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Weaning away from China – Trade and Welfare Implications

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Abstract

Over the past couple of years import dependency on China has deepened and expanded globally. Incidences like supply chain disruption during COVID19 due to over dependence on single supply source, and countries' heavy reliance on Chinese imports—often termed the "China shock"—has garnered anxiety worldwide and forced them to make efforts to wean away from China. The weaning attempt started in 2018 when the US imposed additional tariffs on its imports from China. Gradually, the process of decoupling or weaning away from China, was adopted by other economies. Despite the motivation to move away from China, data shows that nations continue to depend increasingly on imports from China. In this study we empirically quantify the trade dependence on China and estimate the costs associated with weaning away from China using structural gravity model of trade. We find that lowering dependence on Chinese imports results in diminishing countries' propensity to export. Furthermore, general equilibrium counterfactual simulations show that if US progressively reduces import dependency on China, the welfare loss will be higher for the US as compared to that of China. The rest of the world will also suffer welfare losses owing to US' action to bar Chinese imports.

Keywords: *China, Decoupling, Import Dependency, Structural Gravity, Welfare, PPML*

JEL Codes: *F13, F14, F17*

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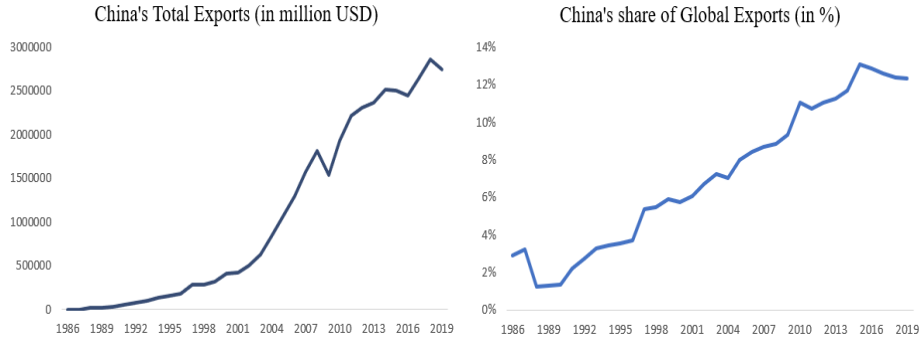
INTRODUCTION

China underwent a transformative shift from its inward-oriented economic approach to export-driven economy in the late 1970s, with Deng Xiaoping's market-oriented reforms (Baldwin & Di Mauro, 2020) that laid the foundation for its integration into the global market. This process was further bolstered by China's accession to the World Trade Organization (WTO) in 2001, a pivotal milestone that facilitated its deeper engagement with international trading system (Subramanian & Kessler, 2013). Subsequently, China aggressively pursued an export-promotion strategy, achieving astronomical growth in its exports, thereby solidifying its integration into the world economy. Over the years, its share of global exports expanded from just ~1 per cent in 1988 to an impressive ~13 per cent by 2019 (See Figure 1), firmly establishing China as a dominant player in the global market.

Figure 1: China's total exports and share of global exports from 1986 – 2019

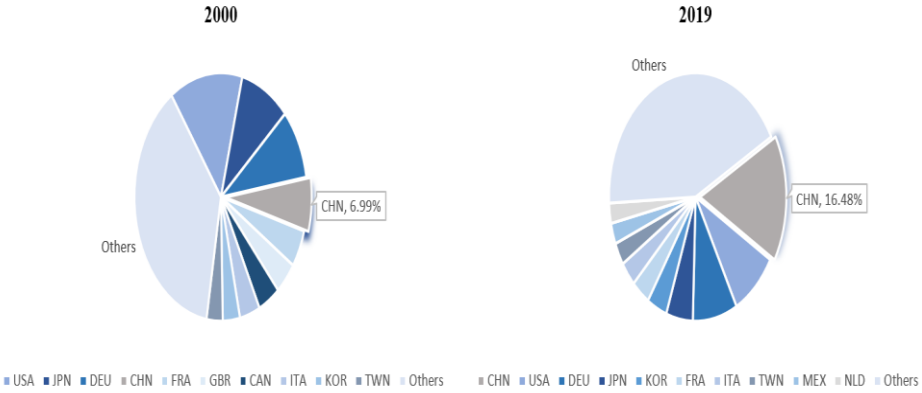


Source: Authors' analysis using ITPD-E data

The remarkable growth in Chinese exports has been predominantly driven by the consistent rise in its manufacturing exports. In 2019, the manufacturing sector accounted for over 95 percent of China's total exports. Furthermore, China's share in global manufacturing

exports rose from less than 7 percent in 2000 to 16.5 percent by 2019 (Figure 2). This transformation emphasizs the central role of manufacturing sector in China's export-led economic strategy, solidifying its position as a leading global trade player.

Figure 2: China's Share in World Manufacturing Exports in 2019

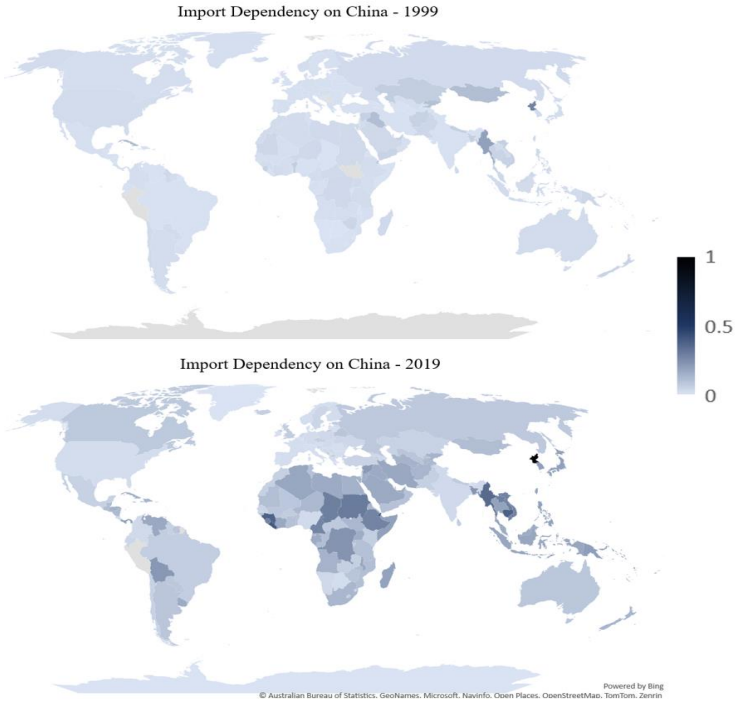


Source: Author's analysis using ITPD-E data

Additionally, as figure 3 illustrates, there is a considerable increase in countries' import dependency[1] on China between 1999-2019, globally. In other words, during 1999-2019, a growing number of nations have become significantly more reliant on Chinese imports. This dependency has not only deepened but also expanded geographically, reflecting China's diversified and global influence on international trade (figure 3).

[1] The calculation of import dependency is discussed in detail in section 2.

Figure 3: Import Dependency on China between 1999 and 2000



Source: Authors' analysis using ITPD-E database.

