How Globalization Unravels: A Ricardian Model of Endogenous Trade Policy*

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Abstract

We provide new insights into how protectionism emerges endogenously from the uneven distribution of globalization's gains. We develop a Ricardian trade model featuring input-output linkages, dual-layer income heterogeneity—where households' income differs in labor and financial wealth across sectors and within households—and endogenous sectoral lobbying. Lobbying for protection by trade-affected sectors involves strategic complementarity, as higher production costs induced by one sector's protection propagate through input-output linkages, intensifying import competition in other sectors and fueling their lobbying efforts. Quantitative simulations calibrated to U.S.-China sectoral productivity and tariff data capture the dynamic decline in support for globalization in the past decades. An evolving trade-off between raising aggregate efficiency and addressing distributional disparities leads to pressures for trade barriers, which are futher strengthened by sectoral lobbying. The model highlights how protectionism, once set in motion, can escalate endogenously through lobbying dynamics, making globalization's reversal not just a policy choice but an outcome of economic and political forces.

JEL Classification: D57, D58, D63, D72, F1, F2, F4, F6
Keywords: Globalization, economic inequality, heterogeneous households, multi-sector, production network, Ricardian trade, political lobbying.

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1 Introduction

Globalization has generated substantial aggregate gains, but its distributional consequences have presented persistent challenges for certain segments of the economy. A growing literature shows that the shift toward backlash of globalization stems not from lost efficiency, but from unequal gains. While many models quantify trade benefits (e.g., Arkolakis et al., 2012; Costinot and Rodríguez-Clare, 2014; Melitz and Redding, 2015), recent work highlights deeper fractures: import competition has caused localized hardship, declining wellbeing (Pierce and Schott, 2020; Adda and Fawaz, 2020), and rising populism (Autor et al., 2020; Pástor and Veronesi, 2021; Rodrik, 2021; Colantone et al., 2022; Guriev and Papaioannou, 2022). These developments have coincided with greater imposition of protective trade measures—even in countries that gained from globalization. As Davis (2024) argues, trade policy has become structurally responsive to distributional pressures, regardless of partisan control.

This paper develops a general equilibrium Ricardian model linking globalization's unequal effects to political mobilization and trade policy. The model features two countries (U.S. and China), heterogeneous households—via sector-specific labor income and financial wealth—multi-sector input–output linkages, and endogenous tariffs shaped by sectoral lobbying. Trade policy is set by a government that weighs aggregate outcome, inequality, and political contributions. When protection in one sector raises production costs elsewhere through input-output linkage, lobbying becomes strategic and self-reinforcing, triggering a cycle of rising tariffs. While recent work emphasizes top-down policy shifts related to strategic or geopolitical considerations (e.g., Becko and O'Connor, 2024; Clayton et al., 2024; Broner et al., 2024; Kleinman et al., 2024; Liu and Yang, 2025), our approach highlights bottom-up pressures: protectionism emerges endogenously from unequal exposure and lobbying incentives—even when trade increases aggregate outcome.

We empirically substantiate this mechanism using new microdata that link economic exposure, attitudes toward globalization, and firm-level lobbying, extending the approach of Autor et al. (2013, 2020, 2021). First, using survey data, we show that individuals living in regions more exposed to import competition are significantly more likely to view trade as a threat—especially if they lack financial wealth. This suggests that distributional concerns, shaped by both labor and asset income, are central to anti-globalization sentiment. Second, using lobbying expenditure data from the Senate Office of Public Records, we find that firms in trade-affected industries substantially increase their lobbying activity in response to import shocks. These expenditures far exceed campaign contributions and offer a more targeted measure of firms' efforts to influence trade policy. These patterns provide direct empirical

support for the two core channels in our model: unequal exposure shaping preferences, and lobbying transmitting economic discontent into policy.

To capture these dynamics, we formalize a structural mechanism in a general equilibrium Ricardian model. On the production side, we build on Eaton and Kortum (2002) and introduce sector-specific labor endowments (Jones, 1971; Mussa, 1974) and an input–output network of intermediate goods, allowing shocks to propagate across sectors. On the household side, income heterogeneity arises from both labor earnings—sensitive to sectoral exposure—and financial wealth. These features generate two dimensions of heterogeneity: across households and within sectors. As in Stolper and Samuelson (1941), wages fall in sectors exposed to import competition, but the extent of harm depends on household asset holdings. Our model builds on and generalizes prior work on structural trade models with heterogeneity and input–output linkages (e.g., Caliendo and Parro, 2015; Levchenko, 2016; Galle et al., 2022; Dix-Carneiro et al., 2023; Baqaee and Farhi, 2024).

A core contribution of our paper is to bring sectoral lobbying into a general equilibrium setting, extending the logic of Grossman and Helpman (1994) beyond its partial equilibrium origins. In our framework, each sector can lobby for protection, and tariff policy is set by a government that balances aggregate gain, inequality, and political contributions. Because sectors are interconnected through the input-output network, protection in one sector alters prices and incentives in others, giving rise to strategic interactions in lobbying behavior—a channel our model endogenizes. Empirical evidence supports key elements of this mechanism. Bombardini et al. (2021) document that lobbying expenditures rose sharply in U.S. industries exposed to Chinese import competition, while Bombardini and Trebbi (2020) offer a comprehensive review of lobbying's effectiveness. Bown et al. (2021) and Zhang (2025) show that sectoral interdependence can give rise to coordinated lobbying, reinforcing our theoretical insights.

To evaluate the model quantitatively, we construct a sectoral dataset for the U.S. and China (1991-2019) using data from the KLEMS project, the China Industrial Productivity (CIP) Database, and the U.S. Bureau of Economic Analysis (BEA). We harmonize sectoral classifications into 31 sectors (19 tradable, 12 nontradable), derive input-output matrices, and calibrate key model parameters. These include sectoral trade elasticities (Caliendo and Parro, 2015 and Baqaee and Farhi, 2024), household wealth shares (Survey of Consumer Finance), labor income, employment shares, risk aversion, and tariff rates sourced from WITS and Fajgelbaum et al. (2019). The calibrated model, incorporating sectoral data, factor inputs, TFP, and tariff rates among others, allows us to simulate key macroeconomic and distributional

outcomes under globalization and the effects of lobbying-induced trade restrictions.

Our model replicates key empirical patterns: it predicts rising aggregate consumption alongside declining net exports as a share of GDP, consistent with observed trends. At the same time, it captures a rise in inequality and a shrinking share of households benefiting from globalization over the past decades, in line with Colantone et al. (2022) and Rodrik (2021). This erosion of support is shaped by three forces: (i) input-output linkages, (ii) changes in tariff policy, and (iii) financial income. Without (i), globalization's effects do not reach nontradable sectors, which account for the vast majority of U.S. employment (with tradable sectors comprising only 9% in 2023). (ii) Tariff changes, particularly those enacted during the 2018–2019 U.S.–China trade tensions, have reduced support for globalization by generating negative impacts on aggregate welfare. (iii) Financial income amplifies these dynamics, as the slowdown in Chinese growth lowers returns on invested wealth.

