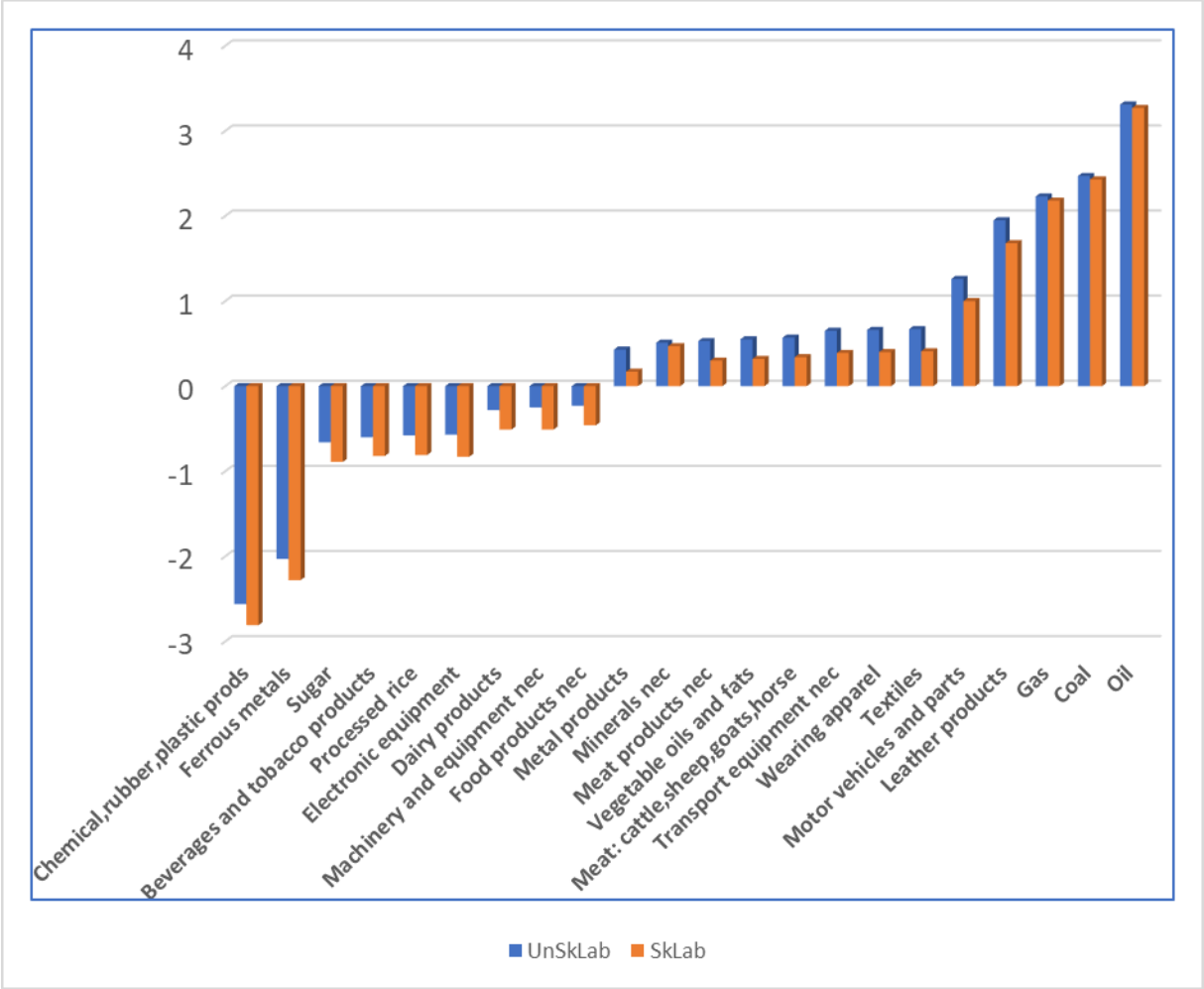
Figure 4 presents the estimates for changes in unskilled and skilled labour use for Mii sectors in India based on our policy experiment.[20] These constitute both proactive and reactive policy shock effects.

We observe that 9 out of 22 MiI related sectors suffer job losses in both skilled and unskilled labour, which includes Chemical, rubber plastic products, Iron and Steel, Food Processing, and Electronic equipment industries. The ones that gain jobs the most are mining and Extraction (of Coal, Oil, and Gas), Automobiles and Transport equipment, and Textile and Apparel industries.

[18]A similar decline was noted for India's exports to the US in this sector.
[19]A similar trend is noted in these sectors for exports to the US.
[20]These are based on *qfe* variable in the GTAP model.

**Figure 4**

**Sectoral Employment effects : Make in India (MiI) (%)**




Source: Author's calculations based on policy simulations in GTAP

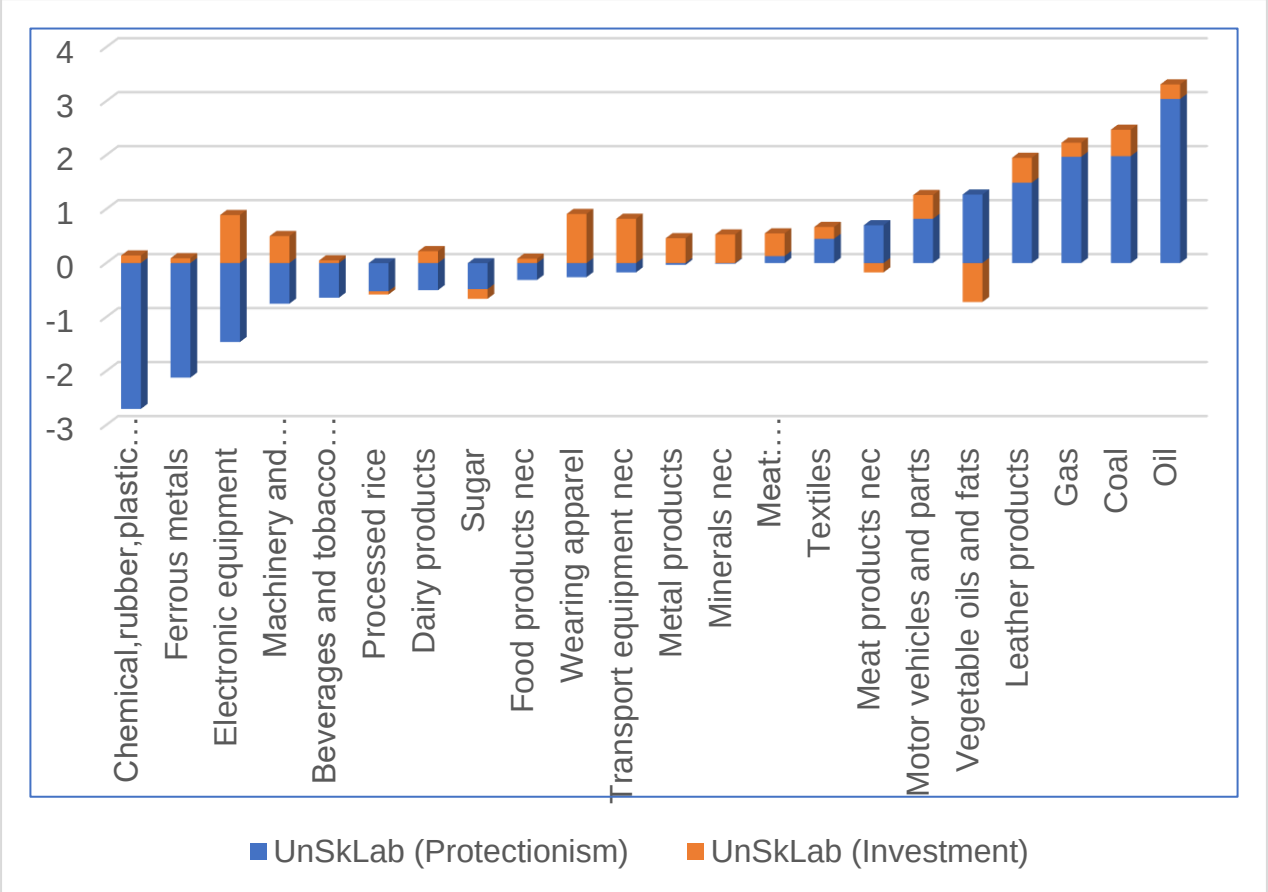
Notably, the sectors that experience the most significant decline in jobs due to this policy are not MiI sectors but important Heavy manufacturing industries involving the production of Petroleum, coal, and mineral products, as well as Gas manufacturing and distribution services.[21]Figure 5 further disaggregates the contribution of protectionism and investment shocks in unskilled labour employment in MII sectors. The results confirm that reactive policy of protectionism contributes to overall job losses in the 9 MiI sectors identified in figure 4 above, as well as job gains in other MiI

[21]These do not constitute any extraction and mining activities, and are treated separately in the GTAP database from those sectors.

sectors such as mining and extraction (of Coal, Oil, and Gas), Automobiles, and Transport Equipment, and textile industries.

