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The Long-term Impact of Trade Wars and 'Make in India on the Indian Economy

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Abstract

It is a well-known fact that India's rapid growth in recent decades has taken place in spite of an almost stagnant contribution of an average of 16% in manufacturing sector to its GDP over 2000-2018. In order to address this constraint and develop India as the next global manufacturing hub, *'Make in India*' a flagship program for industrialization, has been launched by the Government of India since 2014. This has two broad types of features first being business-friendly to reduce transaction costs and improve doing business in India, while the second involves protectionism against import competition for domestic manufacturing firms. The combined effect of these two features on the expected success of this programme has been ambiguous, partly because these are not very clearly laid out in one document but instead they have been captured by a slew of policy measures and announcements over a period of the past four years. Some of them have been proactive while others have been reactive to global policies. The reactive policies have been mainly shaped in the last couple of years, in response to the global trade wars being triggered by the US tariff hikes 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 of them have their own effects separately on Indian economy.

Since Make in India initiative was conceptualized in an environment wherein a global trade war situation was non-existent, it is imperative to analyse whether the overall and sectoral impact of Make in India may have been dented due to the ongoing global trade war, which has hitherto not been addressed in any empirical studies. This assumes significance due to the fact that Make in India program's positive measures may have a favourable effect on the industries and people at large in the longer term, while its protectionist measures may have an ambiguous effect.

In the above backdrop, our study explores the effects of Make in India and the global trade war in a combined way utilizing a dynamic applied general equilibrium analysis based on 2017 data utilizing the GDyn database. This is a unique attempt on two counts; first, we put together the details relevant for global trade wars and Make in India, which in itself is a fresh attempt; second, this is the first time to capture all these contemporary policies in an economy wide dynamic global modelling framework to analyse changes over 2018-2030.

The standard model has been modified to include the following:

1. A baseline or *status quo* scenario is developed, which is based on the standard macro assumptions on future GDP, population and labour force growth rates. The customised model develops and extends the database to a dynamic version (from standard static version) for GDP, population and labour force growth that enables us to predict changes in the macro variables until 2030 under the different scenarios.
2. The standard GTAP model consists of 59 countries/regions. The model, specifically developed for this study, aggregates countries/regions into 47 that disaggregates India and most of its trading partners. This helps us to analyse the effects on India's trade with a number of its existing FTA partners and with those with whom negotiations are ongoing or are planned.

3. The study aims to first analyse the *Macro effects*: GDP, Investment and Trade effects (Export, Import and Terms of Trade effect) from Make in India and Trade War, to understand the overall effect on the Indian economy. Further, sector specific Export, Import, Prices, Output and Employment (skilled and unskilled labour) effects for the chosen 14 Make in India (MII) sectors are analysed, based on their concordance with 20 GTAP sectors. Note that since GTAP sectors are more disaggregated than those announced under 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. Further, since investment promotion is one of the key proactive policies of MII, we also incorporate a policy shock of capital stock growth by 2% (based on 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 are therefore able to clearly demarcate the proactive and reactive impacts of MII by using subtotals to identify how much of output, trade, investment, jobs, are impacted by rising protectionism (reactive policy in MII), compared to the investment push (proactive policy in MII).

Our initial results based on the static model suggests that the combined impact of both policies, while being beneficial for the Indian economy as a whole, yields negative ramifications for exports, jobs and investment growth. Specific sectors are also unable to increase domestic output even in spite of Make in India, such as Chemical, Rubber and Plastics industries, and those that use it as raw materials, which has ramifications for India's trade integration with global value chains (GVCs).

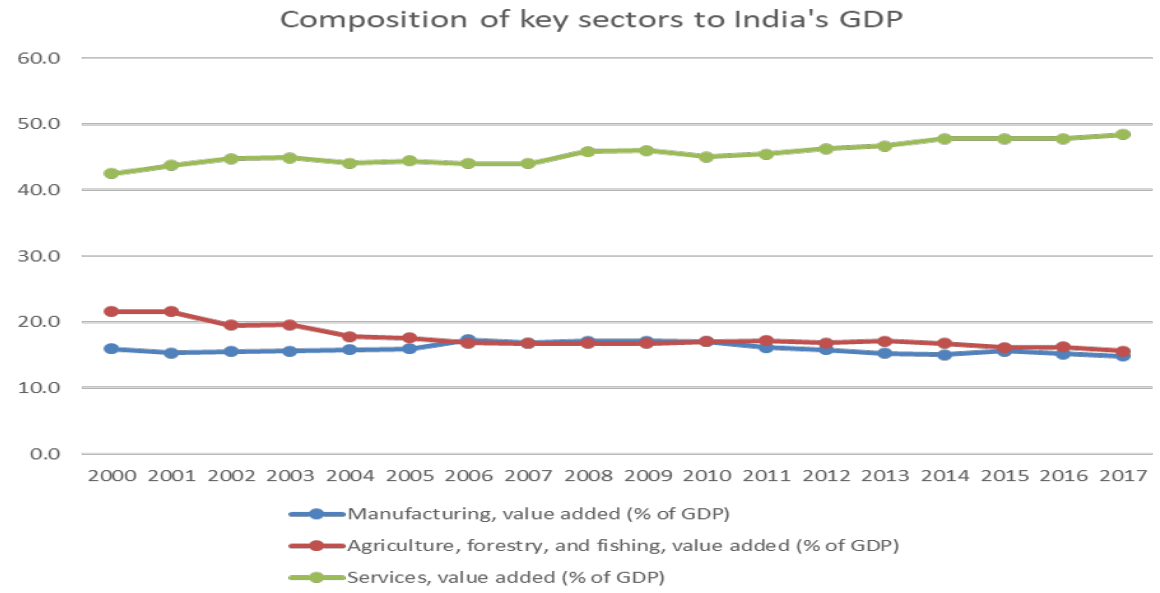
Keywords: Make in India, Dynamic GTAP model, Trade War