China's surging exports and the increasing reliance of countries on Chinese imports—commonly termed the "China shock"—have raised significant economic and political concerns, in the United States (Autor et al., 2016; 2021) and elsewhere. China's emergence as a key player in the global market has captured the attention of trade policymakers worldwide in recent years (Autor et. al., 2016, Autor, 2021; Malgouyres, 2017; Murray, 2017; Hayakawa et al., 2021) and resulted in great discomfort among the western economies, who are tenaciously aiming to decouple, or at least reduce their trade dependency on China (Farrell and Newman, 2020). Other major economies are also trying to diversify their imports, rather than being heavily relying on China for their import

requirement (Wyne, 2020). Notwithstanding, evidence suggests that the process of decoupling, particularly beyond the US, is measured and gradual (Oxford Economics, 2023).

In this context, the objective of our study is threefold. First, we empirically quantify countries' import dependency on China, enabling us to identify how trade dependency on China has evolved over time and across region. Second, using a structural gravity model, we examine whether countries' import dependency on China determines their propensity to export. The US started the trade conflict with China in 2018, whereby it imposed additional tariff on its imports from China. Gradually, the process of decoupling or weaning away from China, escalated by other economic and political imperatives, spread from the US to other advanced countries. The 47th President of the US, Donald Trump, assumed office with the promise to levy blanket 60 per cent tariffs on US imports from China (BBC News, 2024). In view of this, our third objective is to simulate a scenario where the US fully becomes independent from Chinese imports and investigate the resultant implications on overall trade, prices and welfare, in a general equilibrium framework, for China, US and the rest of the world (RoW).

The rest of the paper is organized as follows. The second section discusses the literature on "China Shock". This is followed by a rigorous discussion on the methodology and empirical strategy in section three. Section four gives a detailed overview of data sources and variable construction. In section five we present our results and findings. Finally, we conclude our discussion in section six.

REACTION TO CHINA SHOCK: WHAT LITERATURE SUGGESTS?

The "China shock" has generated considerable economic and political concerns both in the US and globally, prompting scholarly research on

the subject (Lyon and Pessoa 2021 Kiyota e. al. 2021). First, the anxiety around "China shock" stems from the perceived detrimental impact it has on economic dimensions – including the displacement of exports from less-developed Asian countries (Eichengreen et al., 2004), decline in manufacturing output in importing nations (Edwards & Jenkins, 2015), job losses, and depressed wages (Alvarez & Opazo, 2011; Edwards & Jenkins, 2015; Autor et al., 2016, Autor, 2021; Malgouyres, 2017; Murray, 2017; Hayakawa et al., 2021).

Additionally, China's trading partners are wary about its allegedly unfair trade practices and intellectual property theft (Staiger and Sykes, 2010; Dollar and Wang, 2018; Beckley, 2020; Lincicome et. al., 2020). China's rising current-account surpluses have been linked to its aggressive export-promotion strategy, which include maintaining a closed economy to foreign capital inflows and using central bank interventions to purchase surplus foreign currency, thereby ensuring a competitive exchange rate. These practices have fuelled scepticism among China's trading partners and intensified mistrust for China partners for creating an uneven playing field in global trade. The fierce export strategy adopted by China is also perceived as a national threat by many countries including the US. The US banned several Chinese technology companies from operating and exporting their goods and services to its market (Harrell, 2025). Similar steps have also been taken by the European Union (Vela and Moens, 2023).

Second, large part of the world heavily relying on China for trade makes many economies vulnerable to trade shocks. Any disruption in trade relationships—arising from economic or geopolitical shocks—severing critical supply linkages with China, could mean economic repercussions for dependent countries. This fragility was starkly exposed during the COVID-19 pandemic, which highlighted the risks of over

concentrated supply chains around China, particularly in the manufacturing sector. When Chinese factories shut down, manufacturers worldwide struggled to adapt, constrained by inflexible supplier bases and limited alternatives. This situation affirmed the need for greater supply chain diversification to enhance economic resilience. Further, China's threats to restrict rare earth exports have highlighted the import vulnerability of many countries relying on these critical minerals (Seah and Joshi, 2021).

Third, geopolitical factors are increasingly driving the global push to "de-risk" from China. Countries such as the US, the European Union (EU), Japan, South Korea, Australia, Canada, Taiwan[2], and others have voiced concerns over China's track record of economic coercion—leveraging economic tools to achieve political objectives and settling diplomatic scores (Storey, 2023). China's Belt and Road Initiative, involving around 140 countries worldwide, is a testament to China's expansion of economic and political dominance (Russel and Berger, 2020).

International actions are often influenced by commercial dependencies (Paterson 2022)[3]. This dynamic extends to China, where its growing influence over trading partners increases its ability to pressure them into alignment with its strategic interests. For instance, in the recent United Nations resolution condemning Russia's invasion of Ukraine, where China abstained alongside a significant number of Asian and African nations, reflecting its capacity to exert political leverage over its trading partners (Paterson, 2022).

[2] For instance, heightened tensions over a potential conflict in the Taiwan Strait since 2018 have accelerated the urgency to diversify supply chains and reduce dependence on China (Storey, 2023).

[3] For example, Germany's initial hesitation to fully support Ukraine against Russia's invasion was arguably tied to its reliance on Russian gas.

China's expanding economic clout raises concerns about its ability to reshape global governance systems to favour its model of state capitalism, thereby reinforcing its economic hegemony (Paterson, 2022). As a result, the ongoing push for "de-risking" by Western economies is not solely an effort to ensure economic security. More critically, it also is a geopolitical imperative to preserve strategic autonomy in the face of systemic rivals like China (Saxena, 2024).

These concerns have prompted countries to adopt a range of policy measures to wean their economies away from China. The US has been at the forefront of these efforts, adopting a tough stance on trade with China. Under President Donald Trump (2014–2019), the US implemented a series of trade barriers targeting Chinese exports, igniting the US–China trade war. President Joe Biden continued and intensified these measures during his term, further escalating trade tensions. With President Trump's return to office, in 2025 trade tensions between US and China has further intensified. President Trump threatened to impose reciprocal tariffs on China including a few other economies (Shalal, et.al 2025).

Not just the US, other developed nations including the EU and Indo-pacific and Asian economies such as Japan, South Korea, India and Japan have coordinated efforts to pushback Chinese exports. For example, India chose to withdraw from the Regional Comprehensive Economic Partnership (RCEP), due to fear that RCEP would give the China-dominated bloc strategic leverage over the Indian economy (Choudhury 2019, Jena 2020). Another example is the formation of the Indo-Pacific Economic Framework as conscious effort by the US and its partners to reduce China's dominance in the Indo-Pacific region and bring down their economic reliance on China. There are multiple instances of anti-dumping investigations against Chinese exports (Lincicome et. al.,

2020). As per the WTO data on Anti-Dumping Investigations suggests, total 79 anti-dumping investigations were launched by different countries against Chinese products during 2024.