**Figure 5**

**Contribution of Protectionism and Investment shock in MII sector unskilled labour employment changes (%)**

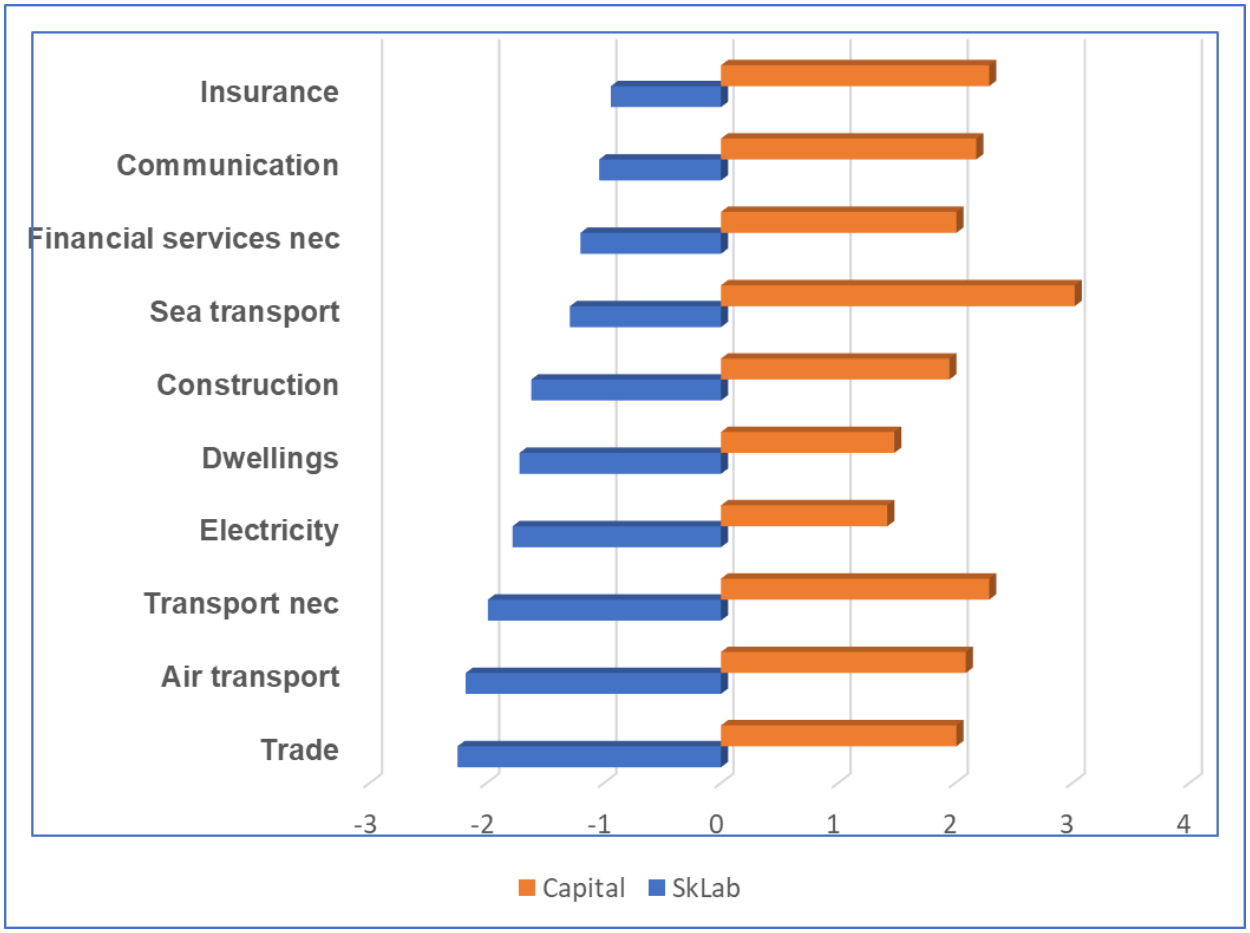



Source: Author's calculations based on policy simulations in GTAP

There is also evidence of job losses across the service sector, with technological changes due to capital infusion prompting substitution from labour to capital as a result of MiI's proactive policy of FDI attraction (figure 6). These results emphasize the importance of skill development in the face of MiI related initiatives and technological change associated with forces of globalization in the Indian economy.

**Figure 6**

**Employment effects on the Services sector due to MiI (%)**




Source: Author's calculations based on policy simulations in GTAP

## 4.2 Global trade War

Table 5 presents the estimated effects of the ongoing global trade war on the Indian economy. The results from our policy simulations confirm that tariff escalations due to the ongoing global trade war, has an overall positive impact on the Indian economy, contributing to about 0.06% in terms of additional real GDP and investment growth (0.7%), and a fall by -1.1% in exports growth. As expected by theory, reactive policies of protectionism through tariff barriers in a trade war hurt export growth, increasing imports, thereby improving the trade balance. The overall impact of the Trade War contributes to a US $ 7.5 billion gain in terms of welfare, translating to 0.06% in terms of real GDP.[22]

[22]This is based on September 2018 announced tariff escalation in the trade war, but even if further "threatened" tariffs were modelled, results do not change substantially, e.g. welfare is now up by the US $ 7.2 billion, and exports growth down by 1.03%.

**Table 5**

**Estimated effects of Global Trade war on the Indian economy**

| Policy | *Welfare change (US $ billion)* | *Real GDP (% change)* | *Exports growth (% change)* | *Import growth (% change)* | *Investment (% change)* | *Terms of Trade (tot)* | *Trade balance (US $ billion)* |
|---|---|---|---|---|---|---|---|
| Trade war | 7.5 | 0.06 | -1.07 | 0.54 | 0.69 | 0.35 | -11.6 |

Source: Author's calculations based on policy simulations in GTAP

We analyze the trade war effect through the following economic mechanisms that work in our CGE model. First, there are "allocative losses" where Indian governments collect more tax revenues on the US imports due to the specific tariff escalation involving the US-India trade. Second, the "endowment gains" result for higher economic activities, which leads to higher income for both skilled and unskilled labour, whose out. One of the channels of improved welfare and positive contribution to real GDP is through the improved terms of trade. For India, export prices rise more than import prices. We observe this due to two reasons. First, due to trade war, as exports fall, producers in the United States and China are likely to experience oversupply (due to blocked markets), and this will lead their export prices to third markets (India, in this case) to decline. The implication is that import prices fall for India, benefitting both consumers and intermediate producers there. Second, from India's perspective as an exporter not blocked by increasing tariffs to all other markets except for the United States, there's an increase in their export prices, as they fill in the gaps opened by the exclusion of China and the United states in respective markets. These effects are similar even if the "threatened" tariffs of 2019 were modelled.

### 4.2.1 Sectoral output effects

We expect the trade war to adversely affect export growth, as well as domestic output growth, especially in sectors that have witnessed initial tariff escalation between India and the United States (Table 2). We next analyze the output changes in those sectors due to the global trade war, focusing on the initial tariff escalations in 2018, and

ascertain whether the decline in output also contributed to a decrease in their exports to the United States. The results are presented in Table 6.