JEL Classification : F15, F61, O53

1. Introduction

India, currently the world's third-largest economy in purchasing power parity (PPP) terms as of 2018, is undergoing an economic transformation over the past few decades. Since economic liberalisation in 1991, its economy has grown at an average of 6-7% annually. Since 2014 with the exception of 2017, India's economy has been the world's fastest growing major economy, surpassing China. Notably, this growth has been achieved in presence of an increasing share of services as a % of India's GDP, and declining share of agriculture, concomitant with an almost stagnant manufacturing sector (% of GDP) ratio of been 16% on an average over 2000-2018 (Figure 1). Following the US-China trade war growth has faltered amid sluggish demand at home and weak investment. India's latest quarterly GDP growth dropped to a five-year low of 5.8%. The country has relied on domestic consumption to spur its huge economy, but spending has slowed sharply. India's central bank has cut rates four times and the benchmark rate currently sits at a near-decade low. More stimulus measures to boost the economy, which is also battling the threat of a widening trade conflict with the US, are expected this year. Banga (2013) argues that while manufacturing exports share has declined, that of imports have increased, an evidence of the hollowing out of manufacturing sector, and 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 manufacturing and services sector.

Figure 1



Source: The World Bank (2018)

To address this policy constraint, Government of India has conceptualized a Make in India initiative, its flagship industrialization strategy, since 2014. The aim of this is 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 objectives of this strategy is to enhance share of India's manufacturing in gross domestic product from 16% to 25% by 2022, creating 100 million jobs, besides boosting domestic and foreign investment, creating opportunities for skill development and innovation in this sector. The Make in India initiative has focussed on 25 sectors of the Indian economy for job creation and skill enhancement (See Figure 2).

Figure 2

Key Sectors of the Make in India initiative

Source : https://www.peoplematters.in/article/jobs/is-the-lion-moving-backward-hits-and-misses-of-make-in-india-program-18308

The above-mentioned initiative has two broad types of features. The first is 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 creation. The second involves protectionism against import competition for domestic manufacturing firms. The combined effect of these two features on the expected success of this programme has been ambiguous, partly because these are not very clearly laid out in one document but instead they have been captured by a slew of policy

measures and announcements over a period of the past four years. Some of them have been proactive while others have been reactive to global policies. The reactive policies have been mainly shaped in the last couple of years, in response to the global trade wars being triggered by the US tariff hikes in several commodities, some of them as recent as June 2019. While US and China have been captured global attention in the ongoing trade war, India itself has also been dragged into it by involving itself in tariff escalations with the US. Therefore, we may observe a link between the global trade wars and Make in India, though both of them have their own effects separately on Indian economy.

Since Make in India initiative was conceptualized in an environment wherein a global trade war situation was non-existent, it is imperative to analyse whether the overall and sectoral impact of Make in India may have been dented due to the ongoing global trade war, which has hitherto not been addressed in the empirical studies. This assumes significance due to the fact that Make in India program's positive measures may have a favourable effect on the industries and people at large, while its protectionist measures may have an ambiguous effect. On the other hand, the ongoing global trade war may affect India's trade positively or negatively because of the combination of adverse global supply shocks and trade diversions that positively favour India. UNESCAP (2018) is the only existing study that attempts to analyse it broadly for the Asia-Pacific region, but country and sector specific impacts on India are not analysed therein.This is also an important area of research gap to fill in because as of 2018, United States accounted for US$51.6 billion (16% of total Indian exports) and China accounted for $16.4 billion (5.1%) respectively, and were the 1st and 3rd largest export destination respectively for India.

In the above backdrop, our study explores the effects of Make in India and the global trade war in a combined way utilizing an applied general equilibrium analysis. This is our preferred approach here compared to the gravity models of trade, as our study analyzes a futuristic impact of both policies on the overall economy, and on specific sectors, thereby generating tariff barriers that simulate both situations, as well as attempting to simulate the expected investment boost from Make in India. Gravity models are more appropriate while dealing with past trends related to the impact of trade policy measures, and aren’t quite applicable to an economy-wide context. Since most general equilibrium studies that analyze trade policy impacts for India utilize the GTAP model and database, we do the same, by updating the model to 2017. This is 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 in itself 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[1].

The remainder of the paper is organized as follows. Section 2 presents a broad overview of the relevant literature on make in India, 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 section 6 provides policy implications and concludes the paper.

2. Literature Review

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 resultsshow that it is possible for a country to 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 special 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 determine retaliatory non-tariffs has since been a feature of the trade conflict literature. Abrego et al (2006), 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), Foreman-Peck et al (2007) explain what are 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 US. Bagwell and Staiger (2002) examine 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 maximise social welfare since they may receive contributions from interest groups.

The recent trade war between the US 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

[1] These include Narayanan et. al. (2019), Gilbert et. al (2018), Narayanan and Sharma (2016) and Hiro and Itakura (2014).

conflicts (Bouet and Laborde, 2018). More recently, Nicita et al (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 findingsare 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)the CGE model to examine the effects of increased protectionism mainly on US and China, especially in terms of trade and welfare reduction. These focused on economic effects in countries directly involved in the trade war and other potential targets, generally developed countries, such as the European Union, or countries geographically close to the US (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 a 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 global GDP in 2022 of about 1.96% and a reduction in global trade of 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 one hand, the trade war would lead to a reduction in 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. But, on the other hand, both countries and the world as a whole 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 important emerging countries, not directly involved in the trade war, would benefit by the shift in demand to sectors where they have comparative advantages.