While geopolitical factors and economic motivations, such as trade diversification, have dampened the global appetite for Chinese exports, a critical question is: is weaning away China truly feasible? The pertinent policy consideration is fully grasping the consequences of reducing reliance on China in terms of trade and economic welfare. Given China's significant engagement in global trade, disruptions such as trade wars or other economic conflicts have far-reaching implications, extending beyond bilateral relations, potentially affecting global economic stability (Johnson et al., 2020). Moreover, there is not enough evidence to suggest that efforts to counter China's manufacturing dominance have not translated into diminished trade dependencies. On the contrary, these dependencies appear to be increasing, driven in part by China's growing subsidies to strategic industries (Paterson, 2022).

Storey (2023) notes that the decline in China's share of US imports since 2018 cannot be construed as evidence of successful decoupling. Instead, as Alfaro and Chor (2023) highlight, exports of Chinese goods and inputs to countries like Mexico and Vietnam have risen in areas where China has reportedly lost US market share, indicating a redistribution rather than a reduction of China's role in global supply chains. Bown (2022) finds US import of certain item from China amid trade war and decoupling attempt was higher than ever.

China's deep entrenchment in global trade linkages underscores the complexities of reducing dependency. For any nation, such an attempt to reduce dependency requires meticulous quantitative analysis to assess its impact on trade dynamics and economic welfare.

Policymakers must weigh the strategic benefits of diversification against the potential costs to global trade stability and economic growth. Our work is a step in this policy direction.

METHODOLOGY AND EMPIRICAL STRATEGY

To empirically quantify countries' trade dependency on China and evaluate the consequences of weaning away from China on countries' trade potential and welfare, we pose two research questions:

i. What are countries' import dependency on China and how it affects their propensity to export?
ii. What is the welfare implication for US, China and the RoW as US completely reduces its dependence on China?

Our research methodology is based on the structural gravity framework. In section 3.1, we discuss the theoretical foundations of structural gravity model. This is followed by specifying empirical gravity model, that helps get the partial equilibrium estimates of the impact of countries' import dependence on China on their bilateral trade, in section 3.2. In section 3.3, we elaborate the methodology to quantify the general equilibrium welfare effects of lowering trade dependency on China.

Structural Gravity Model: Theoretical Underpinnings

We use the following Armington-CES version of the structural gravity of international trade, operationalized by Anderson and Wincoop (2003) for our estimations as well as for the general equilibrium analysis:

$$X_{ij,t} = \frac{Y_{i,t}E_{j,t}}{Y_t}\left(\frac{t_{ij,t}}{P_{j,t}\pi_{i,t}}\right)^{1-\sigma} \quad (1)$$

$$\pi_{i,t}^{1-\sigma} = \sum_j \left(\frac{t_{ij,t}}{P_{j,t}}\right)^{1-\sigma}\frac{E_{j,t}}{Y_t} \quad (2)$$

$$P_{j,t}^{1-\sigma} = \sum_i (\frac{t_{ij,t}}{\pi_{i,t}})^{1-\sigma} \frac{Y_{i,t}}{Y_t} \quad (3)$$

$$p_{j,t} = \frac{(\frac{Y_{j,t}}{Y_t})^{\frac{1}{1-\sigma}}}{\gamma_j \pi_{j,t}} \quad (4)$$

Here, $X_{ij,t}$ denotes trade flows from exporter *i* to destination *j* at time *t*. According to equation (1), exports is a function of market size, ($\frac{Y_{i,t}E_{j,t}}{Y_t}$) and total trade cost ($\frac{t_{ij,t}}{P_{j,t}\pi_{i,t}}$), where $E_{j,t}$, is importer *j*'s total expenditure, $Y_{i,t}$ is the value of total production in exporter *i*, Y_t is the world output, $t_{ij,t}$ is the bilateral trade costs between trade partners *i* and *j*; and $\sigma > 1$ is the elasticity of substitution among goods from different countries. In our analysis, trade dependency on China will be used to approximate time-varying bilateral trade cost.

The structural terms, $P_{j,t}$ and $\pi_{i,t}$ appearing in equations (2)-(3) are the inward and outward multilateral resistance terms (MRTs), respectively. The inward MRT represents importer *j*'s ease of market access, whereas outward MRT represents exporter *i*'s ease of market access (Anderson and van Wincoop, 2003). MRTs capture how changes in trade costs between two countries affect consumer prices, nominal and real incomes, in each country (Anderson and Yotov, 2010; Larch and Yotov, 2016). Hence, MRTs help us translate partial estimates of how trade dependency on China affects countries' trade into general equilibrium effects on countries' trade and welfare.

$P_{j,t}$ and $\pi_{i,t}$ are unobserved and can be accounted for by country-year fixed effects (Yotov, 2012) when using panel data. Also, it is advisable to include country pair fixed effects (μ_{ij}) in gravity model as they absorb any observable and unobservable time-invariant bilateral determinants of trade costs, such as distance, common language, border,

colonial links, etc[4], thereby alleviating potential endogeneity issue, emanating from time varying bilateral trade policy variables (Baier and Bergstrand, 2007; Shepherd, 2021). Lastly, equation (4), where γ_j is the CES share parameter, is the market clearing condition, connecting trade and national income via MRTs.

One way to move from theory to empirics is to log-linearize equation (1). Since trade data is fraught with heteroscedasticity, ordinary least squares estimation (OLSE) of such log-linearized model can be biased and inconsistent. Further, OLSE disregards information pertaining to zero trade observations as log-transformation of these values are automatically dropped from the sample dataset, leading to sample selection bias. Therefore, we use Poisson Pseudo-Maximum Likelihood (PPML) method to estimate gravity models. The PPML estimator effectively handles the presence of "zero" flows and provides consistent estimates in the presence of heteroscedasticity (Silva and Tenreyo, 2006). Moreover, the PPML estimator provides consistent estimates in the presence of fixed effects (Anderson et al., 2015; Larch and Yotov, 2016).

Hence, the following exponential mean model becomes the empirical gravity model:

$$X_{ij,t} = \exp[\,\beta T_{ij,t} + \mu_{ij} + \pi_{i,t} + P_{j,t}]\, \in_{ij,t} \quad (5)$$

where $T_{ij,t}$ is time varying trade costs and is the $\in_{ij,t}$ error term.

[4] In effect, we are controlling for these gravity variables. However, we will not use them in the gravity model for identification.

Modelling Countries' Trade Dependency on China

We estimate the structural gravity model, equation (6), to discern the effects of countries' import dependency on China ($IMPDEP_{it}$) on their bilateral trade ($X_{ij,t}$). In this specification we have incorporated country fixed effects (π_{it}, φ_{jt}) and pair fixed effects (μ_{ij}) based on the theoretical foundations and empirical strategy discussed above.

$$X_{ij,t} = \exp\left[\alpha\{\log(IMPDEP_{it}) * INTL_{ij}\} + \mu_{ij} + \pi_{it} + \varphi_{jt}\right] + \in_{ij,t} \qquad (6)$$

Additionally, we use both domestic and international trade data. So, $INTL_{ij}$ is the dummy for international trade observation and it takes value one for international trade and value zero for intra-national trade. The interaction term, $\log(IMPDEP_{it}) * INTL_{ij}$, the main variable of our interest, represents the elasticity of trade flows with respect to import dependency on China and it varies across countries. This trade elasticity is not absorbed by the importer- and exporter- fixed effects due to the interaction term. Hence, the differential impact of reducing dependency on China on each country can be determined, even in the presence of fixed effects (Anderson and van Wincoop, 2003; Heid, Larch, and Y. Yotov, 2017).