To understand how this decline in support translates into political pressure, we examine the sectoral and household-level drivers of inequality. Tradable sectors are not uniformly affected: for example, electrical products contract under foreign competition, while transportation equipment benefits from cheaper inputs and faces limited foreign substitution due to low trade elasticities. Wealth heterogeneity reinforces these disparities: financial assets buffer some households from losses, while others—even within the same sector—experience falling labor incomes. This within-sector variation generates uneven incentives for protection, laying the groundwork for political mobilization.

In our model, the policymaker faces a fundamental trade-off: maintaining aggregate efficiency versus mitigating the inequality created by trade. This trade-off is always present. We consider scenarios where the government places more weight on inequality and show that this leads to higher tariffs. While such policies compress the distribution of gains—benefiting households harmed by trade and hurting those that would otherwise gain—they reduce overall consumption. As a result, support for globalization, defined as the share of households with higher consumption, becomes ambiguous: improvements for the bottom of the distribution are offset by losses at the top. This trade-off echoes recent arguments by Pástor and Veronesi (2021) and Rodrik (2021), who emphasize that societies with stronger aversion to inequality may accept lower efficiency to contain the extremes of globalization.

When political contributions weigh more heavily in the policymaker's objective, tariff policy becomes further distorted—drifting from what would be chosen based solely on efficiency or equity. Under our calibration, these distortions give rise to strategic interactions: because sectors are linked via input–output relationships, protection in one raises costs in others,

increasing their exposure to import competition and prompting them to lobby as well. As a result, lobbying becomes mutually reinforcing: one sector's protection increases the political incentive for others to follow, creating a self-reinforcing cycle of rising tariffs.

In the limiting case where all sectors obtain protection, distributional disparities narrow—but at the cost of a sharp drop in aggregate efficiency. These dynamics help explain why, as documented by Grossman and Helpman (2020) and Guriev and Papaioannou (2022), populist leaders often pursue protectionist policies even at macroeconomic cost—because such policies align with the perceived fairness and political priorities of their constituencies. Even then, our model implies that a more targeted approach—offering greater support to severely impacted sectors while applying lower tariffs elsewhere—would better balance equity and efficiency, underscoring the inefficiency of uniform protection.

We contribute to the literature studying the backlash against globalization, including Autor et al. (2013, 2020, 2021), Che et al. (2022), Choi et al. (2024), Colantone et al. (2022) (review), Di Tella and Rodrik (2020), Dippel et al. (2022), Galle et al. (2022), Jensen et al. (2017), Leamer (1996), Margalit (2011), and Rodrik (2021).

In the modeling context, we build on the international trade literature, e.g., Adão et al. (2020), Arkolakis et al. (2012), Arkolakis et al. (2019), Baqaee and Farhi (2024), Boehm et al. (2024), Caliendo and Parro (2015), Costinot and Rodríguez-Clare (2014), Eaton and Kortum (2002), Galle et al. (2022), Levchenko and Zhang (2014), Levchenko (2016), Melitz and Redding (2015), Ossa (2015), and Ramondo and Rodríguez-Clare (2013).

Our tariff analysis is in conjunction of the literature on optimal tariffs, which centers on importers' monopolistic power, among other factors, in shaping tariffs (e.g., Johnson, 1953, Broda et al., 2008, Ossa, 2014, Irwin and Soderbery, 2021, Soderbery, 2018, Itskhoki and Mukhin, 2025) and that on distributional consequences of trade and globalization backslash mentioned above.

Broadly speaking, our paper is related to the expanding literature on geopolitical fragmentation (e.g., Aiyar et al., 2023, Ambrosino et al., 2024, Antràs, 2020, Attinasi et al., 2023, Bai et al., 2024, Blanga-Gubbay and Rubinova, 2023, Bloom et al., 2019, Bolhuis et al., 2023, Bonadio et al., 2024, Campos et al., 2023, Cerdeiro et al., 2021, Fajgelbaum and Khandelwal, 2022, Fajgelbaum et al., 2019, Flaaen and Pierce, 2019, Fernández-Villaverde et al., 2024, Fernández-Villaverde et al., 2025, Góes and Bekkers, 2022, Goldberg and Reed, 2023, Gopinath et al., 2025, Hakobyan et al., 2023, Javorcik et al., 2024, Mohr and Trebesch, 2024, Sampson, 2017, Utar et al., 2023).

We are also related to the growing literature on geoeconomics and economic coercion,

recent papers including Becko and O'Connor (2024), Broner et al. (2024), Clayton et al. (2024), Kleinman et al. (2024), Liu and Yang (2025), and Pflueger and Yared (2024), and going back to Hirschman (1945), Keohane and Nye (1973), and Keohane (1984). Among them, our paper complements studies highlighting the self-reinforcing dynamics of fragmentation: Clayton et al. (2024) show that independent pursuit of economic security triggers a "fragmentation doom loop," where each country's withdrawal diminishes global integration, prompting further fragmentation; and Liu and Yang (2025) demonstrate that shifts in international power driven by asymmetric trade dependence reshape geopolitical alignments, which in turn influence trade relationships and can reinforce fragmentation dynamics.

The paper is structured as follows. Section 1 introduces the study. Section 2 empirically establishes a causal link between economic discontent and policy shifts. Section 3 presents a Ricardian model of a two-country, multi-sector economy with tradable and nontradable goods and input-output linkages, and sectoral lobbying dynamics. Section 4 examines key implications from model simulations. Section 5 concludes. The Appendix provides additional details and the model solution.

2 Empirical Evidence

2.1 Globalization and shifting public attitudes

In this section, we present empirical evidence on the effects of globalization—specifically, China's economic expansion and rising imports—on the U.S. economy and public attitudes toward globalization.

Sectoral impact of Chinese growth

First, we examine the impact of Chinese economic growth on U.S. domestic industries using sectoral data compiled from the KLEMS project. To measure exogenous Chinese sectoral growth, we employ two approaches: (i) a productivity shock identified through the long-run restriction of Galí (1999), and (ii) the sectoral TFP growth estimated in the KLEMS database. Following Acemoglu et al. (2015), we account for both direct effects of sectoral productivity growth and propagation through production networks. Specifically, we construct "downstream" and "upstream" shocks by using the Leontief inverse derived from input-output tables.