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UNESCAP (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 their trading partners (3rd party economies) may be impacted by positive or negative spillovers. Positive spillovers for third party economies are generated due to market opportunities created by redirection of trade and investment, .e.g. Brazil filling in the blocked import demand for soybeans in China due to higher tariffs on US import of soybeans into China. This may generate terms of trade improvements if the loss of import demand because of trade wars decreases the global price level of their imports more than their exports (UNESCAP, 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 spilloverson even third party economiesdue to slowdown in global demand. These are 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 impact is likely to be a combination of a i) a direct impact due to tariff escalations with the US; and ii) an indirect impact due to US-China tariff escalations redirecting trade and investment flows between them.

3. Model, Data and Methodology

Our analysis utilizes an augmented version of the standard Global Trade Analysis Project (GTAP) model[2] and database (Hertel, 2017), that features sectoral and economy wide details

[2]The standard GTAP 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. The model 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 price of primary factors; at the second level, it involves a constant elasticity of substitution 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 determine the optimal mix of domestic and imported goods and only then decide the sourcing of their imports (Armington assumption); and at the third level, a constant substitution elasticity is assumed between inputs imported from different origins (Hertel, 1997).

for India, similar to UNESCAP (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 are linked with various economic activities. Second, the model estimates inequality by utilizing the differential between the growth rates of unskilled and skilled labour. Third, standard closures assumptions of full employment or sticky real wages are relaxed by introducing a 45-degree labour supply elasticity curve, ensuring both labour supply (employment) and real wages for India are endogenous in the model. This is consistent with the Monash model, and is well supported by econometric literature on labour supply elasticities, similar to UNESCAP (2017).

It is standard practice to use applied general equilibrium (AGE) models to analyse the likely impact of trade deals. 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 analysing the consequences of trade wars instead of any econometric techniques. The neoclassical theoretical foundations of AGE models explains 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).

In our model, investment grows based on the rate of return and this new investment is then 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. Our model does preserve all the standard features of the GTAP model -- 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.

In order 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. This gives us two time paths for each variable of interest: firstly, a path which shows how the

variable would change over time without the free trade agreement; and secondly, a path which 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 is based on the baseline developed by 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.

The economic impacts of Make in India and trade war policies are captured through: (a) changes in gross domestic product (GDP), output and trade flows for India; (b) the social impact is observed through changes in levels of inequality and employment. As in UNESCAP (2018), the model assumes trade balance 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.

The study simulates two policy modelling scenarios for Make in India, and the trade war. The first step in this direction is designing the policy simulation scenario for Make in India (hereinafter referred to as MII).

3.1 Make in India:Data and policy design

In order to ascertain the reactive policy impact of Make India involving protectionism on imports, 14 Make in India sectors were first identified, that concorded with 20 GTAP sectors. Note that since GTAP sectors are more disaggregated than those announced under 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).

Computation of Tariff for Make in India sectors: Government of India announced a list of 24 sectors 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 HS codes. Some Make

in India sectors like automobiles, aviation, pharmaceuticals, electrical machinery, railways, automobile components, renewable energy, and electronics systems that had one to one mapping with trade related two-digit HS codes (in this case 2012). The remaining sectors had more one to many mappings with the trade related two-digit HS codes; for example, as can be seen in table 1 for the chemicals sector, there were two two-digit HS codes that mapped to the chemicals sector. Then, average tariff of four-digit HS codes within the two-digit HS code was computed for each HS code. In the chemical example, average tariff for HS code 28 was computed using the individual tariffs of the four-digit HS code from 2801 till 2853 (for the Indian case). Similarly, average tariff for HS code 29 was computed. Tariffs of 28 and 29 were then averaged to give the tariff for chemicals sector. Make in India sector of textiles and garments had 14 two-digit HS codes mapping into it. Tariffs for 2017-18 were obtained from the Central Board of Indirect Taxes[3]& Customs, Department of Revenue, Ministry of Finance, Government of India.

The tariff shocks in our model are calculated as power of tariff shocks for 20 GTAP sectors for 46 trading partners, generating a total of 920 shock statements.

As anexample, 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 simply take the average values of AV tariffs across each sector before calculating the power shocks.

Table 1

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

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

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 is one of the key proactive policies of MII, we also incorporate a policy shock of capital stock growth by 2% (based on 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 are able to clearly demarcate the proactive and reactive impacts of MII by using subtotals to identify how much of output, trade, investment, jobs, are impacted by rising protectionism (reactive policy in MII), compared to the investment push (proactive policy in MII).

3.2 Global Trade war: Data and Policy design

This scenario attempts to model current tariff hikes by US and retaliations that have already occurred in 2018 (the "Implemented tariffs"), based on official notifications to the WTO. More specifically, 33 GTAP sectors, 11 individual countries (USA, China, Japan, Korea, Indonesia, India, UK, Turkey, Canada, Mexico and France) raised their tariffs against each

other, with tariff escalation rates ranging from 10% to 140%[4]. We also attempt to further model the impact of all tariff escalationsthat include the abovementioned "implemented" as well as threatened tariffs, mentioned in the concerned economies' official communications, not yet notified to WTO, but some of them are now either been, or on the verge of being implemented[5].

The detailed data sources for all official communications that incorporate tariff escalations as paper our policy scenario, is provided in Kravchenko et. al. (2019). Specifically, for India the tariff escalations are modelled on 18 May 2018 notification to the WTO. For the US, the data comes from USTR Documents including September 2018 Press release on finalizing tariffs on US $ 200 billion worth of imports from China.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, it is observed that tariff escalations as of 2018 involving the US took place across a number of 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 has been no tariff changes on 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, although highest tariff escalations are for non-MII agricultural products. Metal products including Aluminium and articles thereof, Automobiles and Auto-parts as well as Iron and Steel are MII sectors that face higher tariffs in 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 trade war involving India and the US in 2018

GTAP sector code	**Direction of escalation and Sector description**	***Escalated power of tariff*stms(%)**
	India's exports to US	
36	Metals, including Aluminium	50.0
38	Motor vehicles and parts	22.1
35	Iron & Steel	13.4

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

[5] 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.