We cluster standard errors in the panel regressions by exporter- and importer-year, as recommended in recent literature (Egger and Tarlea, 2015; Larch et al., 2017). In addition to estimating the baseline model for aggregate exports, we estimate equation (6) for sector wise exports, i.e., exports in agriculture, manufacturing, energy and mining and services. In order to understand, which region will be more affected by lowering dependency on China, we also do subsample analysis for following regions – Europe, South and East Asia, North America and Africa. This also serves a robustness test for our baseline model.

General Equilibrium Simulations

To quantify general equilibrium effects of reducing trade dependency on China on welfare, we rely on equations (1) – (4). In other words, theoretically, the estimates of MRTs from equation (4) are used to simulate changes in import dependency and capture the total effect it has on the equilibrium output prices[5] and subsequently on welfare.

To be more precise, bilateral trade costs emanating from changes in import dependency are translated into factory gate prices, $p_{j,t}$, via the MRTs. The factory gate prices, in turn, help determine the changes in nominal income $Y_j = p_j Q_j$, where Q_j is an exogenous endowment of country *j*'s product. Thus, the changes in the factory-gate prices and the MRTs, together, enables the calculation of the change in real income or welfare as change in term of trade (Anderson & Yotov, 2016):

$$\Delta W_j = \Delta \left(\frac{p_j}{P_j} \right) \tag{7}$$

Based on the Armington gravity model, equation (7) is the ratio of change in nominal income to change in consumer prices in country *i*, in response to a trade cost shock, i.e., the expression is nothing but change in welfare. For our counterfactual simulations, we consider the impact of shocks to the import dependency variable, defined as a progressive reduction in US import dependency on China, culminating in a complete elimination of this dependency. We analyze the resultant impacts on prices and welfare.

[5]For brevity sake, we have refrained from showcasing the price dynamics and only showcased the welfare implications. The graphs pertaining to changes in equilibrium prices as response to change in US dependency is available on request.

Mathematically, these shocks are defined using a new variable '*shock*' which takes values according to the following formula:

$$shock = \beta \, ln\left(\frac{IMPDEP'}{IMPDEP}\right) \quad (8)$$

If $IMPDEP' = IMPDEP$, the value of shock becomes 0. For a 1 percent decrease in $IMPDEP$, shock will be equal to $\beta \, ln(0.99)$. Similarly, for a 99 percent decrease in $IMPDEP$, shock will be equal to $\beta \, ln(0.01)$. Here β represents the coefficient of the $IMPDEP$ variable in the estimated gravity model. To run these simulations, we will take our estimated coefficients. The elasticities of substitution for different industries are borrowed from Aichele & Heiland (2018) estimates. The elasticities of industries under each sector are aggregated using geometric mean[6] to arrive at sector wise elasticities.

DATA

Data Source

Our main data source is ITPD-E dataset (Borchert et al. 2021) that contains information on annual international as well as intra-national flows at the sectoral level, covering trade in agriculture, mining and energy, manufacturing, and services. We use the second release of the ITPD-E, published in July 2022, containing information for 265 countries and 170 industries, including 17 in service industries (Borchert et al., 2022b). We consider 1999 to 2019 as the time period of our study since there two decades mark the period of exponential growth in Chinese exports, with the China's accession to WTO in 2001 (Subramanian & Kessler, 2013).

[6] Geometric mean is used instead of arithmetic mean because of the high variability and outliers which cause a positive bias in arithmetic mean.

Following Fraser (2021), we exclude observations with missing data assigned as zero in the ITPD-E but retain all true zero trade observations. This is to avoid misrepresenting potentially large true values for the missing data. Also, we use consecutive year data, as the use of consecutive data improves estimation efficiency and provides unbiased estimation (Egger et.al., 2022) of effects of trade policy, such as lowering dependency on China.

Import Dependency

To construct the measure for countries' trade dependency on China, we adopt the approach outlined by Lai and Anuar (2021), who define dependency as the reliance on economic transactions (imports or exports) that could be disrupted due to actions or unexpected events involving a trade partner. Specifically, a country's import dependency is measured as the ratio of imports from a trade partner to total imports. In our analysis, a country's import dependency on China is therefore, given by:

$$IMPDEP_i = \frac{M_{CHN,i}}{M_i}$$

where, $M_{CHN,i}$ and M_i represents country *i*'s imports from China and from all other countries, respectively. This measure of import dependency lies between 0 and 1. A country which is more dependent on China would have a higher share of its imports coming from China, and therefore have higher import dependency value.

Our calculation suggests that on an average, the overall dependence on Chinese imports grew by 46.27 percent between 2000-2019. The growth of import dependency has been consistently backed by growth in dependency in all broad sectors, with highest being in services sector, followed by manufacturing sector. Services sector

witnessed highest growth in import dependency on China, on the back of base year effect.

Further, as per table 1, over the years, North America and Europe have become the most dependent on Chinese imports, followed by South America and South East Asia. It may also be noted that the dependence on Chinese imports in the services sector came down for South America.

Table 1: Average Year-On-Year Change In Import Dependency between 1999-2019 Across Regions And Sectors

Y-o-Y Average % change (1999-2019)	Agriculture	Manufacturing	Mining & Energy	Services[#]	All sectors
Europe	4.35% (0.0033-0.0072)	9.13% (0.0105-0.0566)	0.75% (0.0021-0.0016)	28.11% (0.0002-0.0025)	16.34% (0.0093-0.0259)
Middle East	1.49% (0.0179-0.0159)	8.54% (0.0338-0.1599)	43.72% (0.0083-0.0278)	51.76% (0.00002-0.00001)	64.66% (0.0305-01176)
North America	6.09% (0.0046-0.0110)	10.06% (0.0134-0.0777)	35.97% (0.0074-0.0096)	6.00% (0.0005-0.0002)	18.47% (0.0127-0.0337)
South America	4.69% (0.0154-0.0125)	10.88% (0.0159-0.1089)	11.96% (0.0090-0.0075)	-5.29% (0.0004-0.00001)	28.43% (0.0134-0.0784)
South East Asia	4.52% (0.0654-0.1063)	7.84% (0.0637-0.2773)	5.77% (0.0316-0.052)	15.03% (0.0017-0.0154)	75.29% (0.0511-0.2014)
Africa	23.47% (0.0143-0.0510)	9.05% (0.0310-0.1652)	20.22% (0.0033-0.0216)	- (0.0055-0.0006)	63.51% (0.0178-0.1356)
Other	4.60% (0.0605-0.1123)	6.37% (0.0302-0.0852)	6.12% (0.0195-0.0370)	55.71% (0.0027-0.0029)	48.33% (0.0356-0.0764)
World	4.20% (0.0268-0.0487)	8.01% (0.0279-0.1258)	4.67% (0.0111-0.0225)	18.43% (0.0006-0.0034)	46.27% (0.0239-0.095)

Note: [#] Values for Middle East and South America not averaged for entire period due to zero values arising from limited services trade with China. Value for Africa cannot be calculated for the same reason. Values in parathesis show average of Import Dependency between 1999-2019 except for Services, where the range differs due to data availability

Source: Author's Calculation from ITPDE Database

Table 1 also establishes that China's manufacturing exports have a global reach, whereas its service sector exports are more regionally concentrated in Southeast Asia. In the agriculture and mining & energy sectors as well, Chinese exports have a fairly global presence. However, their reach is less extensive compared to the China's manufacturing sector, with a notably higher dependency observed in regions such as the Middle East, Southeast Asia, and Africa.