**Table 6**

**Summary of estimated sectoral output effects selected sectors due to global trade war**

| GTAP sector code | India to the US | Power of tariff shocks (%) | Output changes (%) | Growth in exports (to the US) (%) |
|---|---|---|---|---|
| 36 | Metals nec. | 50.0 | -0.46 | -99.97 |
| 38 | Motor vehicles and parts | 22.1 | -0.30 | -44.32 |
| 35 | Ferrous metals | 13.4 | -0.29 | -36.78 |
| 41 | Machinery and equipment nec. | 5.5 | -0.5 | -6.64 |
| 40 | Electronic equipment | 4.9 | -1.27 | 1.27 |
| 30 | Wood products | 4.6 | 0.44 | 23.07 |
| 34 | Mineral products nec. | 3.7 | 0.41 | 1.47 |
| 37 | Metal products | 3.3 | 0.17 | 14.66 |
| 33 | Chemical, rubber, plastic products | 0.1 | 0.17 | 5.765 |
| | **The US to India** | | | |
| 4 | Vegetables, fruit, nuts | 50 | 0.21 | -72.04 |
| 10 | Animal products nec | 50 | 0.11 | -60.28 |
| 37 | Metal products | 32.4 | 0.17 | -86.82 |
| 35 | Ferrous metals | 9.4 | -0.29 | -36.18 |
| 33 | Chemical, rubber, plastic products | 4.7 | 0.17 | -18.50 |
| 39 | Transport equipment nec | 1.1 | -0.53 | -1.21 |

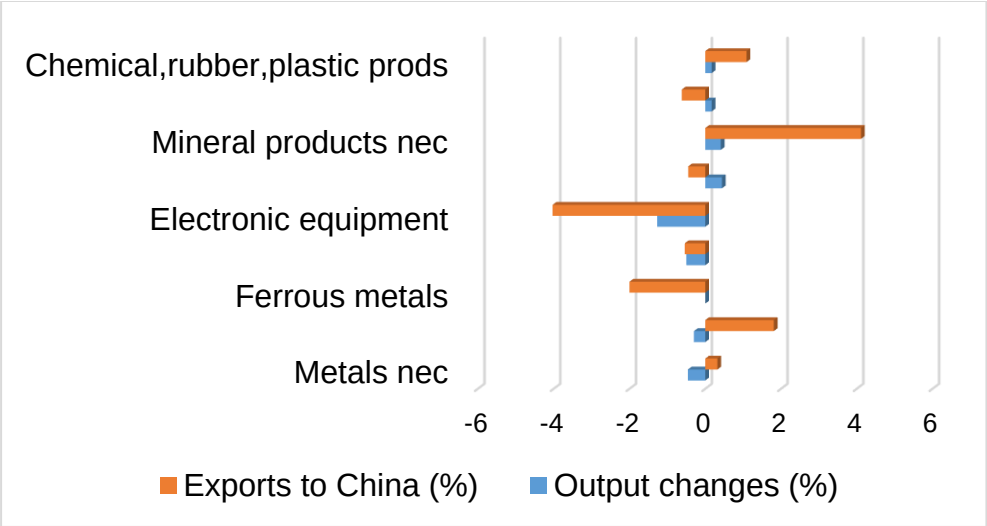
Source: Author's calculations based on policy simulations.

The top 5 sectors that involved tariff escalation from India to the US due to trade war also suffers losses in domestic production, and except for electronic equipment and parts, the domestic sector production losses also translate into decreased export growth from India to the US. Ferrous metals (Iron and Steel) sector output falls as it faces tariff escalation on both sides, but more on India to the US market than the other way around. Chemical Rubber plastics, and Metal products both have higher tariff barriers equivalent from the US to India, so protectionism leads to increased domestic production in both these import-competing sectors and decreases exports growth to the US. Wood and mineral products exports, which only experience a tariff escalation in the US market, expand their domestic output by 0.4% and increases the growth of their exports to the US market.

To ascertain whether trade war also affected export growth to China in the sectors that witnessed the US-India tariff escalation, figure 7 presents the estimated impact on output and exports from India to China in these sectors.

**Figure 7**

**Estimated impact of trade war on India-China exports**




Source: Author's calculations based on policy simulations in GTAP

Mineral products, metals as well as motor vehicles and parts are the key industrial sectors wherein bilateral exports between India and China grow despite a decline in domestic production, suggesting improved terms of trade effect in these sectors vis-a-vis China. Ferrous metals, as well as electronic equipment and parts exports to

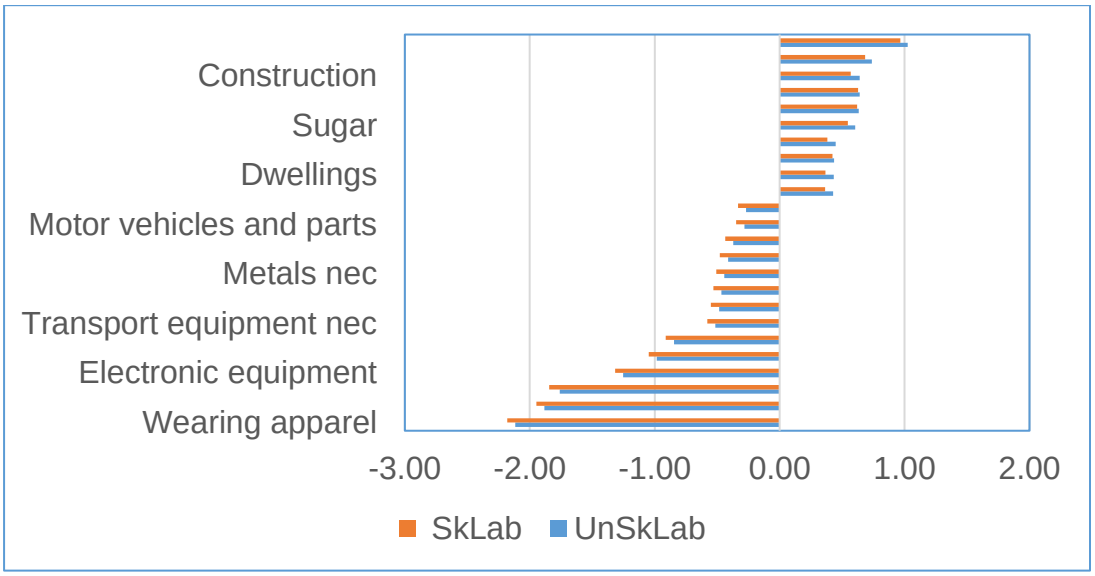
China, do fall along with their output, these sectors affect the growth of India-China exports growth adversely, despite no direct tariff escalation between the two countries. Overall, as expected, the sectoral results are mixed, with no evidence to suggest across that board that the global trade war adversely affected output growth and export growth of key sectors that involved bilateral tariff escalation between India and the US. We confirm this further in Appendix 1 that estimates the output changes in the top 20 GTAP sectors in India due to the global trade war. The top 10 industries wherein output falls, as well as rises due to trade war, do not involve a direct tariff escalation based on Table 2, but are vital inputs to some of those sectors, especially in services.

### 4.2.2 Sectoral employment effects

Figure 8 presents the estimates for changes in unskilled and skilled labour use to the trade war based on our policy experiment.[23]

**Figure 8**

**Sectoral employment effects: Trade war (%)**




Source: Author's calculations based on policy simulations in GTAP

[23]These are based on *qfe* variable in the GTAP model.

We observe that due to the trade war and tariff escalations involving India and the United States, job losses in both skilled and unskilled labour result in Apparel, Textiles, Automobiles, and parts, as well as services inputs that go in these sectors, including business services, sea transport, insurance, etc. Those sectors that suffer the most considerable output losses due to the trade war in Appendix 1 also happen to the ones suffering the greatest job losses. The Capital goods sector benefits the most, followed by agriculture and food processing industries in terms of job gains due to the trade war, and these also happen to be the sectors that experience a domestic output growth as per Appendix 1.

The sectors that experience the greatest decline in jobs due to the trade war are all not subject to tariff escalation in the US market, except for electronic, transport, and machinery equipment. Still, notably, these are also connected to intermediate goods trade and services links involving global value chains (GVCs). There is, therefore, emerging evidence of trade war adversely affecting trade in global value chains and employment in these sectors for India.

## 4.3 Make in India and trade war

Table 7 presents the estimated effects of the combined impact of Make in India and ongoing global trade war on the Indian economy and confirms that tariff escalations both due to MiI policies and the ongoing global trade war, has had an overall positive impact on the Indian economy, contributing to about 0.31% in terms of additional real GDP, but a decline in investment growth (-0.35%), with exports growth sharply falling by 2.6%. As expected by theory, reactive policies of protectionism through higher tariff barriers due to MiI and the trade war hurt export growth severely, also reducing imports growth but less than that of exports, resulting in an improved trade balance. The overall combined impact of MiI policies and the trade war contribute to a US $ 11.7 billion gain in terms of welfare, translating to 0.3% in terms of real GDP.[24]

[24]This is based on September 2018 announced tariff escalation in the trade war, but even if further "threatened" tariffs were modelled, results do not change substantially.