Table 1 presents the results. It indicates that Chinese sectoral productivity growth significantly lowers U.S. sectoral output in directly affected industries (e.g., $OwnProdShock_{it}^{CHN}$

Table 1: Impact of Chinese productivity on U.S. sectoral output

	Depenent var: US sectoral output					
	All	Tradable	Non-tradable	All	Tradable	Non-tradable
	(1)	(2)	(3)	(4)	(5)	(6)
$OwnProdShock_{it}^{CHN}$	-0.840***	-1.449*	-0.349*			
	(0.255)	(0.797)	(0.207)			
$DownstreamProdShock_{it}^{CHN}$	5.851***	8.556**	2.588**			
	(1.844)	(3.095)	(1.233)			
$UpstreamProdShock_{it}^{CHN}$	-4.320***	-7.277**	-1.856*			
	(1.498)	(3.107)	(0.996)			
$Own\Delta TFP_{it}^{CHN}$				-0.890**	-3.485**	-0.281*
				(0.415)	(1.617)	(0.153)
$Downstream\Delta TFP_{it}^{CHN}$				3.705**	11.626***	0.480
				(1.848)	(3.571)	(0.652)
$Upstream\Delta TFP_{it}^{CHN}$				-2.866*	-9.114*	-0.384
				(1.551)	(5.149)	(0.536)
N of obs.	1,638	598	1,040	1,764	644	1,120
N of sectors	63	23	40	63	23	40
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: Observations are annual. Dependent variable is the logarithm of U.S. sectoral output. The data is obtained from the Integrated Industry-Level Production Account (KLEMS) compiled by the U.S. Bureau of Economic Analysis (BEA). Main independent variable is the Chinese sectoral productivity shock identified by the long-run restriction of Galí (1999) in a univariate VAR of the growth rate of labor productivity and hours worked with 2-period lags, or the growth rate of sectoral TFP. Own, downstream, and upstream shocks are defined following Acemoglu et al. (2015) and calculated using the US input-output matrix of 1997, which is the earliest available year. The independent variable is normalized so that the estimated coefficients represent percent changes in U.S. sectoral output responding to a 1 standard deviation change in Chinese sectoral productivity. Chinese sectoral data are obtained from the China Industrial Productivity (CIP) 4.0 Database, whose sample spans annually from 1988 through 2017. All regressions include the first and second lags of the dependent and main independent variables, as well as the first and second lagged U.S. sectoral labor productivity, hours worked, and labor input.

in column (1)), consistent with the view that increased competition with China under globalization damaged U.S. domestic industries. Note that, as the regression includes a time fixed effect, the coefficient elicits the impact on a sector relative to the average aggregate effect. The effects also propagate upstream via input demand, while downstream sectors benefit from lower input prices due to productivity growth. The upstream result is in contrast to Acemoglu et al. (2015), who find that a supply shock propagates only downstream under perfect competition. Interestingly, non-tradable sectors also exhibit some effects, though their magnitude and statistical significance are lower than those observed in tradable sectors. We revisit these points in the context of our model.

Individuals' attitude toward globalization

Next, we assess how rising Chinese imports influenced individuals' attitudes toward globalization. Autor et al. (2020) provide an important contribution by leveraging the "China shock" of Autor et al. (2013), which measures regional import penetration of Chinese products instrumented by Chinese supply factors. Their findings indicate that regions more exposed to Chinese imports increased support for Republican candidates in the 2008 and 2016 U.S. Presidential elections. We expand the analysis by examining the effect of wealth holdings, as financial income may mitigate the adverse effects of trade-induced labor income losses. To do so, we combine regional wealth estimates from Suss et al. (2024), derived from the Survey of Consumer Finances (SCF), with regional import penetration and voting data from Autor et al. (2020). To the best of our knowledge, this is the first paper that integrate the trade-induced globalization shock with financial data to examine heterogeneous impacts across wealth positions.

Table 2 presents the results. Columns (1)–(2) confirm that Chinese import penetration is associated with increased support for Republican candidate (Trump) in the 2016 election. Additionally, median household wealth level in 2000 (ln(Wealth)) is negatively associated with Republican vote share, consistent with our hypothesis that wealthier households are more likely to benefit from globalization. The result suggests that opposition to globalization—proxied by a vote for Trump—decreases with wealth. Columns (3)–(6) further explore the differential impacts of import penetration across wealth levels. Consistent with the hypothesis above, the result indicates that trade-related economic disruptions are more severe in lower-wealth regions. These findings remain robust to the inclusion of control variables.

To further investigate attitudes toward globalization, we use the Gallup Poll Social Series, which includes survey responses on perceptions of foreign trade.[1] We merge these survey responses with regional import penetration and wealth using survey respondents' zip codes. A key advantage of the Gallup survey is that it provides a direct measure of individual attitudes toward globalization, whereas presidential voting behavior may reflect broader political factors. Additionally, the panel structure of the survey allows us to control for individual and year fixed effects, unlike the cross-sectional nature of the presidential election analysis. We differ from the empirical literature that investigates the relation between globalization-related attitudinal variables and voting behavior (see Rodrik (2021) for a review) in that we examine

[1]Specifically, we use the question "What do you think foreign trade means for America? Do you see foreign trade more as – an opportunity for economic growth through increased U.S. exports or a threat to the economy from foreign imports?" Respondents select either "opportunity for economic growth" or "threat to economy from foreign imports".

Table 2: 2016 Presidential election Republican vote share

	(1)	(2)	(3)	(4)	(5)	(6)
Import penetration	2.604***	1.834***				
	(0.843)	(0.614)				
ln(Wealth)	-6.706***	-15.945***				
	(1.794)	(3.051)				
Import penetration						
× 1(Wealth 1st quantile)			4.626***	2.557***	3.293***	1.710*
			(0.898)	(0.768)	(1.139)	(0.875)
× 1(Wealth 2nd quantile)			3.935***	2.654***	3.855***	1.503*
			(1.159)	(0.737)	(1.291)	(0.789)
× 1(Wealth 3rd quantile)			1.008	1.219**	0.881	1.523***
			(1.272)	(0.554)	(1.141)	(0.586)
× 1(Wealth 4th quantile)			0.664	-0.280	1.885	0.954
			(1.186)	(0.828)	(2.707)	(1.094)
N of obs.	3,077	3,077	3,077	3,077	3,077	3,077
Wealth quantile controls	—	—	No	No	Yes	Yes
Full controls	No	Yes	No	Yes	No	Yes

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable is the change in percentage of two-party vote obtained by Republican candidate, 2016 (Trump) versus 2000 (Bush). Observations are counties, excluding Alaska and Hawaii. Main independent variables are the change in the import penetration of Chinese products from 2000 to 2014 and the median net wealth as of 2000 for each commuting zone (CZ). The import penetration used by Autor et al. (2020) was up to 2008, we use the updated estimates to 2014 by Autor et al. (2021). The net wealth is obtained from the Geographic Wealth Inequality Database provided by Suss et al. (2024). All regressions are estimated by 2SLS, using the supply-driven components of the import penetration (and their interactions with wealth quantiles) as exogenous instruments. Observations are weighted by counties' total votes in the 2000 presidential election, and standard errors are clustered by CZ. The top and bottom 0.5 percentiles of the dependent variable are excluded as outliers. In columns (5) and (6), controls include wealth quantile dummies. In columns (2), (4), and (6), full control variables are those used by Autor et al. (2020): industry and occupation controls (the CZ-level manufacturing employment share, the Autor and Dorn (2013) routine share, and offshorability index of a CZ's occupations); census division dummies; demographic controls (the percentage of a county's population in nine age, as well as the population shares that are female, college-educated, foreign-born, white, Hispanic, and black); and the Republican two-party vote share in the presidential elections of 1992 and 1996. In addition, the full controls include the logarithm of the average income, average age, average age squared, the gini coefficient of wealth, and average household size at the CZ level, compiled in the Geographic Wealth Inequality Database.

the causal link from globalization-induced economic shocks, measured by the import penetration from China, to the attitude toward globalization and how the impact differs across wealth distribution.