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
	US 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.

Note : Power of tariffs in the GTAP database is likely to be higher or lower than the actual percent point increase in tariff escalations, so a 50% value of *tms* more likely represents a very high tariff escalation of 100% or beyond.

Based on the above, we analyse results for 3 key 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 3 scenarios, from the baseline year of 2017, our model estimates overall economicimpacts from each of these policy changes. The economic losses or benefits, and any estimated sectoral impact 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 analyse.

In our model, similar to that in GTAP, any changes in tariffs (due to Make in India and/or trade war) affects 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 commodity 'i' from region 'r' to region 's':

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

Tariff induced changes in bilateral import prices, affects 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 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 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 analysed as follows. Changes in total output affect sector demands for primary factor composite good *j*used in 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 output 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

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 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 contribute to a US $ 4.2 billion gain in terms of welfare, translating to 0.25% in terms of real GDP. However, the reactive policies hurt

the overall growth of trade, with exports growth is estimated to decline by 1.5% and imports by 2.9%. As tariff barriers also affect imported intermediate inputs growth, which also negatively affects investment growth.

The above changes due to Make in India policies can be analyzed through the following economic mechanisms that works in our CGE model. First, there are "allocative losses" where governments collect more tax revenues. Second, there's a large "endowment gains" 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 affects 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 favorable outcome of improving real trade balances by US $ 19 billion.

It is therefore evident that MIIpolicies would have had a more favorable impact on the Indian economy if reactive policies of protectionism were avoided, but that may 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. The results are presented 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

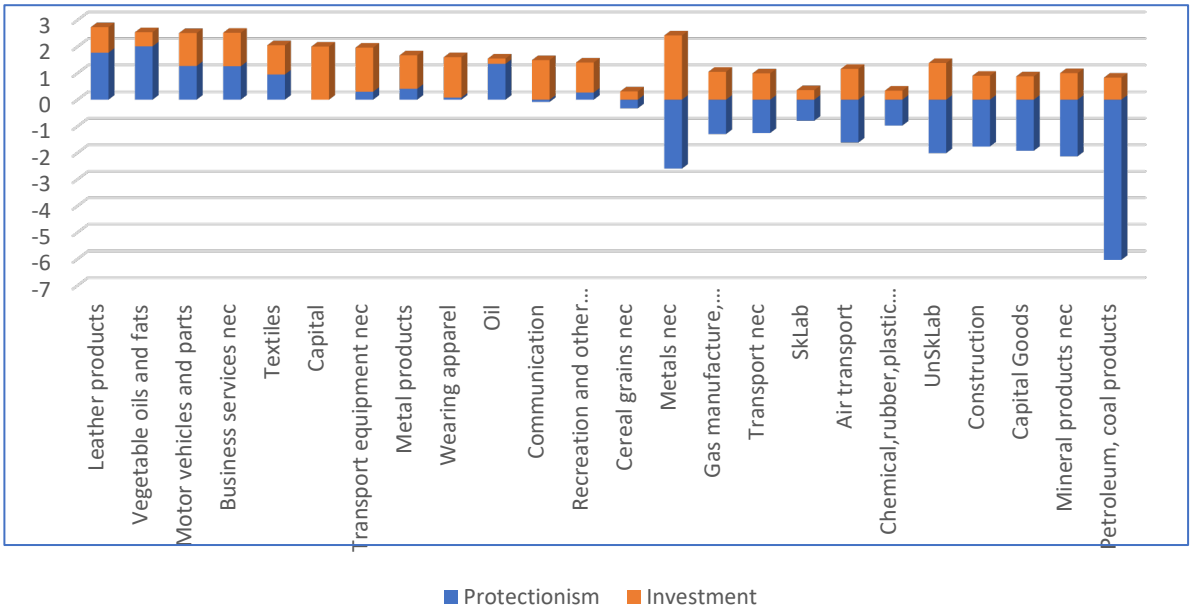
21	*Vegetable oils and fats*	2.53	36	Metals nec	-0.18
38	*Motor vehicles and parts*	2.52	44	Gas manufacture, distribution	-0.23
54	Business services nec	2.52	48	Transport nec	-0.26
27	*Textiles*	2.05		Skilled Labour (fop)	-0.43
	Capital (fop)	2	50	Air transport	-0.45
39	*Transport equipment nec*	1.97	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. The results are reported for the combined proactive and reactive effects of the policy.

It is noted 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 is the only MII linked sector to experience a negative output growth of -0.6%. As per Table 1, a decline in output in this sector is likely to directly affect Chemicals, Pharmaceuticals 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 positive domestic output growth compared to the reactive protectionism, in two MII sectors, Textiles and Garments, as well as 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). Reactive elements of Make in India are also observed to be contributing to the decline in output of GTAP MII related sectors (most notably, Chemicals) (Figure 2)