**Table 7**

**Estimated effects of Make in India and Trade war policies on the Indian economy**

| | ***Welfare change (US $ million)*** | ***Real GDP (% change)*** | ***Exports growth (% change)*** | ***Import growth (% change)*** | ***Investment (% change)*** | ***Terms of Trade (tot)*** | ***Trade balance (US $ million)*** |
|---|---|---|---|---|---|---|---|
| ***Make in India & Trade War*** | *11703.08* | *0.31* | *-2.56* | *-2.34* | *-0.35* | *0.77* | *7780.67* |
| ***Make in India (proactive) & Trade War*** | *26938.28* | *1.06* | *0.17* | *1.29* | *1.57* | *0.06* | *-11703.00* |

Source: Author's calculations based on policy simulations.

Note: Welfare changes refer to the Equivalent Variation (EV) measure in our model that measures the additional dollar of income that a regional household (India in this case) would need to obtain at the new level of utility if goods were still to be valued at initial prices.

The outcome of a combined effect of strong protectionism effects of a trade war and Make in India seems to override the proactive impact of investment expansion through the latter. An interesting result is that the unexpected event such as a trade war does not reverse any macroeconomic outcome in the Make in India program; if anything, it contributes positively to output growth, although there are clear negative sectoral impacts for manufacturing exporters.

## 5. Policy implications and concluding remarks

Our paper was the first ever attempt to analyse economy wide and sectoral impacts of Make in India program, extending it to incorporate the effects of the global trade war. The simulation results suggest that Make in India programme, at its best, seems to have had a marginal impact on the Indian economy. It confirms that proactive policies of MiI through investment push generate higher growth benefits, compared to a mix of proactive and reactive policies. Due to reactive protectionism as part of MiI, output grows, but yields negative ramifications for exports, jobs, and investment growth, with high tariffs affecting imported intermediate inputs and potential GVC

sectors. The only difference added by the unexpected trade war is the extra negative impact on export growth of India, that leads to net import growth, instead of a net exports growth. Specific manufacturing sectors are found to be unable to increase domestic output despite being a part of Make in India, such as the Chemical, Rubber, and Plastics industries, and those that use it as raw materials.

An important caveat is in order while interpreting these results. Demonetization of the Indian rupee announced in November 2016, and the Goods and Services Tax implemented in July 2017 changed the structure of the Indian economy, especially unorganized manufacturing, which may not be reflected in the results of our static model. Any impact on credit availability due to these policies that might have adversely affected ability of manufacturing sector firms to increase production capacity or exports is also therefore not captured, as our model does not include financial sector, and doesn't include firm-level data. Our model also does not evaluate any subsidy impacts under MiI in this scenario (schemes that include a one-time capital subsidy for eligible benchmarked machinery, Interest Equalization Scheme on Pre and Post Shipment Rupee Export Credit, as well as sector-specific subsidies, investment allowances, and duty drawback schemes. Further, we model reactive protectionism in MiI sectors only in terms of tariff-barriers, and do not model any non-tariff barriers due to data limitations.

Despite some obvious limitations as outlined above, there are some key lessons from this study that informs Indian policymakers as it aims to recover along with the global economy in 2021, from the covid-19 pandemic. First, as India aims to become self-reliant but remain engaged globally by enhancing export capabilities post-COVID-19, reactive protectionism by keeping tariff barriers are best avoided in the long run, as it not only hurts export growth in key industries, but also directly affects job creation in those industries. Second, proactive policies that involves investment push such as the recently announced 10 sector Production linked incentive (PLI) scheme that focusses on boosting manufacturing capabilities, and thereby exports, should be more preferred, and properly implemented, avoiding any opportunities for tariff-jumping foreign investments. Last, but not the least, demand and supply side constraints that affect manufacturers need to be eased and infrastructural development should be a priority.

It is obvious that our study is unable to capture any firm-specific impacts due to MiI in these sectors, which would provide more insights into which kind of firms are more likely to succeed in developing production and export capabilities in India's manufacturing sector. Future research in this area is therefore expected to utilize trade and protection data based on firm heterogeneity and production data in a global economic modelling framework, as and when it is available.[25]

[25] Detailed firm level trade data is required for GTAP-HET modelling as per Akgul et. al.(2014), which is a data constraint in the Indian context.

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**Table 1**

**Mapping of selected Make in India (MiI) sectors to the GTAP database**

| Make in India sectors | HS code 2012 | Average tariff %) | GTAP sector code |
|---|---|---|---|
| Automobiles | 87 | 28.1 | 38 |
| Aviation | 88 | 8.3 | 39 |
| Chemicals | 28,29 | 9.5 | 33 |
| Pharmaceuticals | 30 | 10.0 | 33 |
| Defence manufacturing | 87,88,89,93 | 14.6 | 38,39,33,35,37,41 |
| Electrical machinery | 85 | 8.8 | 41 |
| Food processing | 16,17,18,19,20,21,22 | 48.5 | 19,20,21,22,23,24,25,26 |
| Textiles and garments | 50,51,52,53,54,55,56,57,58,59,60,61,62,63 | 23.4 | 27,28 |
| Leather | 41,42,43 | 10.6 | 29 |
| Mining | 25,26,27 | 8.2 | 15,16,17,18 |
| Railways | 86 | 10.0 | 39 |
| Automobile components | 87 | 28.1 | 38 |
| Renewable energy | 85 | 8.8 | 41 |

| | | | |
|---|---|---|---|
| Electronics systems | 85 | 8.8 | 40 |

Source: Customs tariff as on 01-07-18, Central Board of Indirect Taxes & Customs

**Table 2**

**Summary of tariff escalations as part of a trade war involving India and the US in 2018**

| GTAP sector code | The direction of escalation and sector description | *Escalated power of tariffs tms* (%) |
|---|---|---|
| | **India's exports to the US** | |
| 36 | Metals, including Aluminium | 50.0 |
| 38 | Motor vehicles and parts | 22.1 |
| 35 | Iron & Steel | 13.4 |
| 41 | Machinery and equipment nec | 5.5 |
| 40 | Electronic equipment | 4.9 |
| 30 | Wood products | 4.6 |
| 34 | Mineral products nec | 3.7 |
| 37 | Metal products | 3.3 |
| 33 | Chemical, rubber, plastic prods | 0.1 |
| | **The US's exports to India** | |
| 4 | Vegetables, fruit, nuts | 50.0 |
| 10 | Animal products nec | 50.0 |
| 37 | Metal products | 32.4 |
| 35 | Iron & Steel | 9.4 |
| 33 | Chemical, rubber, plastic prods | 4.7 |
| 39 | Transport equipment nec | 1.1 |

Source: Author's calculations based on policy simulations. The power of tariffs in the GTAP database is likely to be higher or lower than the actual percent point increase in tariff escalations. Hence, a 50% value of *tms* more likely represents a very high tariff escalation of 100% or beyond.

**Table 3**

**Estimated effects of Make in India policies on the Indian economy**

| | ***Welfare change (US $ million)*** | ***Real GDP (% change)*** | ***Exports growth (% change)*** | ***Import growth (% change)*** | ***Investment (% change)*** | ***Terms of Trade (tot)*** | ***Trade balance (US $ million)*** |
|---|---|---|---|---|---|---|---|
| Protectionism (reactive) | *-15235.2* | *-0.75* | *-2.73* | *-3.63* | *-1.92* | *0.71* | *19483.44* |
| Investment (proactive) | *19451.27* | *1.00* | *1.24* | *0.75* | *0.88* | *-0.29* | *-138.65* |
| Overall | *4216.18* | *0.25* | *-1.49* | *-2.88* | *-1.03* | *0.42* | *19344.77* |

Source: Author's calculations based on policy simulations.

Note: Welfare changes refer to the Equivalent Variation (EV) measure in our model that measures the additional dollar of income that a regional household (India in this case) would need to obtain at the new level of utility if goods were still to be valued at initial prices.