Summary Statistics

The summary statistics for the data is presented in table 2. Trade data in every sector is highly skewed. The dispersion of trade observations is widest in the aggregate trade data, followed by that in services trade, while the dispersion is lowest in agriculture as indicated by the standard deviations. Within sectors, services have the highest average followed by manufacturing. However, one must refrain from misinterpreting this finding. It may be noted that trade in services sector was high during 2000-2019. Consequently, the average for the service sector can be high due to the smaller number of countries trading in services sector, i.e., lesser trading pairs in service sector industries.

Import dependency has the highest average in the manufacturing sector (~0.09), followed by agriculture (~0.08) and mining & energy (~0.07). The difference between the magnitude of these averages is well in line with the fact that China is highly integrated in world trade in manufacturing sector, followed by agricultural and mining and energy sector (Table 2).

Table 2: Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min	*Max*
Summary statistics for aggregate import dependency and exports variable					
Import Dependency	4944	0.047	0.071	0	0.958
Trade	632667	2260.675	122663.1	0	26100000
Summary statistics for sector wise international trade data					
Agriculture					
Import Dependency	4097	0.024	0.077	0	0.925
Trade	291108	28.523	261.645	0	29566.09
Manufacturing					
Import Dependency	4870	0.075	0.09	0	0.965
Trade	615506	327.719	3529.962	0	323000
Mining and Energy					
Import Dependency	4723	0.016	0.065	0	0.932
Trade	244279	127.416	1321.839	0.00	103000
Services					
Import Dependency	3095	0.002	0.018	0	0.541
Trade	65718	928.156	4025.088	0.00	141000

Source: ITPD-E.
Note: i) Data on import dependency is summarized for 248 countries across 20 years; ii) Data on international trade is summarized for 46578 country pairs across 20 years

RESULTS: TRADE DEPENDENCY ON CHINA

Partial Equilibrium Estimates

Table 3 provides structural gravity estimates pertaining to the role of countries' import dependency on China on their bilateral trade flows, where trade flows are grouped into trade in agriculture, manufacturing, services and overall trade.

Table 3: Estimates of Impact of Import Dependency on China on Bilateral Trade Flows

Variables	Trade				
	Agriculture	**Manufacturing**	**Mining & Energy**	**Services**	**Combined**
INTL*log($IMPDEP_{ij}$)	0.401***	0.456***	0.265***	0.260***	0.375***
	(0.0251)	(0.0426)	(0.0571)	(0.0238)	(0.0297)
Constant	9.823***	12.18***	10.75***	14.90***	14.21***
	(0.0331)	(0.0541)	(0.194)	(0.0109)	(0.0237)
Observations	286,413	596,426	235,004	47,619	610,567
Pseudo - R^2	0.993	0.996	0.987	0.999	0.998

Notes: The estimates are obtained using PPML estimator, with country-time fixed effects and country-pair fixed effects. The estimates of all fixed effects are omitted for brevity and are available on request. All standard errors are clustered by country pairs and reported in the parentheses. *** p < .01, ** p < .05, * p < .1

The estimated coefficients of the import dependency variable quantify the costs of moving away from China and reducing import dependency on China. The exporting countries' import dependency on China has a positive and statistically significant coefficient in all broad sectors, which implies that if countries try to reduce import dependence on China, the bilateral exports, in general sense will fall. The magnitude of this decline in trade varies significantly across sectors, being highest in manufacturing sector, followed by agriculture. More specifically, reducing import dependency on China in a particular sector by 1 percent would reduce international trade in manufacturing sector by 0.46 percent, in agriculture by 0.40 percent, in mining and energy by 0.27 percent and in services sector by 0.26 percent. This finding reiterates the fact that countries across the world in heavily dependent on Chinese imports, especially manufacturing imports. Thereby, any small reduction in import dependency on China results in a reduction in countries propensity to export (Kireyev and Leonidov 2016, Miura, 2022).

Next, we present partial estimates for region wise subsamples– Europe, South and East Asia, North America and Africa – in tables 4, 5, and 7.

Table 4: Europe - Estimates of Impact of Import Dependency on China on Bilateral Trade Flows

Variables	Trade				
	Agriculture	**Manufacturing**	**Mining & Energy**	**Services**	**Combined**
*INTL*log(IMPDEPij)*	0.572***	0.355***	0.125	0.308***	0.243***
	(0.0469)	(0.0209)	(0.102)	(0.0257)	(0.0293)
Constant	9.344***	11.50***	9.669***	13.71***	13.28***
	(0.0803)	(0.0347)	(0.376)	(0.0186)	(0.0316)
Observations	86,458	166,672	80,866	36,839	168,266
Pseudo - R^2	0.990	0.997	0.988	0.998	0.998

Notes: The estimates are obtained using PPML estimator, with country-time fixed effects and country-pair fixed effects. The estimates of all fixed effects are omitted for brevity and are available on request. All standard errors are clustered by country pairs and reported in the parentheses. *** p < .01, ** p < .05, * p < .1

Table 5: South and East Asia - Estimates of Impact of Import Dependency on China on Bilateral Trade Flows

Variables	Trade				
	Agriculture	**Manufacturing**	**Mining & Energy**	**Services**	**Combined**
*INTL*log(IMPDEPij)*	0.594***	1.063***	0.436***	0.287**	0.947***
	(0.102)	(0.0779)	(0.155)	(0.117)	(0.0782)
Constant	10.86***	12.73***	9.855***	14.92***	14.30***
	(0.0527)	(0.0881)	(0.393)	(0.0234)	(0.0578)
Observations	44,753	80,182	36,551	2,616	81,114
Pseudo - R^2	0.997	0.996	0.986	0.999	0.998

Notes: The estimates are obtained using PPML estimator, with country-time fixed effects and country-pair fixed effects. The estimates of all fixed effects are omitted for brevity and are available on request. All standard errors are clustered by country pairs and reported in the parentheses. *** p < .01, ** p < .05, * p < .1

Table 6: North America - Estimates of Impact of Import Dependency on China on Bilateral Trade Flows

Variables	Trade				
	Agriculture	**Manufacturing**	**Mining & Energy**	**Services**	**Combined**
*INTL*log(IMPDEPij)*	0.701***	0.174***	0.449	0.364***	0.275***
	(0.147)	(0.0122)	(0.297)	(0.103)	(0.0916)
Constant	11.18***	13.74***	12.90***	16.22***	16.03***
	(0.280)	(0.010)	(0.404)	(0.0273)	(0.0387)
Observations	11,753	17,703	9,960	2,182	17,882
Pseudo - R^2	0.997	0.999	0.999	0.999	0.999