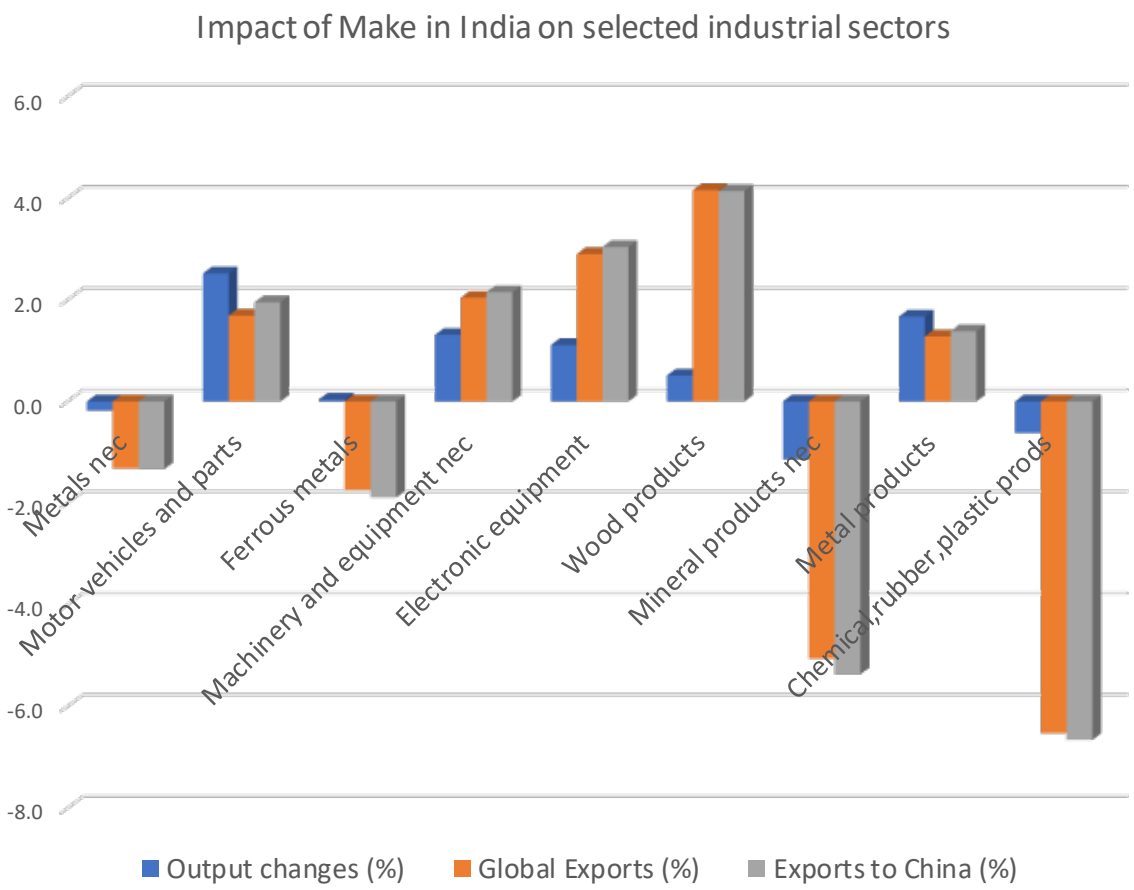
Figure 2
Contribution of Investment and Protectionism shocks to domestic output changes due to Make in India (%)



Source: Author's calculations based on policy simulations.

In order 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 3



Source: Author's calculations based on policy simulations.

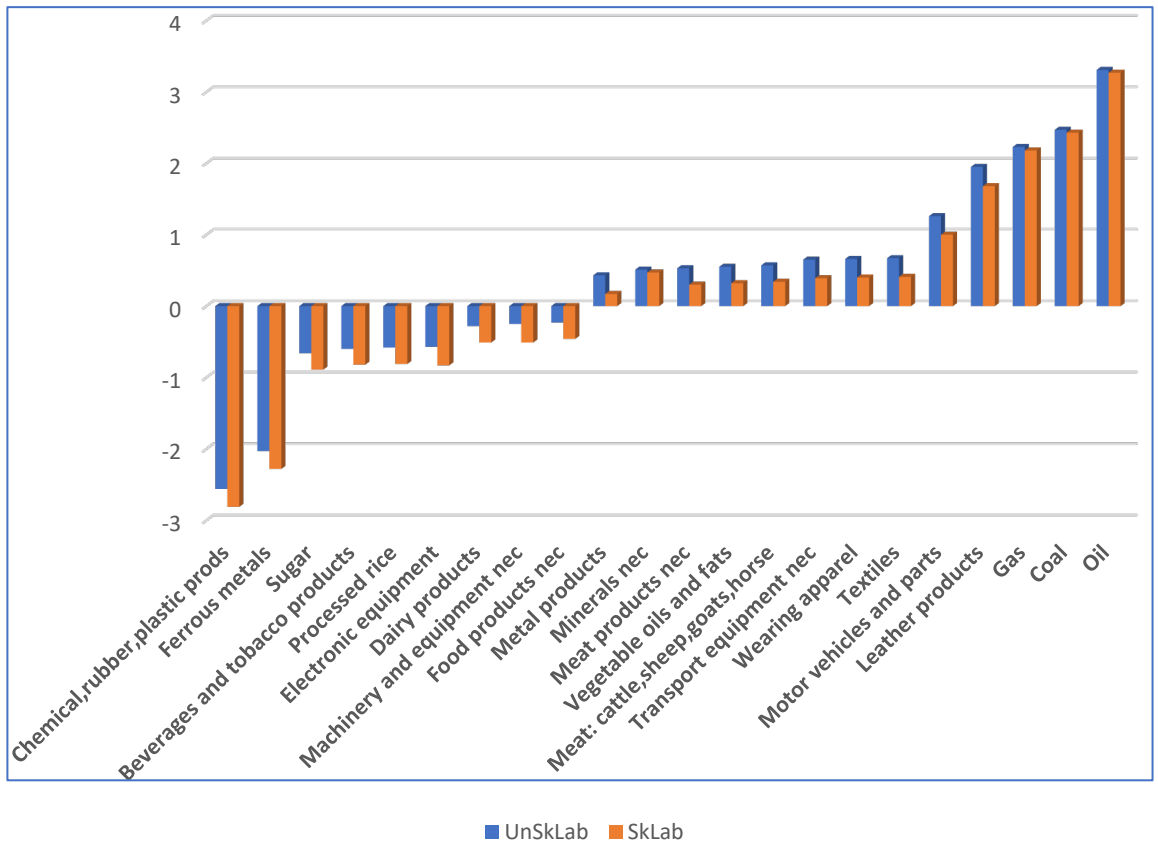
It is observed that in the absence of a trade war, MII has a significant negative impact on Chemical Rubber and Plastics industry in terms of falling output as observed also in Table 4, that reduced its global exports growth by - 6.5%, and also specifically to China[6]. Mineral products also suffered a negative output growth of -1.1%, reducing its exports to China, and to US, by about -5%. A similar trend but at a smaller scale was observed for metals n.e.c sector. It is also noted that Iron and Steel (Ferrous metals sector), does not witness an output decline, but its exports to China and the US, also 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 a higher export growth of these industries globally, and to China and other major trading partners[7].