**Table 4**

**Summary of estimated sectoral output effects in top 10 GTAP sectors due to Make in India**

| **GTAP Sector code** | **Sector** | **Output rises by (%)** | **GTAP Sector code** | | **Output falls by (%)** |
|---|---|---|---|---|---|
| 29 | *Leather products* | 2.73 | 3 | Cereal grains nec | -0.01 |
| 21 | *Vegetable oils and fats* | 2.53 | 36 | Metals nec | -0.18 |

| | | | | | |
|---|---|---|---|---|---|
| 38 | *Motor vehicles and parts* | 2.52 | 44 | Gas manufacture, distribution | -0.23 |
| 54 | Business services nec | 2.52 | 48 | Transport nec | -0.26 |
| 27 | *Textiles* | 2.05 | | Skilled Labour (fop) | -0.43 |
| | Capital (fop) | 2 | 50 | Air transport | -0.45 |
| 39 | *Transport equipment nec* | 1.97 | 33 | *Chemical,rubber,plastic prods* | -0.62 |
| 37 | *Metal products* | 1.67 | | Unskilled labour (fop) | -0.64 |
| 28 | *Wearing apparel* | 1.6 | 46 | Construction | -0.86 |
| 16 | *Oil* | 1.54 | | Capital Goods | -1.03 |

Source: Author's calculations based on policy simulations. We report these for the combined proactive and reactive effects of the policy.

**Table 5**

**Estimated effects of Global Trade war on the Indian economy**

| **Policy** | ***Welfare change (US $ billion)*** | ***Real GDP (% change)*** | ***Exports growth (% change)*** | ***Import growth (% change)*** | ***Investment (% change)*** | ***Terms of Trade (tot)*** | ***Trade Balance (US $ billion)*** |
|---|---|---|---|---|---|---|---|
| Trade war | 7.5 | 0.06 | -1.07 | 0.54 | 0.69 | 0.35 | -11.6 |

Source: Author's calculations based on policy simulations in GTAP

**Table 6**

**Summary of estimated sectoral output effects selected sectors due to Global Trade war**

| GTAP sector code | India to the US | Power of tariff shocks (%) | Output changes (%) | Growth in exports (to the US) (%) |
|---|---|---|---|---|
| 36 | Metals nec. | 50.0 | -0.46 | -99.97 |
| 38 | Motor vehicles and parts | 22.1 | -0.30 | -44.32 |
| 35 | Ferrous metals | 13.4 | -0.29 | -36.78 |
| 41 | Machinery and equipment nec. | 5.5 | -0.5 | -6.64 |
| 40 | Electronic equipment | 4.9 | -1.27 | 1.27 |
| 30 | Wood products | 4.6 | 0.44 | 23.07 |
| 34 | Mineral products nec. | 3.7 | 0.41 | 1.47 |
| 37 | Metal products | 3.3 | 0.17 | 14.66 |
| 33 | Chemical, rubber, plastic products | 0.1 | 0.17 | 5.765 |
| | **The US to India** | | | |
| 4 | Vegetables, fruit, nuts | 50 | 0.21 | -72.04 |
| 10 | Animal products nec | 50 | 0.11 | -60.28 |
| 37 | Metal products | 32.4 | 0.17 | -86.82 |
| 35 | Ferrous metals | 9.4 | -0.29 | -36.18 |

| | | | | |
|---|---|---|---|---|
| 33 | Chemical, rubber, plastic products | 4.7 | 0.17 | -18.50 |
| 39 | Transport equipment nec | 1.1 | -0.53 | -1.21 |

Source: Author's calculations based on policy simulations.

**Table 7**

**Estimated effects of Make in India and Trade war policies on the Indian economy**

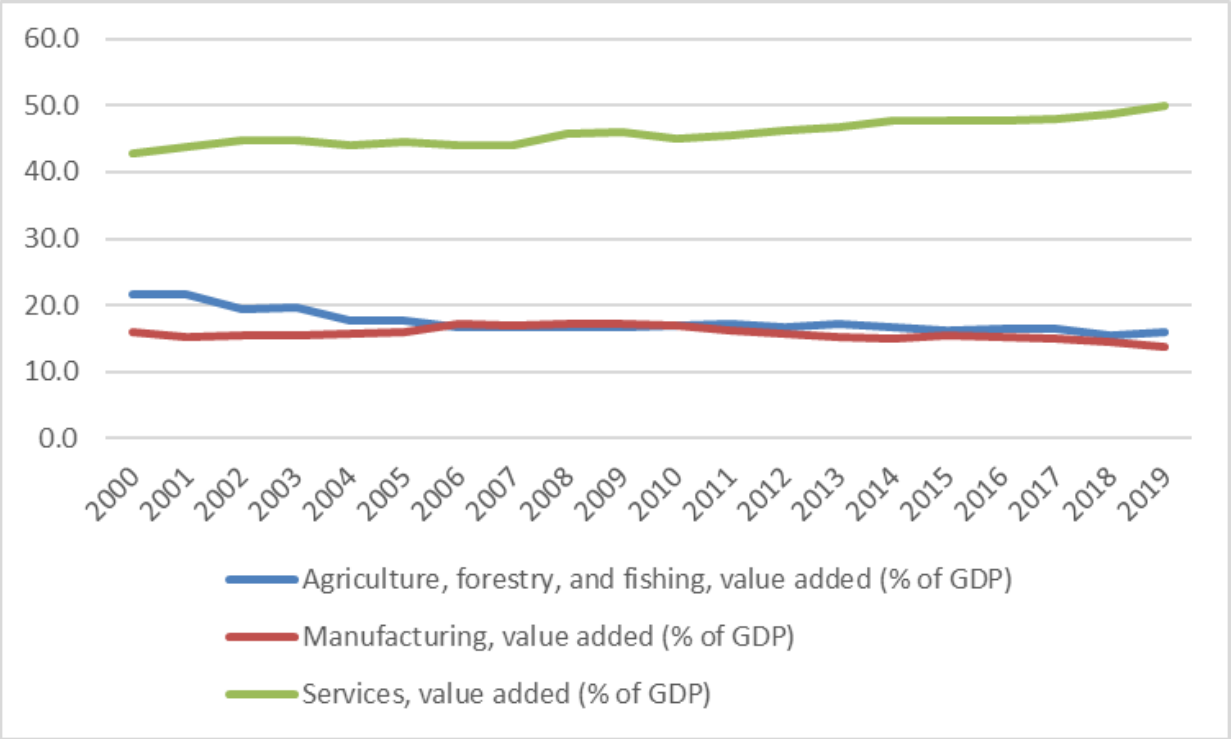
| | ***Welfare change (US $ million)*** | ***Real GDP (% change)*** | ***Exports growth (% change)*** | ***Import growth (% change)*** | ***Investment (% change)*** | ***Terms of Trade (tot)*** | ***Trade Balance (US $ million)*** |
|---|---|---|---|---|---|---|---|
| ***Make in India & Trade War*** | *11703.08* | *0.31* | *-2.56* | *-2.34* | *-0.35* | *0.77* | *7780.67* |
| ***Make in India (proactive) & Trade War*** | *26938.28* | *1.06* | *0.17* | *1.29* | *1.57* | *0.06* | *-11703.00* |

Source: Author's calculations based on policy simulations.

Note: Welfare changes refer to the Equivalent Variation (EV) measure in our model that measures the additional dollar of income that a regional household (India in this case) would need to obtain at the new level of utility if goods were still to be valued at initial prices.