Notes: The estimates are obtained using PPML estimator, with country-time fixed effects and country-pair fixed effects. The estimates of all fixed effects are omitted for brevity and are available on request. All standard errors are clustered by country pairs and reported in the parentheses. *** p < .01, ** p < .05, * p < .1

Table 7: Africa - Estimates of Impact of Import Dependency on China on Bilateral Trade Flows

Variables	Trade			
	Agriculture	**Manufacturing**	**Mining & Energy**	**Combined**
*INTL*log(IMPDEPij)*	0.173***	0.467**	0.0421	0.320***
	(0.0311)	(0.200)	(0.0834)	(0.0778)
Constant	8.681***	8.538***	8.195***	9.895***
	(0.0283)	(0.300)	(0.339)	(0.106)
Observations	59,978	128,623	44,282	135,492
Pseudo - R^2	0.993	0.973	0.968	0.985

Notes: The estimates are obtained using PPML estimator, with country-time fixed effects and country-pair fixed effects. The estimates of all fixed effects are omitted for brevity and are available on request. All standard errors are clustered by country pairs and reported in the parentheses. *** p < .01, ** p < .05, * p < .1. Africa reported limited value for services trade. Hence, partial estimates for services sector could not be obtained.

As can be gleaned from the above tables, the estimates for partial elasticity remain robust across subsample analyses – a reduction in dependency on imports from China leads to lowering of countries' overall propensity to export. The susceptibility of trade loss is the highest for the South and East Asian region. Specifically, 1 percent reduction in import dependency on China results in 0.95 percent fall in exports of the South and East Asian region. In addition to being highly dependent on China for its export, Asia is deeply and intricately embedded in China-led Factory Asia.

In addition, the partial estimates are robust for all sectors, except in the mining and energy sector. The estimated coefficient of import dependency for mining and energy sector shows statistical significance only for South and East Asia, highlighting that this region relies on Chinese imports in this sector. In contrast, the import dependence of other regions on China in mining and energy sector is miniscule (see Table 1). Therefore, if other regions reduce their import dependency on China, it doesn't affect their propensity to export in mining and energy sector significantly.

It may also be noted that the estimated coefficient of import dependency is highest for agriculture sector in North America, implying that agricultural trade of North America faces highest consequences due to the change in import dependency on China. International trade for the manufacturing sector would reduce by more than 1.1 percent for all south and east Asia due to 1 percent decrease in import dependency on China. Mining & energy is the least affected sector by the change in import dependency. For the service sector, the estimated coefficient of import dependency is close to 0.3 percent in all regions.

In a nutshell, the results mirror the strong position China has in global trade network and the key role it plays in shaping global trade.

General Equilibrium Effects on Welfare

In this section, we translate the partial estimates into general equilibrium effects on welfare. The baseline year for the analysis is 2019 and the counterfactual experiment employs our pair-and-direction-specific estimates from the previous section to simulate a situation where the US reduces its dependency on China progressively. The values of elasticities, as borrowed from Aichele and Heiland (2018), for different sectors and corresponding estimated coefficients of import dependency are presented in the following table 8.[7]

Table 8: Sector-wise CES Elasticity and Coefficient of Import Dependency

Sector	CES Elasticities	Coefficients of Import Dependency
All Sectors	3.5	0.375
Agriculture	8.1	0.409
Manufacturing	4.3	0.455
Energy and Mining	10.35	0.263
Services	5	0.268

Note: Elasticities are from Aichele & Heiland (2018). Coefficients from authors' analysis

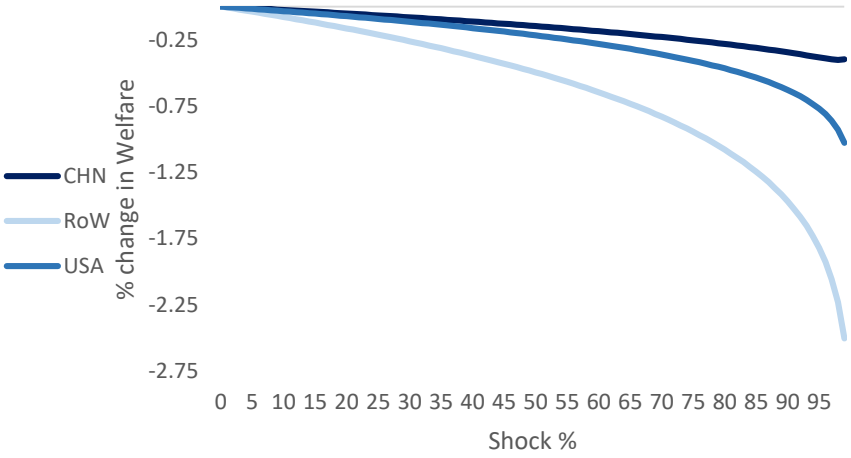
The counterfactual graphs presented below depict the potential effects of reduced US dependency on China on real income i.e., our economic welfare measure for all the broad sectors as well as for the

[7] Before running the counterfactual simulation, we need to construct a square dataset. Square dataset implies that for every observation measuring trade from country A to country B, we should have another observation measuring trade from country B to country A. Furthermore, we need to have non-zero intra-national trade observations for all the countries in the dataset. This is because while running the simulation, solving the model requires a positive definite square trade data matrix. In our dataset, we created a square matrix replacing missing values (non-existent trade between two countries) with zero. Additionally, zeroes in intra-national trade are replaced by 0.0000000001. This value of intra-national trade is negligible and enables running the counterfactual simulation without significantly changing the simulation output.

overall economy. These impacts, calculated using the methodology detailed in section 3, are shown across broad sectors – agriculture, manufacturing [8], mining and energy[9], services and aggregate trade (i.e., all sectors combined), affecting the US, China, and the RoW[10]. The analysis covers reductions ranging progressively from 1 percent to 99 percent[11].

Figure 4: Counterfactual Analysis: Welfare Effects of 0%-99% reduction of US import dependency on China

All Sector Combined



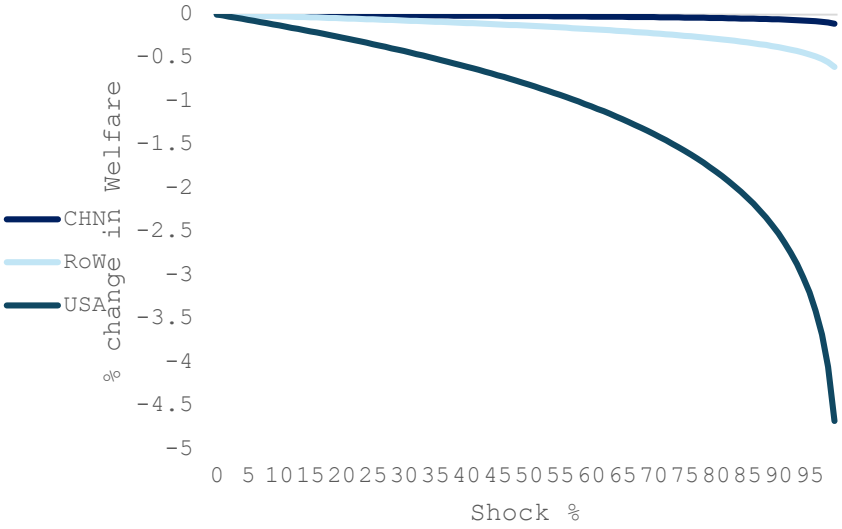
[8] RoW line for Welfare graph is calculated without Tokelau. Values for Tokelau are highly positive and doesn't fit this graph's range.