[6] A similar decline was noted for India's exports to the US in this sector.
[7] A similar trend is noted in these sectors for exports to the US.

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[8]. These constitute both the proactive and reactive policy shock effects.

Figure 4
Sectoral employment effects : Make in India (MII) (%)



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

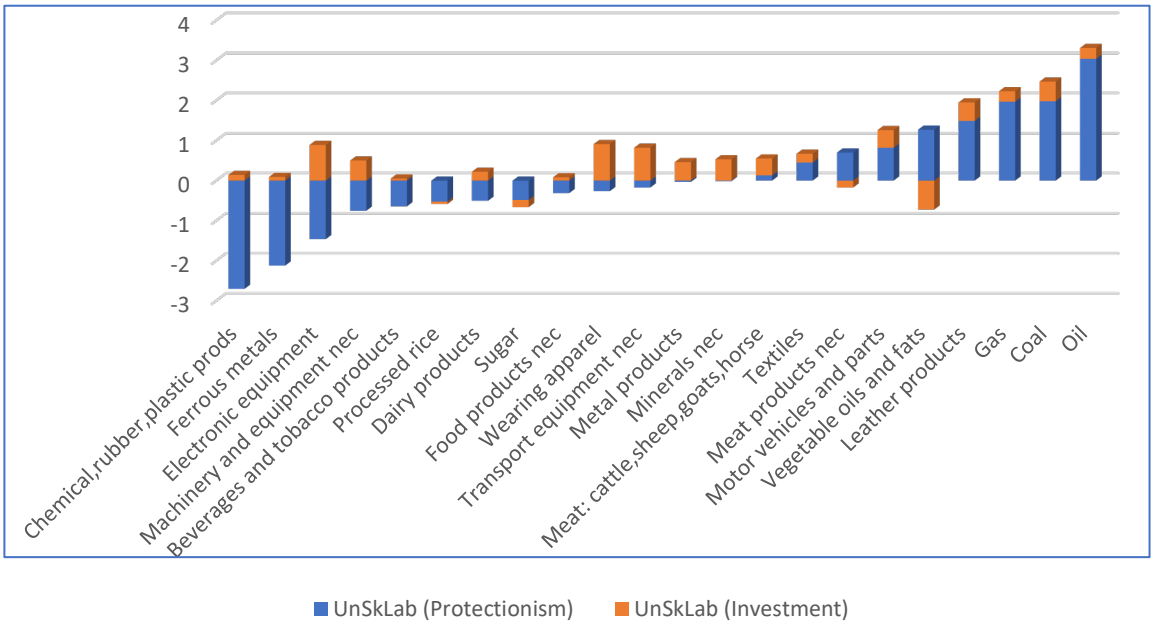
It is observed that 9 out of 22 MII related sectors suffer job losses in both skilled and unskilled labour, which includes Chemical, rubber plastic products, Iron and Steel, Food processing, and Electronic equipment industries. The ones that gain jobs the most are mining and Extraction (of Coal, Oil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

Notably, the sectors that experience the greatest decline in jobs due to this policy are not MII sectors, but important Heavy manufacturing industries involving production of Petroleum, coal

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

and mineral products, as well asGas manufacturing and distribution services[9].Figure 5 further disaggregates the contribution of protectionism and investment shocks in unskilled labour employment in MII sectors, and confirms 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 sectors such asmining and extraction (of Coal, Oil and Gas), Automobiles and Transport equipment, and textile industries.