**Figure 1**

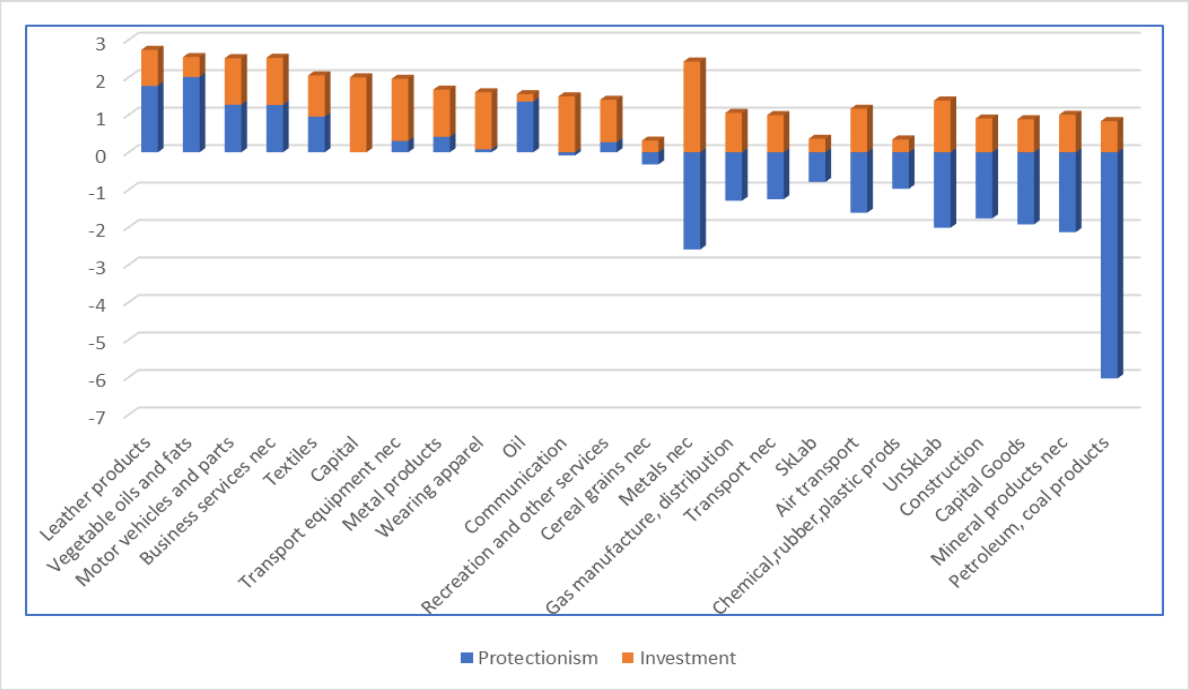
**Composition of key sectors to India's GDP**




Source: The World Bank (2018)

**Figure 2**

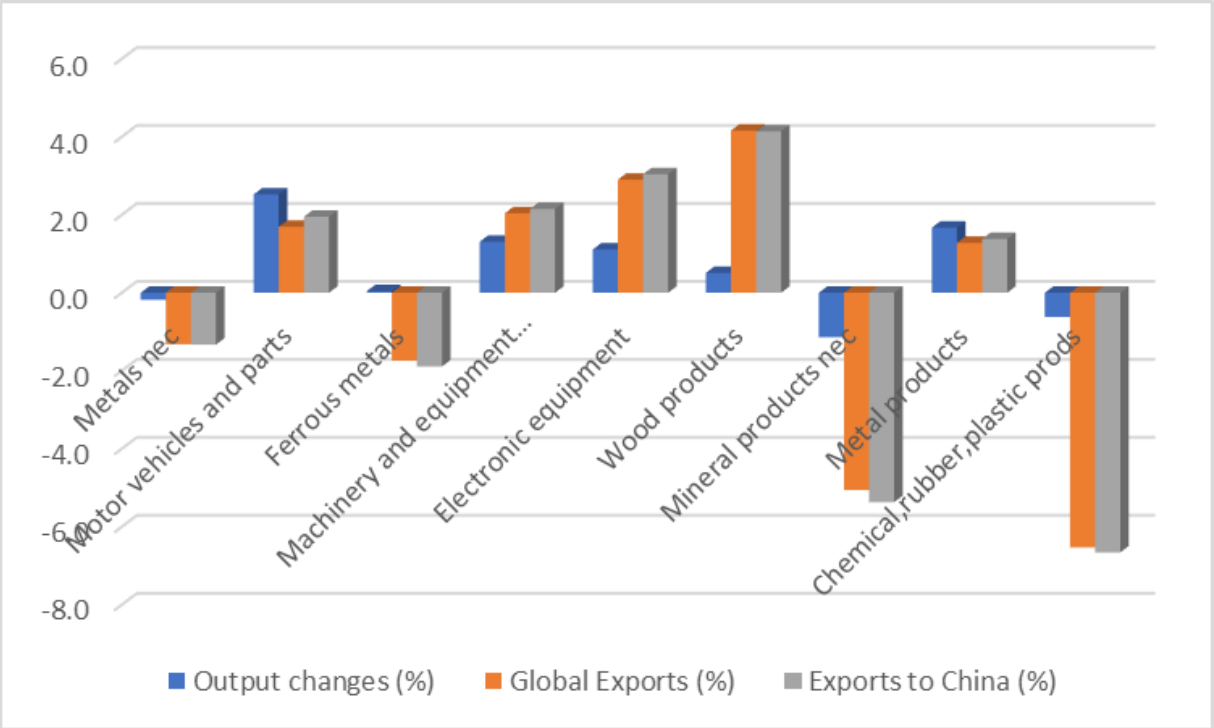
**Contribution of Investment and Protectionism shocks to domestic output changes (Due to Make in India (%))**




Source: Author's calculations based on policy simulations.

**Figure 3**

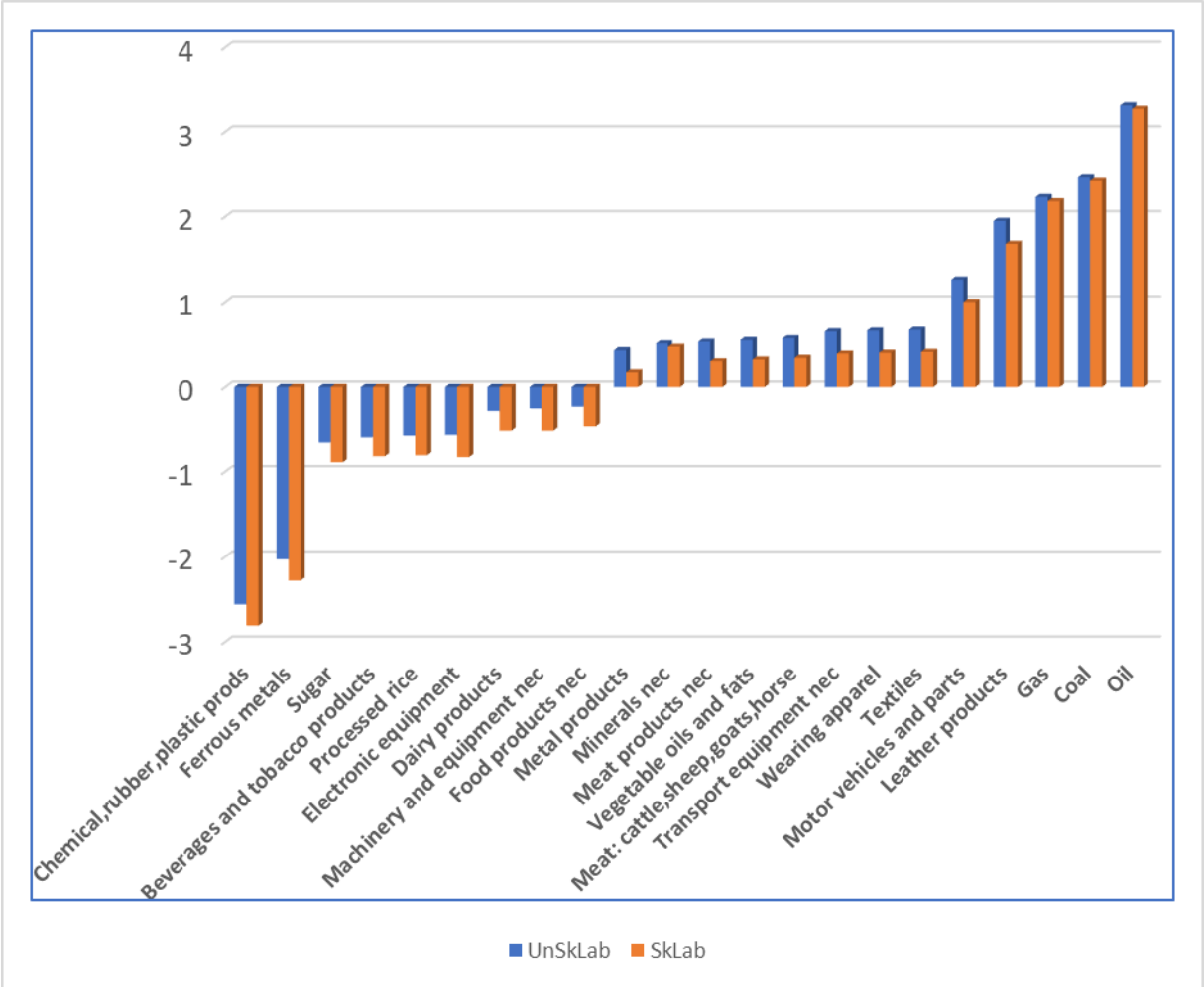
**Impact of Make in India on selected Industrial sectors**




Source: Author's calculations based on policy simulations.