[9] No RoW line put for Welfare graph. We have put Russia to show increase in its welfare as a substitute to China as an energy exporter. Many Middle Eastern and other countries show welfare increase in very high ranges, which can be due to high CES elasticity in Energy and Mining sector.

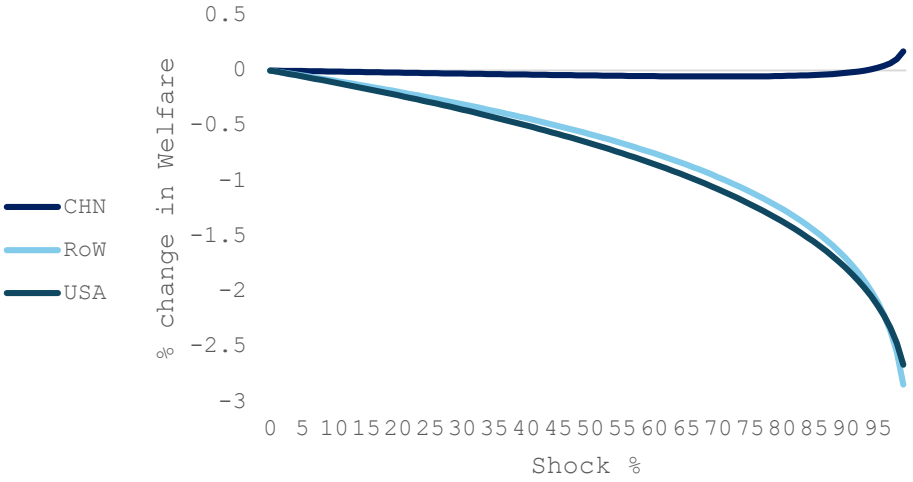
[10] For brevity, we have only reported welfare values for the RoW rather than effects on individual countries, where RoW is the average for all countries in the world. See appendix for top gainers and losers as the US reduces dependency on China. The estimated impact on individual countries' real wages, prices and welfare are available on request.

[11] We have excluded the scenario of a 100 percent reduction to simplify the calculations. Mathematically, a 100 percent reduction corresponds to a shock coefficient, which is undefined. Nonetheless, a 99 percent reduction serves as a practical approximation of near-complete elimination of US dependency on Chinese imports.

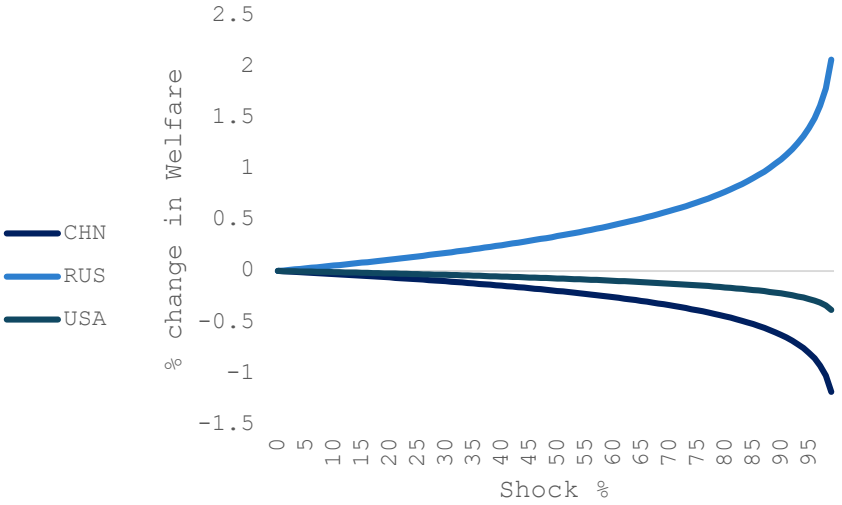
Agriculture



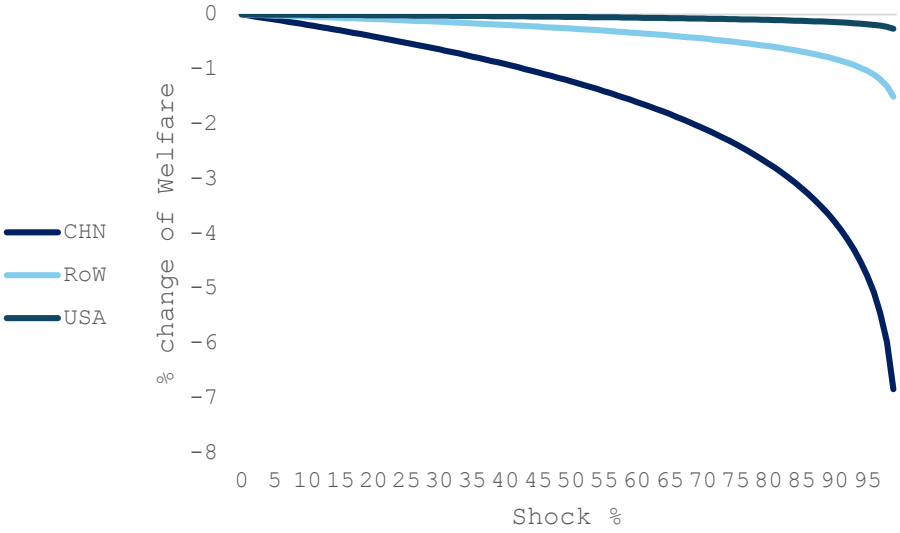
Manufacturing



Mining and Energy



Services



As expected, the reduction of US import dependency on China has significant detrimental economic impacts on both US and China, as illustrated in the first chart of figure 4. This shift results from higher costs for US consumers as well as US' importing firms, who must pay more for same imports, either for consumption or for production purposes, sourced from alternative suppliers. In other words, welfare loss for US arises from possible loss in consumers' and producers' real income. For China, a substantial amount of export earnings plummets as it loses the US market, with US weaning away from China. Consequently, aggregate real income declines in both nations as the US moves away from reliance on Chinese imports (Amiti et al., 2019; Bown, 2021; Cavallo et al., 2021; Chang et al., 2021; Fajgelbaum et al., 2023; Flaaen et al., 2020).

Surprisingly, the welfare loss for US is higher than that for China, should US completely reduce import dependency on China. This is intuitive because China is able to find alternative markets for its exports and somewhat hedges its welfare loss. Also, a study by Nicita (2019) suggests that the Chinese firms have started absorbing part of the costs of the tariffs, levied as a measure to reduce dependency on China, by reducing the prices of their exports, thereby preserving its export market. The US, prime proponent of weaning away from China, has been negatively affected by its decupling measures. Raising tariffs on intermediate goods from China negatively affected the output, employment and exports of US downstream industries. These impacts are especially strong in the US downstream industries that rely on China for those targeted intermediate inputs (Zhou, 2023).