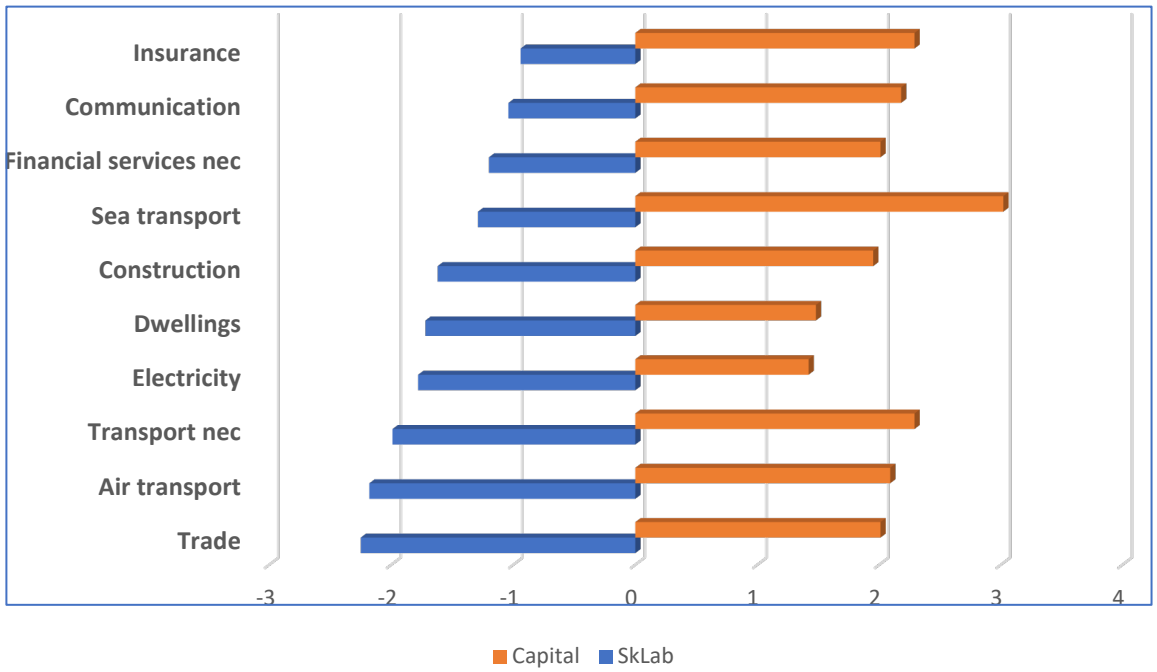
Figure 5
Contribution of Protectionism and Investment shock in MII sector unskilled labour employment changes (%)



There is also an evidence of job losses across the service sector due to MII, with technological changes due to capital infusion prompting substitution from labor to capital (Figure 6).

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

Figure 6
Employment effects on Services sector due to MII (%)



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

An important caveat is in order while interpreting these results. Demonetization 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 our static model. Any subsidy impacts have not been evaluated under MII in this scenario (schemes that include 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.

As per our understanding, there is no scholarly review of the MII policy, however, our results seem to be in line with the business media commentary that MII at its best, if at all, seems to have had marginal impact on the economy, which is not visible in the economy.

4.2 Global Trade War

Table 5 presents the estimated effects of the ongoing global trade war on the Indian economy, and confirms 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. Asexpected by theory,

reactive policies of protectionism through tariff barriers in a trade war hurts export growth, increasing imports, thereby improving the trade balance. The overall impact of Trade War contribute to a US $ 7.5 billion gain in terms of welfare, translating to 0.06% in terms of real GDP[10].

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

The trade war effect can be analyzed through the following economic mechanisms that works in our CGE model. First, there are "allocative losses" where Indian governments collect more tax revenues on US imports due to the specific tariff escalation involving US-India trade. Second, the "endowment gains" result for higher economic activities, whichleads 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. This implies that for India, export prices rise more than import prices. This is observed 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. This implies that import prices fall for India, benefitting both consumers and intermediate producers there. Second, from India's perspective as an exporter, since it is not blocked by increasing tariffs to all other markets except for the US, 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 latest "threatened" tariffs are modelled.

4.2.1 Sectoral output effects

[10]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 US $ 7.2 billion, and exports growth down by 1.03%.

Since the trade war is expected to affect export growth, it is likely to also impact adversely on domestic output growth, especially at sectors that have witnessed initial tariff escalation between India and the US (Table 2). We next analyze the output changes on those sectors due to the global trade war, focusing on the initial tariff escalations in 2018, and ascertain whether decline in output also contributed to a decline in their exports to the US. 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 US**	**Power of tariff shocks (%)**	**Output changes (%)**	**Growth in exports (to 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
	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

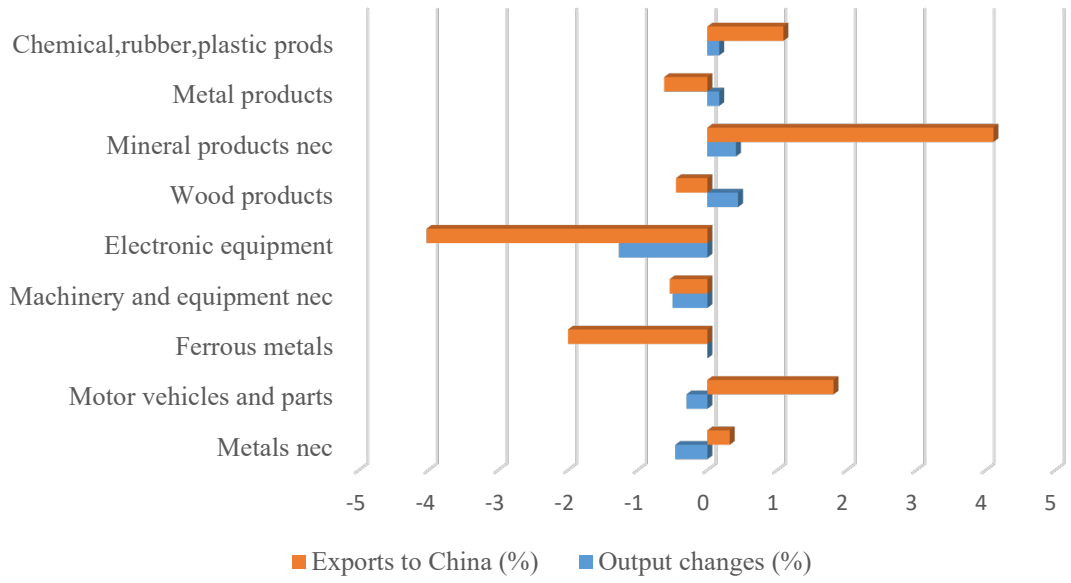
39	Transport equipment nec	1.1	-0.53	-1.21

Source: Author's calculations based on policy simulations.