Table 3 confirms that individuals residing in regions with higher import penetration are more likely to perceive foreign trade as a threat, whereas wealthier individuals are more likely

Table 3: Individuals' attitude toward foreign trade in the Gallup Poll Social Series

	(1)	(2)	(3)	(4)	(5)	(6)
Import penetration	-0.028***	-0.028***				
	(0.008)	(0.008)				
ln(Wealth)	0.106***	0.108***				
	(0.015)	(0.014)				
Import penetration						
× 1(Wealth 1st quantile)			-0.047***	-0.047***	-0.029**	-0.028**
			(0.009)	(0.009)	(0.014)	(0.014)
× 1(Wealth 2nd quantile)			-0.033***	-0.033***	-0.031**	-0.031**
			(0.011)	(0.011)	(0.013)	(0.012)
× 1(Wealth 3rd quantile)			-0.017	-0.017	-0.019	-0.018
			(0.019)	(0.018)	(0.024)	(0.024)
× 1(Wealth 4th quantile)			0.028**	0.028**	-0.014	-0.015
			(0.012)	(0.012)	(0.024)	(0.024)
N of obs.	17,716	17,679	17,716	17,679	17,716	17,679
Wealth quantile controls	—	—	No	No	Yes	Yes
Full controls	No	Yes	No	Yes	No	Yes
ID FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: The dependent variable is an indicator variable elicited from a survey question: "What do you think foreign trade means for America? Do you see foreign trade more as an opportunity for economic growth through increased U.S. exports or a threat to the economy from foreign imports?" The dependent variable takes a value of one if the response to the question is "opportunity for economic growth", and zero if the response is "threat to the economy from foreign imports." Observations are individuals. The survey spans 2000 to 2020. Main independent variables are the change in the import penetration of Chinese products from 2000 to 2014 and the median net wealth as of 2000 for each commuting zone (CZ) obtained from the Geographic Wealth Inequality Database provided by Suss et al. (2024). These are linked to individuals' survey responses using the zip code information. All regressions are estimated by 2SLS, using the supply-driven components of the import penetration (and their interactions with wealth quantiles) as exogenous instruments. In columns (5) and (6), controls include wealth quantile dummies. In columns (2), (4), and (6), full control variables include age and age squared. Time and individual fixed effects are included in all regressions.

to view it as an opportunity. These are aligned with the findings in Table 2.

2.2 Globalization's impact on politics and lobbying

Similar to voting behavior, one can expect that campaign contributions are influenced by globalization. To empirically assess this link, we conduct an analysis analogous to the previous subsection, using campaign contribution data from the Database on Ideology, Money

Table 4: Campaign contributions to Republican relative to Democrat

	(1)	(2)	(3)	(4)
Import penetration				
× 1(Wealth 1st quantile)	0.612***	0.562***	0.325*	0.528***
	(0.157)	(0.174)	(0.186)	(0.186)
× 1(Wealth 2nd quantile)	0.443***	0.480***	0.504***	0.447***
	(0.120)	(0.155)	(0.136)	(0.167)
× 1(Wealth 3rd quantile)	0.265*	0.373**	0.382**	0.479**
	(0.139)	(0.152)	(0.172)	(0.202)
× 1(Wealth 4th quantile)	0.037	0.258	0.011	0.183
	(0.164)	(0.183)	(0.255)	(0.225)
N of obs.	2,319	2,315	2,319	2,315
Wealth quantile controls	No	No	Yes	Yes
Full controls	No	Yes	No	Yes

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

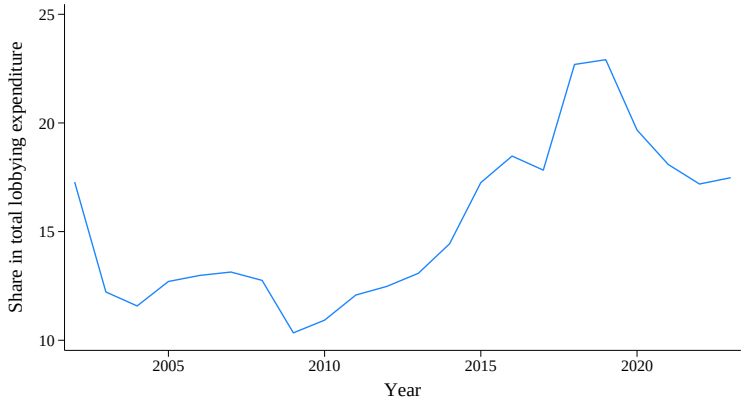
Notes: Dependent variable is the differential between Republican and Democrat candidates in terms of the campaign contribution growth from the 2002 to 2016 elections cycles. Observations are country-congressional district pairs, excluding Alaska and Hawaii. Main independent variables are the change in the import penetration of Chinese products from 2000 to 2014 and the median net wealth as of 2000 for each commuting zone (CZ), as in Table 2. Control variables include those in Table 2, as well as the share of campaign contributions received by Republican candidates and the CF scores of each of Republican and Democrat candidates in the 2002 election cycle at the congressional district-level compiled by the DIME dataset. Observations are weighted by a county-district cell's share in the total year-2002 voting age population of a district, and standard errors are twoway clustered by CZ and congressional districts.

in Politics, and Elections (DIME), compiled by Bonica (2015). This dataset, which links campaign contributions to contributors' ideological leanings, was also utilized by Autor et al. (2020).

Table 4 presents the results. Column (1) shows that regions with lower wealth exhibit higher elasticities with respect to Chinese import penetration. Since these regions experience larger economic losses from imports while benefiting less from globalization-induced asset returns, they contribute more financially to political campaigns aimed at reversing globalization trends. This finding remains robust across various specifications, as shown in columns (2)–(4). Notably, regions in the highest wealth quantile display the smallest coefficients, which are consistently insignificant at the 10 percent level.

We further examine political lobbying in response to globalization. Under the Lobbying Disclosure Act of 1995, amended by the Honest Leadership and Open Government Act of 2007, lobbying activities—including expenditures and associated policy issues—must be publicly disclosed. Total lobbying spending hovered around 3 to 3.5 billion dollars per year in

Figure 1: Lobbying expenditure on trade issues



Notes: Lobbying expenditure on trade and tariff as a share of total lobbying expenditure. Company fixed effects are removed. Lobbying expenditure data are collected from the Senate Office of Public Records (SOPR), which are linked to listed companies' names using the S&P Capital IQ data.

the 2010s, nearly doubling compared to the level in 1998, the earliest year for which data is available. The scale is far larger than campaign contributions by Political Action Committees (PAC)—most of which represent business, labor or ideological interests—which were around 200 to 250 million dollars per year during the same period (Bombardini and Trebbi, 2020). Further, the disclosure requires to identify policy issues involving lobbying activities, such as trade, tax, and labor issues, which enables us to specify the spending of our interest.

We compile firm-level lobbying expenditures from filings submitted to the Senate Office of Public Records (SOPR). While these data have been utilized in political economy (e.g., Kang, 2015) and corporate finance research (e.g., Bertrand et al., 2014; Borisov et al., 2015), they remain largely unexplored in the macroeconomic literature. Since lobbying filings are reported at the level of individual legal entities, we consolidate them at the parent company level to construct a firm-by-year dataset.[2] Figure 1 illustrates the rising share of lobbying expenditures allocated to trade-related issues (e.g., trade and tariffs), peaking in 2018-2019. Although this trend has moderated in recent years, lobbying expenditures on trade remain significantly higher than a decade ago.