**Figure 4**

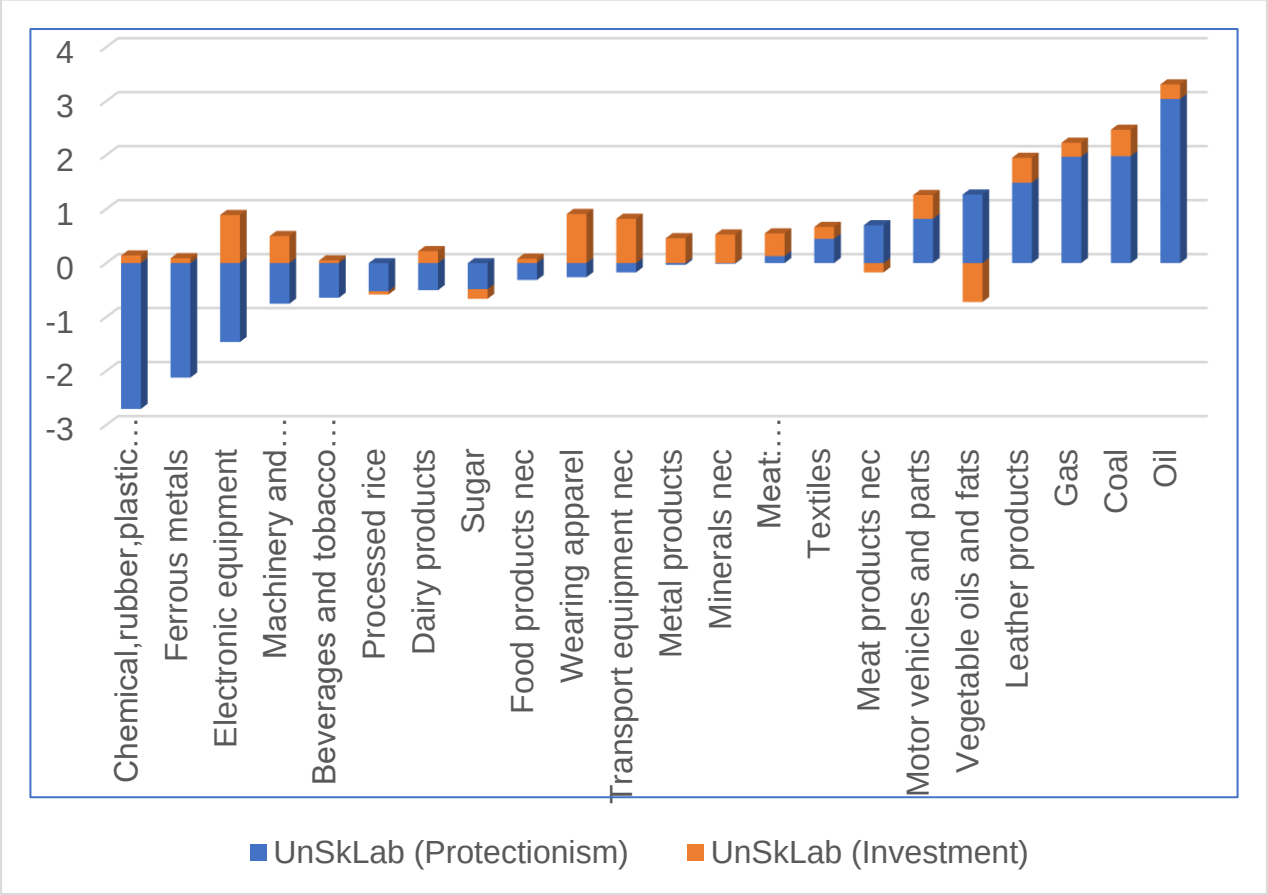
**Sectoral employment effects : Make in India (Mil) (%)**




Source: Author's calculations based on policy simulations in GTAP

**Figure 5**

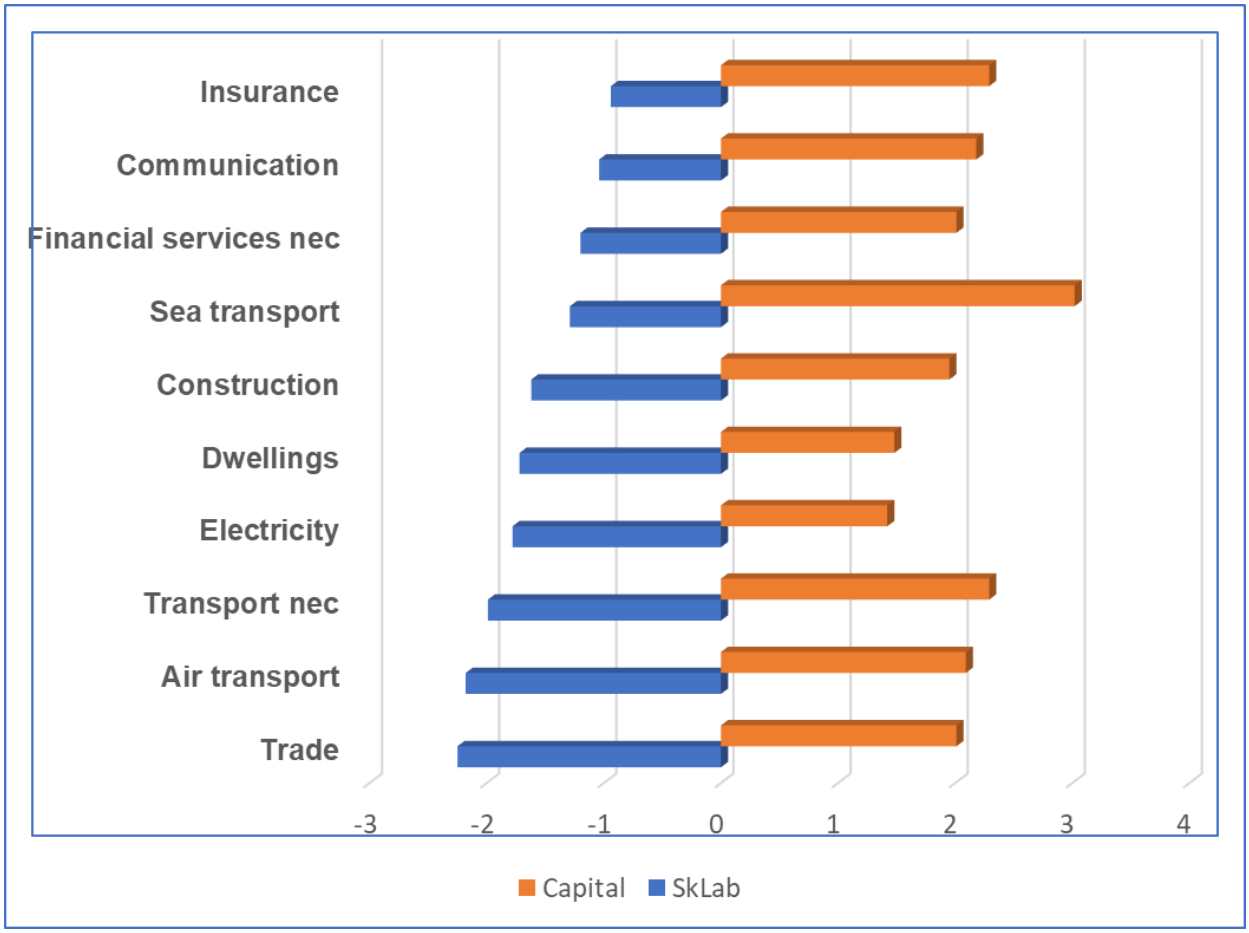
**Contribution of protectionism and investment shock in MII sector unskilled labour employment changes (%)**