It is observed that the top 5 sectors that involved tariff escalation from India to US due to trade war also suffers losses in domestic production, and with the exception of electronic equipment and parts, the domestic sector production losses also translate into decreased export growth from India to the US. In particular, 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 barrier equivalent from 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 experiences a tariff escalation in the US market, expands their domestic output by 0.4%, and also increases their exports growth to the US market.

In order to ascertain whether trade war also affected exports growth to China in the sectors that witnessed a 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

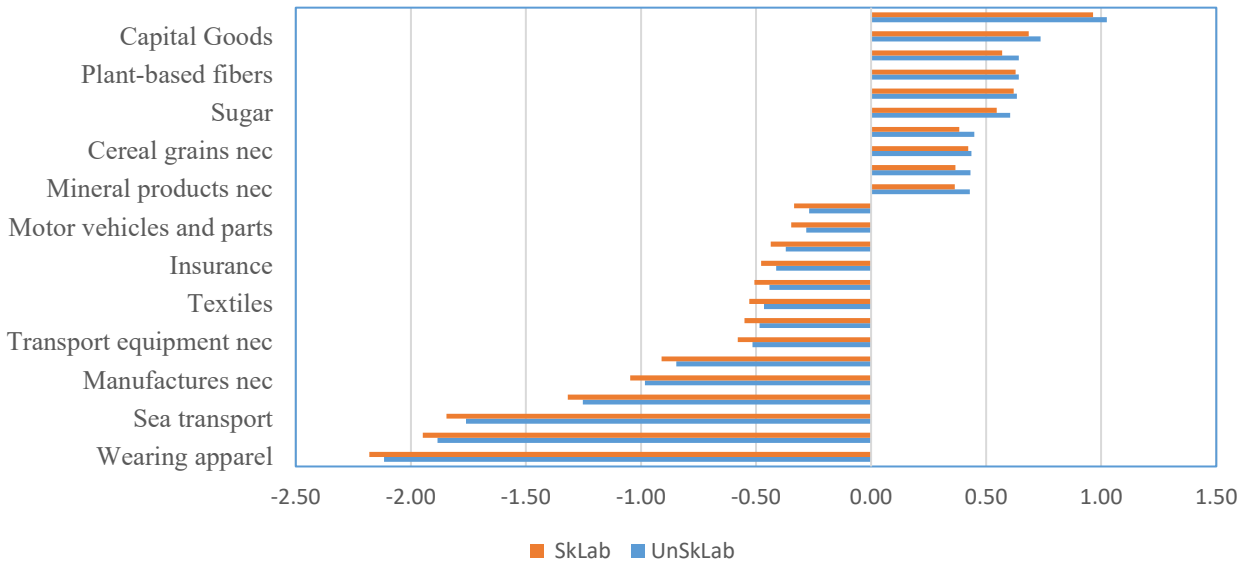
Notably, mineral products, metals as well as motor vehicles and parts are the key industrial sectors wherein bilateral exports between India and China grow in spite of decline in

domestic production, suggesting a positive terms of trade effect in these sectors vis-a vis China. Ferrous metals as well as electronic equipment and parts exports to China does fall with fall in output growth in India, suggesting these sectors affect growth of India-China exports growth adversely, in spite of 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 exports growth of key sectors that involved bilateral tariff escalation between India and the US. This is further confirmed 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 sectors wherein output falls, as well as rises due to trade war, do not involve a direct tariff escalation based on Table 2, but are key inputs to some of those sectors, especially in services.

4.2.2 Sectoral employment effects

Figure 7 presents the estimates for changes in unskilled and skilled labour use to the trade war based on our policy experiment[11].

Figure 8
Sectoral employment effects: Trade War (%)



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

It is observed that due to the trade war and tariff escalations involving India and the US, job losses in both skilled and unskilled labour is expected in Apparel, Textiles, Automobiles and parts, as well as services inputs that go in these sectors including business services, sea

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

transport, insurance etc. Those sectors that suffer largest output losses due to the trade war in Appendix 1 also happen to the ones suffering greatest job losses. Capital goods sector benefit 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.

Notably, 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, with the exception of electronic, transport and machinery equipment, but notably these are also connected to intermediate goods trade and services links involving global value chains (GVCs). There is therefore an emerging evidence of trade war adversely affecting trade in global value chains and employment in those sectors.

4.3 Make in India and Trade War

Table 7 presents the estimated effects of the combined effect 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 tariff barriers both through MII and through thetrade war hurts export growth severely, also reducing imports growth but less than that of exports, resulting in an improved the 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[12].

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*

[12]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.

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 trade war and Make in India seems to override the proactive impact of investment expansion through the latter. Interesting result is that unexpected presence of a trade war does not reverse any macroeconomic outcome in the Make in India program, if anything , it contributes positively.

It is notable that Make in India would have had a more favourable impact if reactive policies of protectionism were avoided, but that may have adversely affect the export industries as imports grow faster than exports, reducing the trade surplus.

5. Policy Implications and Concluding remarks

As we have mentioned before an important caveat is in order while interpreting these results. Demonetization 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.

Make in India policies only will likely benefit the economy as a whole, but exports will fall more than imports, investment and employment will fall, with high tariffs affecting imported intermediate inputs and potential GVC sectors

Proactive policies of Make in India through investment push generate higher growth benefits, compared to a mix of proactive and reactive policies

Assuming the unexpected trade war was non-existent, Make in india only would also have yielded similar results - the exceptions being the extra negative impact on export growth added due to the trade war that leads to a net import growth, instead of a net exports growth

The present model does not include a range of other policies that are apart of Make in india, as well as any latest retaliations from China, so its impact may currently well be underestimated

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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