Table 5 analyzes the impact of Chinese import exposure on firms' lobbying activities. Consistent with earlier findings, greater exposure to Chinese imports—measured at the SIC 4-digit industry level—is associated with increased lobbying expenditures on trade issues.

[2]For example, entities such as "Amazon Corporate," "Amazon.com Services," and "Amazon Web Services" are separately registered in the data. We aggregate these under "Amazon.com, Inc."

Table 5: Lobbying expenditure

	(1)	(2)
Import penetration	0.230**	0.317**
	(0.109)	(0.132)
N of obs.	4,457	4,457
ID FE	No	No
Year FE	Yes	Yes

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: Dependent variable is the lobbying expenditure on trade issues as a share of total lobbying expenditure. Observations are firms by year. The independent variable is the change in the import penetration of Chinese products from 1999 to 2011 at SIC 4-digit level, provided by Acemoglu et al. (2016). Column (2) is estimated by 2SLS, using the supply-driven components of the import penetration as exogenous instruments. Time fixed effects are included in all regressions. SEs are clustered by firm.

2.3 Discussion

The empirical evidence presented in this section highlights the substantial effects of Chinese economic growth on the U.S. economy. Overall, the findings support the hypothesis that increased competition from globalization has adversely affected U.S. domestic industries and contributed to shifting public sentiment away from globalization. However, the impact is multifaceted. Sectoral propagation through production networks simultaneously creates both beneficiaries and adversely affected industries (e.g., upstream and downstream effects in Table 1). Moreover, wealth holdings play a crucial role in shaping the effects of globalization, as its consequences extend beyond labor income to financial outcomes. Political responses are also complex, influenced not only by economic disruptions but also by the role of powerful lobbying entities, such as large firms actively shaping trade policy.

As such, a comprehensive assessment of the macroeconomic implications of Chinese growth requires a framework that integrates these various dimensions. In the next section, we develop a model that accounts for these factors.

3 Model

3.1 Setting

Consumption basket. Consider n types of goods. There is a continuum of households h on an interval $[0, h_j]$ for each good producing sector $j = 1, 2, ..., n$, with $\sum_{j=1}^{n} h_j = 1$. The

consumption basket is given by a Cobb-Douglas aggregator:

$$C_t^{jh} = \prod_{i=1}^{n} \left(C_{it}^{jh} \right)^{v_i}, \tag{1}$$

where C_{it}^{jh} denotes consumption of good i at time t by household h working in sector j. $v_i > 0$ with $\sum_{i=1}^{n} v_i = 1$ represents consumers' preference over individual goods, which is assumed identical across households. C_{it}^{jh} is a CES aggregator of home- and foreign-produced goods:

$$C_{it}^{jh} = \left(\xi_i (C_{it}^{Hjh})^{\frac{\theta_i - 1}{\theta_i}} + (1 - \xi_i)(C_{it}^{Fjh})^{\frac{\theta_i - 1}{\theta_i}} \right)^{\frac{\theta_i}{\theta_i - 1}}, \tag{2}$$

where H and F denote home- and foreign-produced goods, and θ_j is the elasticity of substitution. ξ_i governs the steady-state import share, which reflects non-price competitiveness or barriers for trade. The corresponding price is given by

$$\lambda_{it} = \left(\xi_i^{\theta_i} (P_{it}^H)^{1-\theta_i} + (1 - \xi_i)^{\theta_i} (\tau_{it} P_{it}^F)^{1-\theta_i} \right)^{\frac{1}{1-\theta_i}}, \tag{3}$$

where τ_{it} is a tariff imposed on imported goods.

Tradable and non-tradable goods. Goods $i \in T = 1, 2, ..., n_T$ are tradable and the rest $i \in N$ is non-tradable. That is, $\xi_i \in (0, 1)$ for $i \in T$ and $\xi_i = 1$ for $i \in N$.

Households. Households in a home country (U.S.) maximizes their utility:

$$U_t^{jh} = \mathbb{E}_t \left[\sum_{s=0}^{\infty} \beta^{t+s} \frac{(C_{t+s}^{jh})^{1-\gamma} - 1}{1 - \gamma} \right], \tag{4}$$

$$\text{s.t.} \quad P_t C_t^{jh} + W_{t+1}^{jh} = R_t W_t^{jh} + \frac{1}{h_j} E_{jt} X_{jt}. \tag{5}$$

W_t^{jh} is the net wealth at the beginning of the period. Households in each sector are equally endowed with a fixed amount of sector-specific factor input X_{jt}/h_j, provide it for production inelastically, and receive earnings E_{jt}. Factor input X_{jt} can be sector-specific skills or capital, which we assume non-transferable across sectors. $P_t = \prod_{i=1}^{n} \lambda_{it}^{v_i}$ is the domestic price index. R_t represents the gross nominal rate of return on wealth.

Production. Consider a constant-return-to-scale Cobb-Douglas production function with

intermediate inputs. Gross output Y_{it} is given by

$$Y_{it} = A_{it} X_{it}^{\alpha_i} \prod_{j=1}^{n} Y_{ijt}^{(1-\alpha_i)w_{ij}}, \tag{6}$$

where Y_{ijt} is intermediate good produced by sector j and used in sector i. A_{it} is productivity and X_{it} is factor input, which are determined exogenously. $(1-\alpha_i) \in [0,1]$ is the intermediate input share and $\sum_{j=1}^{n} w_{ij} = 1$. Each intermediate is a CES aggregator of home- and foreign-produced goods:

$$Y_{ijt} = \left(\xi_j (Y_{ijt}^H)^{\frac{\theta_j - 1}{\theta_j}} + (1-\xi_j)(Y_{ijt}^F)^{\frac{\theta_j - 1}{\theta_j}} \right)^{\frac{\theta_j}{\theta_j - 1}}. \tag{7}$$

Foreign economy. A foreign country (China) has a symmetric structure with a variable with a superscript f denoting the one for the foreign economy.

Market clearing. Market clearing condition is given by

$$\underbrace{\underbrace{\sum_{j=1}^{n} \int_0^{h_j} C_{it}^{Hjh} dh}_{\text{Final goods}} + \underbrace{\sum_{j=1}^{n} Y_{jit}^H}_{\text{Intermediate goods}}}_{\text{Home demand}} + \underbrace{\underbrace{\sum_{j=1}^{n} \int_0^{h_j^f} C_{it}^{fHjh} dh}_{\text{Final goods}} + \underbrace{\sum_{j=1}^{n} Y_{jit}^{fH}}_{\text{Intermediate goods}}}_{\text{Foregin demand (=exports)}} = \underbrace{Y_{it}}_{\text{Supply}}. \tag{8}$$

National account identity. Home country's nominal GDP is given by

$$GDP_t = P_t C_t + \underbrace{\sum_{i=1}^{n} (1-\xi_i^f)^{\theta_i} (\tau_{it}^f)^{-\theta_i} \left(\frac{P_{it}}{\lambda_{it}^f} \right)^{-\theta_i+1} D_{it}^f}_{=EX_t\text{: Exports}} - \underbrace{\sum_{i=1}^{n} (1-\xi_i)^{\theta_i} \tau_{it}^{-\theta_i} \left(\frac{P_{it}^f}{\lambda_{it}} \right)^{-\theta_i+1} D_{it}}_{=IM_t\text{: Imports}}, \tag{9}$$

where D_{it} and D_{it}^f capture final and intermediate goods demand in the home and foreign economies, respectively.