Source: Author's calculations based on policy simulations in GTAP

**Figure 6**

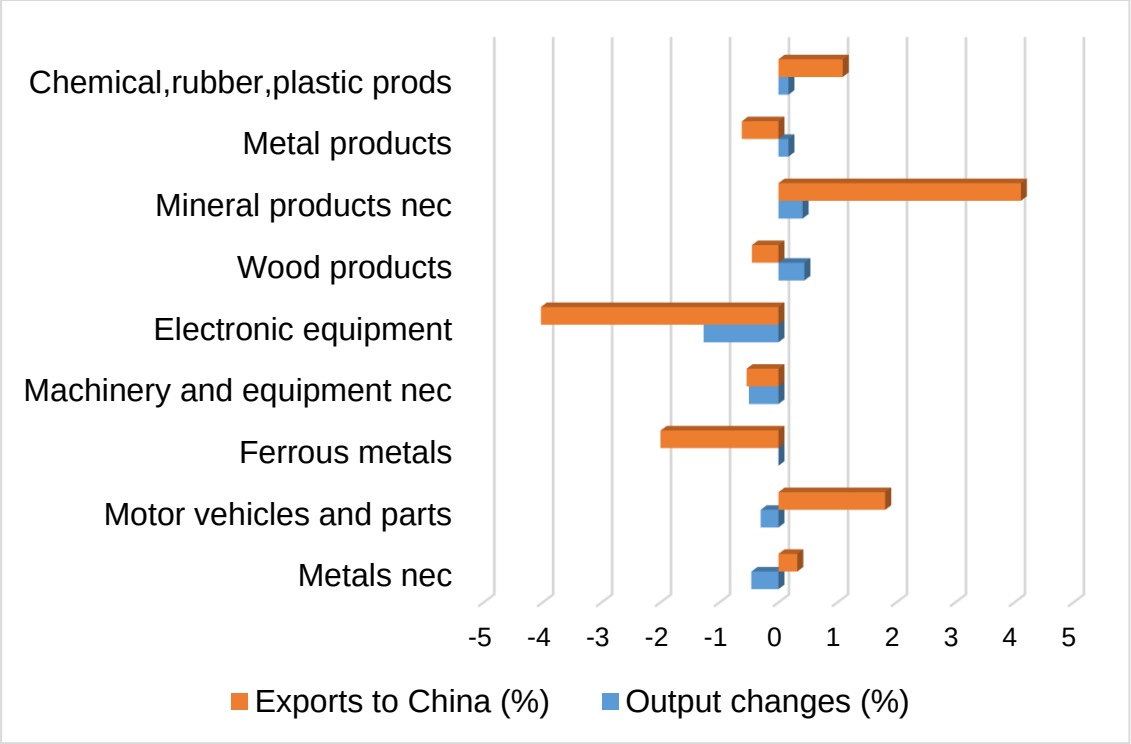
**Employment effects on the services sector due to Mil (%)**




Source: Author's calculations based on policy simulations in GTAP

**Figure 7**

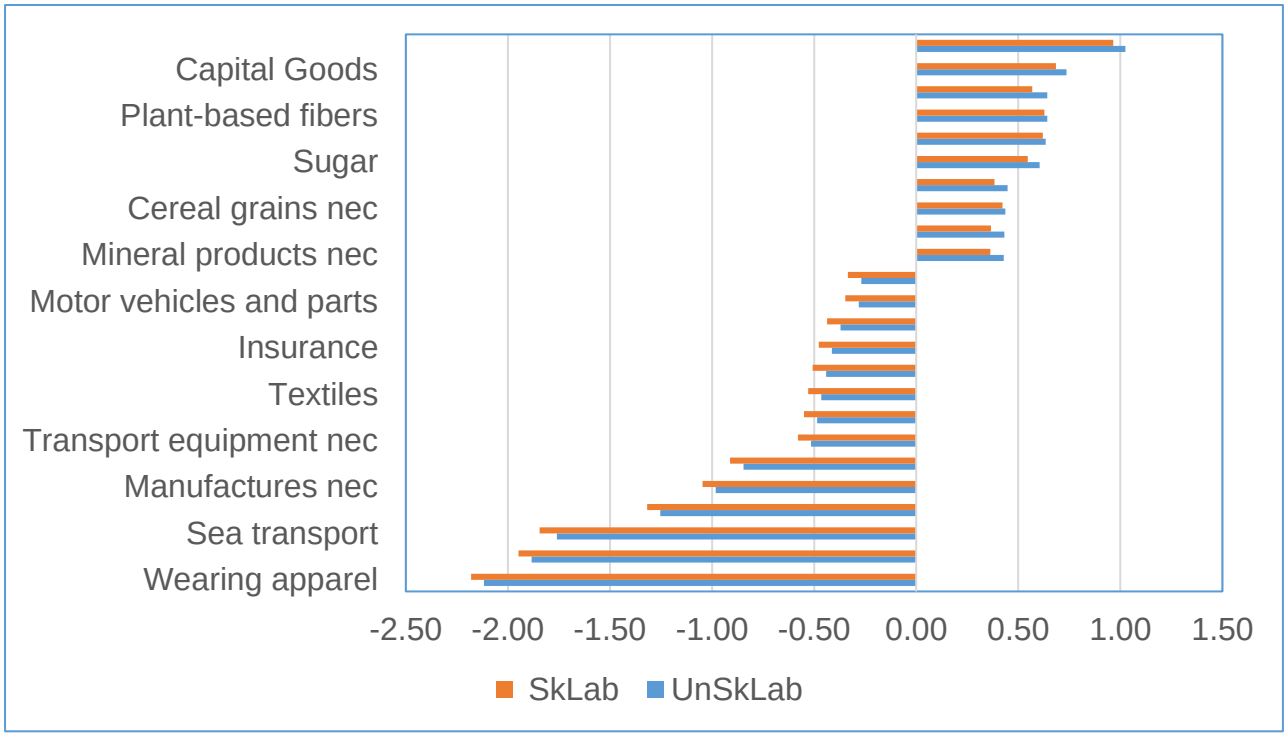
**Estimated impact of trade war on India-China exports**




Source: Author's calculations based on policy simulations in GTAP

**Figure 8**

**Sectoral employment effects : Trade war (%)**




Source: Author's calculations based on policy simulations in GTAP

## Appendix 1

### Top 20 GTAP sectors wherein output falls or rises in India due to the trade war

| No | Sector code | Description | Output ( %) fall | Sector code | Description | Output (%) rise |
|---|---|---|---|---|---|---|
| 1 | 28 | Wearing apparel | -2.13 | 19 | Meat: cattle,sheep,goats,horse | 1.01 |
| 2 | 29 | Leather products | -1.9 | NA | Capital Goods | 0.69 |
| 3 | 49 | Sea transport | -1.78 | 46 | Construction | 0.62 |
| 4 | 40 | Electronic equipment | -1.27 | 24 | Sugar | 0.59 |
| 5 | 42 | Manufactures nec | -1 | 6 | Sugar cane, sugar beet | 0.48 |
| 6 | 54 | Business services nec | -0.89 | 7 | Plant-based fibers | 0.47 |
| 7 | 39 | Transport equipment nec | -0.53 | 30 | Wood products | 0.44 |
| 8 | 41 | Machinery and equipment nec | -0.5 | 34 | Mineral products nec | 0.41 |
| 9 | 27 | Textiles | -0.48 | 57 | Dwellings | 0.41 |
| 10 | 36 | Metals nec | -0.46 | 25 | Food products nec | 0.31 |
| 11 | 53 | Insurance | -0.44 | 56 | PubAdmin/Defence/Health/Educat | 0.31 |
| 12 | 51 | Communication | -0.39 | 3 | Cereal grains nec | 0.3 |
| 13 | 38 | Motor vehicles and parts | -0.3 | 14 | Fishing | 0.23 |
| 14 | 35 | Ferrous metals (Iron and Steel) | -0.29 | 2 | Wheat | 0.23 |
| 15 | 55 | Recreation and other services | -0.17 | 26 | Beverages and tobacco products | 0.22 |
| 16 | 52 | Financial services nec | -0.12 | 4 | Vegetables, fruit, nuts | 0.21 |
| 17 | 31 | Paper products, publishing | -0.11 | 23 | Processed rice | 0.21 |
| 18 | 16 | Oil | -0.1 | 47 | Trade | 0.21 |
| 19 | 15 | Coal | -0.08 | 9 | Cattle,sheep,goats,horses | 0.19 |
| 20 | 50 | Air transport | -0.02 | 13 | Forestry | 0.18 |

Source: Author's calculations based on policy simulations in GTAP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