RoW doesn't remain unscathed and faces a steepest decline in economic welfare in the scenario where US steadily reduces its reliance on Chinese imports. The welfare loss accrued to RoW could be a resultant of many forces driven by changes in world process. First,

countries still dependent on imports from China could be subjected to price volatility as China is compelled to adjust its export prices in response to losing the US market. While consumers in the RoW may benefit from cheaper Chinese goods redirected from the US, domestic producers will face stiff competition due to deluge of Chinese goods in the Row, leading to a loss in producers' welfare (Das, 2025). Second, if China's growth slows due to lower exports earnings, demand for consumer goods from countries in Asia, Africa and Latin America and capital goods from countries such as Germany and Japan will take a hit. This will severely affect the global exporters, adding to the welfare loss for the RoW. Finally, the US will face inflationary pressures as it substitutes Chinese imports with high-cost alternatives, prompting US to raise interest rates. This will have spillover effect in the financial markets of the Row and subsequently on welfare (Leibovici and Abiakalam 2024).

Sector wise welfare analysis reveals that, in the manufacturing sector, US' lowering reliance on China will amount to substantial loss for the US and the RoW rather than it is for China. In agricultural sector as well, we find the highest loss in welfare accrues to the US.

In mining and energy and in services sector, China suffers welfare loss as compared to the US and the RoW with US' reduction of trade dependency on China. The decline in economic welfare is particularly steeper in services sector for China. China has dominated world trade on the back of manufacturing exports and it depends on the US for its services exports. In other words, the US is China's main market for its services exports.[12] Hence, whatever little China may be exporting in services is squeezed, China is likely to suffer a welfare loss in that

[12] Our calculations using ITPD-E data suggests that US is the second major importer of China's services, closely following Hong Kong.

sector. Nonetheless, this loss is not so much as to reduce China's overall welfare loss, since overall welfare loss is represented by a flat line.

Interestingly, in mining and energy sector, Russia seems to emerge as an alternative substitute to China and gains in welfare in this sector. This helps buoy welfare losses of the US and the RoW as US weans away from Chinese imports in mining and energy sector.

The results highlight the interconnected nature of global trade, which operates through value chains spanning multiple borders. Consequently, a typical "Chinese product" imported by the US contains significant value-added from other countries, including US firms operating in China and suppliers, particularly in Asia. This is reflected in the recent rise in exports from countries like Vietnam and Thailand to the US, which use Chinese goods as inputs (Kwon, 2022). Thus, efforts to reduce US import dependence on China through higher tariffs would not only harm the economic welfare of both the US and China but also cause collateral damage to RoW.

CONCLUDING DISCUSSION

China's surging exports, ever since China's accession to the WTO in 2001, and the increasing dominance in global trade network, especially in manufacturing, have raised significant economic and political concerns, in the United States and elsewhere. Over the past couple of decades import dependency on China has deepened and expanded globally. Countries' heavy reliance on Chinese imports—often termed the "China shock"— has garnered anxiety worldwide due to perceived detrimental effects it has on various economic and political dimensions.

The supply chain disruption in the COVID-19 pandemic revealed the worlds dependence on Chinese supply. As Chinese companies had to shut down their plants during lockdowns, a lot of companies around the world had to halt their operation due to shortage of raw materials. As many modern supply chains run through China and the country provides resources for key technologies, policymakers and companies are finding alternative suppliers and production bases.

Economic and geopolitical factors are increasingly driving the global push to decouple from, or at least reduce import dependency on, China. China's deep entrenchment in global trade gives rise to complexities of reducing dependency. For any nation, such an attempt to reduce dependency requires meticulous quantitative analysis to assess its impact on trade dynamics and economic welfare.

The US started the decoupling attempt with China in 2018, whereby it imposed additional tariff on its imports from China. Gradually, the sentiments of decoupling or weaning away from China spread from the US to other advanced countries. President Donald Trump is assuming office in 2025 with the promise to levy blanket tariffs on all US imports from China. In view of this, we examined the welfare losses, in a general equilibrium framework, accrued the US, China and the RoW, simulating scenarios where US progressively reduces its import dependency on China to completely eliminating Chinese imports.

Our calculations using the ITPD-E data reveals that on an average, the overall dependence on Chinese imports grew by 46.27 percent between 2000-2019, backed by rise in dependency in all broad sectors. China’s manufacturing exports have a global reach, whereas its service sector exports are more regionally concentrated in Southeast Asia. In the agriculture and mining & energy sectors, as well, Chinese

exports also have a fairly global presence. However, their reach is less extensive compared to the China's manufacturing sector, with a notably higher dependency observed in regions such as the Middle East, Southeast Asia, and Africa.

Our structural gravity model analysis lends statistical evidence that countries' import dependency on China has a significant positive impact on their propensity to export. By implication this means if countries try to reduce import dependence on China, the bilateral exports, in general sense will fall. The magnitude of this decline in trade varies significantly, though, across sectors, being highest in manufacturing sector, followed by agriculture. Region-wise analysis shows that susceptibility of trade loss is the highest for the South and East Asian region, especially in manufacturing and mining and energy sectors. North America has the highest negative effect on trade in agricultural sector due to the change in import dependency on China.

Finally, our general equilibrium welfare analysis supports that reduction of US import dependency on China has significant detrimental economic impacts on both US and China. This loss in welfare emanates from higher costs for US consumers as well as US' importing firms, who must pay more for same imports sourced from alternative suppliers. China, on the other hand, loses export-led income, with US weaning away from China. Nonetheless, the welfare loss for US is higher than that for China as China is able to find alternative markets for its exports and somewhat hedges its welfare loss. It is, however, the RoW that faces a steepest decline in economic welfare in the scenario where US steadily reduces its reliance on Chinese imports leading to price uncertainty, stiff export competition, inflationary pressures and slowdown in global growth.

Sector wise welfare analysis shows that in manufacturing sector, lowering dependence on China will amount to substantial loss for the US and the RoW rather than it is for China. In agricultural sector as well, we find the highest loss in welfare accrues to the US. In mining and energy and in services sector, though, China suffers substantial loss as compared to the US and the RoW with US' reduction of trade dependency on China. The decline in economic welfare is particularly steeper in services sector. relies on the US as its primary market for services exports. Any decline in China's services exports would lead to welfare losses in that sector, though not enough to impact its overall welfare loss, which remains constant. Meanwhile, Russia emerges as an alternative in the mining and energy sector, benefiting from increased exports. This shift helps offset welfare losses for the US and the rest of the world as they reduce reliance on Chinese imports in this sector.

Through this study we demonstrate that, owing to the interconnected nature of global trade, efforts to reduce US import dependence on China would not only undermine the economic welfare of both the nations but also jeopardize the global economic stability. This is the key contribution of our study. Therefore, we conclude that rather than attempting to eliminate Chinese imports completely, countries should focus on diversifying their sources of imports destinations and enhance their exports.

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