The production approach yields

$$GDP_t = \sum_{i=1}^{n} \alpha_i \underbrace{P_{it} Y_{it}}_{\equiv S_{it}}, \tag{10}$$

where S_{it} denotes sectoral nominal output. (9) and (10) provide an accounting identity to

close the model.

Using the consumption Euler equation, the real rate of return is given by

$$d\ln \tilde{R}_{t+1} = \gamma \left(\mathbb{E}_t \left[d\ln C_{t+1} \right] - d\ln C_t \right), \tag{11}$$

where $\tilde{R}_{t+1}$ is the real rate of return.

Equilibrium. The FOCs of households' and firms' optimization, market clearing conditions, national income identity, and feasibility of production yield a competitive equilibrium, which composes of prices $\{P_{it}, P_{it}^f, R_t\}$ and quantities $\{C_{it}^{jh}, C_{it}^{fjh}, Y_{it}, Y_{it}^f\}$ given $\{A_{it}, A_{it}^f, X_{it}, X_{it}^f, \tau_{it}, \tau_{it}^f\}$. We treat home aggregate price index P_t as a numeraire. The equilibrium is computed as a solution to a system of linear equations. The detail is provided in Appendix A.

3.2 Impact of foreign economy

Sectoral output. Before deriving a model solution, it is instructive to see the impacts of foreign economy on the domestic one using a few equilibrium conditions. Our primary focus is on sectoral output $S_{it} = P_{it}Y_{it}$ as it is proportional to sectoral income $E_{it}X_{it}$ according to a firm's FOC with sector-specific input.

Lemma 1. *In the first-order approximation, the demand side of the economy is given by:*

$$\underbrace{d\boldsymbol{S}_t}_{\text{Sectoral output}} = \underbrace{\tilde{\boldsymbol{V}}'}_{\text{Network}} \Bigg\{ \underbrace{\tilde{\boldsymbol{v}} d(P_t C_t)}_{\text{Home aggregate demand}} \quad \underbrace{+\tilde{\boldsymbol{v}}^f d(P_t^f C_t^f)}_{\text{Foreign aggregate demand}} \quad \underbrace{-\tilde{\boldsymbol{\theta}}}_{\text{Trade elasticity}} \underbrace{\left(d\ln \boldsymbol{P}_t - d\ln \boldsymbol{P}_t^f \right)}_{\text{Relative price}} \quad \underbrace{+\boldsymbol{\eta} d\ln \boldsymbol{\tau}_t - \boldsymbol{\eta}^f d\ln \boldsymbol{\tau}_t^f}_{\text{Tariff}} \Bigg\}. \tag{12}$$

This is derived from the FOCs and market clearing conditions, with details provided in Appendix A. A variable with bold letters denotes a matrix or vector. $d\boldsymbol{S}_t$ is a n-by-1 vector that collects each sector's nominal output dS_{it} in the i-th element. $\tilde{\boldsymbol{V}}$ is the Leontief inverse adjusted with trade. $\tilde{\boldsymbol{v}}$ and $\tilde{\boldsymbol{v}}^f$ represent sectoral elasticity with respect to aggregate demand. $\tilde{\boldsymbol{\theta}}$ is a n-by-n diagonal matrix that collects demand elasticity $\tilde{\theta}_i$ in the (i,i) element. n-by-n matrices $\boldsymbol{\eta}$ and $\boldsymbol{\eta}^f$ govern the impact of tariffs.

(12) indicates that sectoral outputs are inversely related to the relative price between home and foreign goods while positively affected by home and foreign aggregate demand. In other words, foreign (China) economy's productivity and factor input growth affects domestic (U.S.)

economy in both ways: a negative effect due to reduced price competitiveness as the foreign economy provides cheaper products; and a positive effect if foreign growth increases aggregate demand. These impacts are propagated through intermediate goods demand in production network, captured by $\tilde{\boldsymbol{V}}'$. Note that, without trade, (12) collapses to $d\boldsymbol{S}_t = \boldsymbol{V}'\boldsymbol{v}d(P_tC_t)$ where fluctuations in aggregate demand P_tC_t impact sectoral output through production network represented by the Leontief inverse $\boldsymbol{V}$. Tariffs $d\ln\boldsymbol{\tau}_t$ create a wedge between domestic and foreign prices and benefit or harm domestic sectors depending on the sign of corresponding elements in $\boldsymbol{\eta}$, conditional on aggregate demand.

Furthermore, using production function (supply side of the economy), we can derive the following proposition.

Proposition 1. *Sectoral output is related, to a first order, to exogenous productivity, factor inputs, and tariffs ($\boldsymbol{A}_t, \boldsymbol{A}_t^f, \boldsymbol{X}_t, \boldsymbol{X}_t^f, \boldsymbol{\eta}_t, \boldsymbol{\eta}_t^f$), as well as aggregate consumption P_tC_t and $P_t^fC_t^f$:*

$$\underbrace{d\boldsymbol{S}_t}_{\text{Sectoral output}} = \underbrace{\check{\boldsymbol{V}}'}_{\text{Network}} \Bigg[\underbrace{\check{\boldsymbol{v}}d(P_tC_t)}_{\text{Home aggregate demand}} \quad \underbrace{+\check{\boldsymbol{v}}^f d(P_t^fC_t^f)}_{\text{Foreign aggregate demand}} \tag{13}$$

$$+\check{\boldsymbol{\theta}} \underbrace{\left\{\boldsymbol{V}(d\ln\boldsymbol{A}_t + \boldsymbol{\alpha}d\ln\boldsymbol{X}_t) - \boldsymbol{V}^f(d\ln\boldsymbol{A}_t^f + \boldsymbol{\alpha}^f d\ln\boldsymbol{X}_t^f)\right\}}_{\text{Differential of home and foreign production}} \quad \underbrace{+\check{\boldsymbol{\eta}}d\ln\boldsymbol{\tau}_t - \check{\boldsymbol{\eta}}^f d\ln\boldsymbol{\tau}_t^f}_{\text{Tariff}} \Bigg].$$

The derivation is provided in Appendix A. The objects $\check{\boldsymbol{V}}'$, $\check{\boldsymbol{v}}$, $\check{\boldsymbol{v}}^f$, and $\check{\boldsymbol{\theta}}$ are analogues of their counterparts in Lemma 1, modified to incorporate supply-side effects arising from sectoral productivity, factor inputs, and tariffs. The third term in the square brackets represents the differential of home and foreign production, which affects the relative price between home and foreign goods, thereby sectoral outputs. Notice that the effect of production network appears twice: foreign economy's sectoral productivity and factor input growth first propagate downstream though supply chain represented by $\boldsymbol{V}^f$ in the third term; and then it spillovers upstream in the home country's sectors through $\check{\boldsymbol{V}}'$.

3.3 Illustrative two-sector examples

We provide intuitions of the model using a few simple examples of a 2-sector economy as illustrated in Figure 2. For illustrative purposes, we set $d\ln\boldsymbol{A}_t = d\ln\boldsymbol{X}_t = d\ln\boldsymbol{X}_t^f = d\ln\boldsymbol{\eta}_t = d\ln\boldsymbol{\eta}_t^f = 0$ and focus on foreign productivity $d\ln\boldsymbol{A}_t^f$. The detail is provided in Appendix A.

Example 1: Horizontal network. As a starting point, suppose that production is con-

ducted horizontally without sectoral input-output linkage, i.e., $\boldsymbol{\alpha} = \boldsymbol{\alpha}^f = \boldsymbol{I}$. Then, according to (13), the impact of foreign productivity is, conditional on aggregate consumption, given by

$$\left[\begin{array}{cc} \frac{dS_{1t}}{d\ln A_{1t}} & \frac{dS_{1t}}{d\ln A_{2t}} \\ \frac{dS_{2t}}{d\ln A_{1t}} & \frac{dS_{2t}}{d\ln A_{2t}} \end{array}\right]\Bigg|_{P_tC_t, P_t^fC_t^f \text{ fixed}} = -\left[\begin{array}{cc} \frac{\tilde{\theta}_1}{1+\tilde{\theta}_1(S_1^{-1}+S_1^{f-1})} & 0 \\ 0 & \frac{\tilde{\theta}_2}{1+\tilde{\theta}_2(S_2^{-1}+S_2^{f-1})} \end{array}\right]. \tag{14}$$

Sectoral output is negatively affected, conditional on aggregate demand, by foreign productivity $d\ln A_{it}^f$ as it will decrease relative prices through the abundance of supply. Without input-output linkage, sectoral shocks do not spillover to other sectors conditional on aggregate consumption. If a good is non tradable, (14) is further reduced to

$$\frac{dS_{it}}{d\ln A_{it}^f}\Bigg|_{P_tC_t, P_t^fC_t^f \text{ fixed}} = 0, \tag{15}$$

for $i = 1, 2$, which indicates that non-tradable goods are not affected by the same sector in the foreign economy. If a foreign productivity shock has positive aggregate consumption effect, it is possible that non-tradable sectors benefit from it whereas relevant tradable sectors are damaged.

In sum, conditional on aggregate demand, foreign productivity lowers relative prices and reduces domestic output in the same tradable sector, while non-tradable sectors remain unaffected in the absence of input-output linkages.

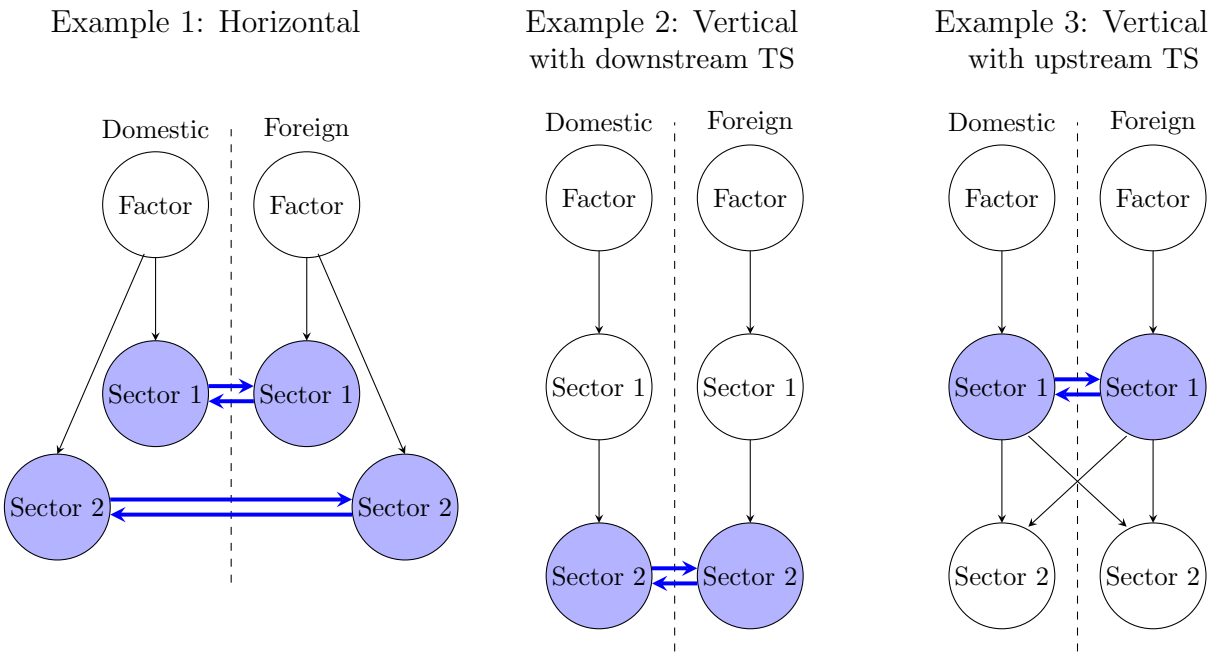
Example 2: Downstream tradable sector. Now consider input-output linkage, focusing on vertical network. Specifically, we assume good 1 is used as input in both sector 1 and 2, i.e., $\boldsymbol{W} = \boldsymbol{W}^f = \left[\begin{array}{cc} 1 & 0 \\ 1 & 0 \end{array}\right]$, while factor X is only used in sector 1, i.e., $\boldsymbol{\alpha} = \boldsymbol{\alpha}^f = \left[\begin{array}{cc} 1 & 0 \\ 0 & 0 \end{array}\right]$. Assume also that sector 1 is non-tradable whereas sector 2 is tradable (for example, non-manufacturing sectors, such as transportation and construction (non-tradable), providing inputs to (tradable) manufacturing sectors). Then, we obtain

$$\left[\begin{array}{cc} \frac{dS_{1t}}{d\ln A_{1t}} & \frac{dS_{1t}}{d\ln A_{2t}} \\ \frac{dS_{2t}}{d\ln A_{1t}} & \frac{dS_{2t}}{d\ln A_{2t}} \end{array}\right]\Bigg|_{P_tC_t, P_t^fC_t^f \text{ fixed}} = -\frac{\tilde{\theta}_2}{1+\tilde{\theta}_2(S_1^{-1}+S_1^{f-1})}\left[\begin{array}{cc} 1 & 1 \\ 1 & 1 \end{array}\right]. \tag{16}$$

(16) shows that, conditional on aggregate consumption, foreign productivity shocks in either sector 1 or sector 2 influence domestic sectoral output.

Consider first a foreign productivity shock in sector 2 (the downstream tradable sector),

Figure 2: Examples of production network



Notes: Blue circles are tradable goods sectors and blue arrows indicate trade. Black arrows indicate input usage. TS denotes tradable sector.

$d \ln A_{2t}^f$. As foreign sector 2 becomes more productive, it expands and exerts competitive pressure on domestic sector 2, which contracts. This contraction reduces its demand for inputs from domestic sector 1 (the upstream non-tradable sector), causing sector 1 to contract as well. Importantly, sector 1 is not directly exposed to foreign competition—rather, it is affected indirectly through the decline in intermediate demand from sector 2. Since sector 1 is non-tradable, it cannot offset this loss through export markets. This result contrasts with Acemoglu et al. (2015), who show that supply shocks propagate only downstream under perfect competition. Our result supports the upstream propagation observed in Table 1, and it arises from the interaction between production networks and trade.[3]

Now consider a shock to foreign sector 1 (the upstream non-tradable sector), $d \ln A_{1t}^f$. The productivity gain lowers input costs in the foreign economy, benefiting foreign sector 2. As foreign sector 2 expands, domestic sector 2 again contracts due to increased competition. This reduces domestic sector 2's demand for inputs from sector 1, leading again to a contraction in domestic sector 1. Thus, even a foreign shock in a non-tradable upstream sector can

[3]Baqaee (2018) finds that a supply shock can have upstream effects under imperfect competition. Our result holds under perfect competition with trade. Baqaee and Farhi (2024) point out spillovers through households' demand complementarity among tradable and non-tradable goods, while our model's mechanism involves intermediate goods demand.

propagate through the foreign production network and spill back into the domestic economy via intermediate demand. In this way, non-tradable sectors are indirectly exposed to foreign productivity through global production linkages, even in the absence of direct trade exposure.

Example 3: Upstream tradable sector. Consider the same vertical network as in Example 2, but now assume that sector 2 is non-tradable instead of sector 1. We obtain

$$\left[\begin{array}{cc} \frac{dS_{1t}}{d\ln A_{1t}} & \frac{dS_{1t}}{d\ln A_{2t}} \\ \frac{dS_{2t}}{d\ln A_{1t}} & \frac{dS_{2t}}{d\ln A_{2t}} \end{array}\right]\Bigg|_{P_tC_t, P_t^fC_t^f \text{ fixed}} = c\left[\begin{array}{cc} -\left\{1+(1-\tilde{\xi}_1)\right\} & 0 \\ 2(1-\tilde{\xi}_1) & 0 \end{array}\right]. \tag{17}$$

where $c = \tilde{\theta}_1\left[\left\{1+\tilde{\theta}_1(S_1^{-1}+S_1^{f-1})\right\}\left\{1+(1-\tilde{\xi}_1)\right\}+2(1-\tilde{\xi}_1)\right]^{-1}$.

In this case, a productivity shock in foreign sector 1 (upstream, tradable) affects domestic sectors through a different channel. Domestic sector 1 contracts due to direct import competition, as tradable goods from foreign sector 1 become cheaper. In contrast, domestic sector 2 (non-tradable, downstream) benefits from lower input costs, since it relies on good 1 as an input but is insulated from direct foreign competition.

This example contrasts with Example 2, where the non-tradable upstream sector is hurt via reduced domestic demand; here, the non-tradable downstream sector gains via cost-side spillovers. The result underscores how tradability shapes the sign and strength of shock transmission through the production network.

3.4 Consumption dynamics

The first-order approximation of household's budget constraint around the steady-state wealth level yields

$$\underbrace{d\ln C_t^{jh}}_{\text{Individual consumption}} = \underbrace{\frac{\omega^{jh}}{1-\beta}d\ln R_t}_{\text{Financial income}} + \underbrace{(1-\omega^{jh})d\ln S_{jt}}_{\text{Labor income}}, \tag{18}$$

where $\omega^{jh} = (1-\beta)W^{jh}/((1-\beta)W^{jh}+\frac{\alpha_j}{h_j}S_j)$ is the wealth share. Notice that households differ in the wealth share ω^{jh} and sectoral labor income $(\alpha_i/h_i)S_{it} = (\alpha_i/h_i)P_{it}Y_{it}$. (18) highlights the importance of two sources of income: financial and labor income, whose impacts are amplified or mitigated by the wealth share ω^{jh}.

3.5 Support for globalization

We define the share of households who support globalization as

$$\frac{1}{n}\sum_{j=1}^{n}\int_{0}^{h_j} 1_{d\ln C_t^{jh}>0} dh. \tag{19}$$

This measure (19) aligns with a median voter interpretation, since if more than half of households experience consumption gains from globalization, the political majority would favor continued integration; conversely, once the share of benefiting households falls below 50%, political support is likely to erode.

3.6 Sectoral lobbying

Next we incorporate sectoral lobbying into the model. Our setting is akin to Grossman and Helpman (1994) (GH, henceforth). As GH's model is partial equilibrium with fixed prices except for tariffs, it does not have interactions between sectors, and tariffs are determined in the trade off between the benefits for a domestic producer and cost for consumers. In contrast, our model incorporates general equilibrium effects, and thus, one sector's lobbying, and resulting trade restrictions, affect other sectors' benefits or costs of globalization. Our model also considers dynamics between globalization and fragmentation over time, whereas GH's setting is static.

A politician's objective function U_t^{pj}, when considering sectoral tariff τ_{jt}, balances *social welfare* u_t and *lobbying contributions* Q_t^j:

$$\begin{aligned} U_t^{pj} &= \eta u_t + (1-\eta) Q_t^j, \\ u_t &= \underbrace{\overline{d\ln S_t}}_{\text{Average output}} \underbrace{-\frac{\sigma}{2}\sum_{j=1}^{n} h_j \left(d\ln S_{jt} - \overline{d\ln S_t}\right)^2}_{\text{Inequality}} + \underbrace{\sum_{j=1}^{n}\frac{IM_j}{S}(1+d\ln IM_{jt})d\ln\tau_{jt}}_{\text{Tariff revenue (imports } \times \text{ tariff rates)}}. \end{aligned} \tag{20}$$

Here, $\eta \in [0,1]$ captures the weight placed on aggregate welfare versus political contributions. The social welfare component, u_t, includes three terms: (i) the *average sectoral output*, $\overline{d\ln S_t}$, capturing overall economic performance; (ii) a *penalty for output inequality*, where higher dispersion in sectoral performance reduces welfare depending on the inequality aversion parameter σ; and (iii) *tariff revenue*, scaled by the size of the economy, reflecting the fiscal gains from trade restrictions.

This formulation reflects a policymaker who values not only the economy's overall output,

but also its distribution and fiscal capacity. Importantly, because sectoral output is shaped by general equilibrium forces, lobbying by one sector affects not just its own tariff, but also generates feedback effects on other sectors' welfare and lobbying incentives.

The lobbying sector's payoff is given by

$$\begin{aligned} U_t^j &= u_t^j - Q_t^j, \\ u_t^j &= d\ln S_{jt} - \frac{\sigma}{2}\left(d\ln S_{jt} - \overline{d\ln S_t}\right)^2. \end{aligned} \tag{21}$$

Nash bargaining. Following Goldberg and Maggi (1999), we consider Nash bargaining between the government and lobbyists. They maximize joint surplus:

$$(U_t^{pj})^{1-\phi}\left(U_t^j\right)^{\phi}, \tag{22}$$

where ϕ is weight for lobbyists, which we will show shortly is irrelevant in equilibrium.[4] The FOC for Q_t^j yields

$$U_t^{pj} \propto U_t^j \propto \eta u_t + (1-\eta)u_t^j. \tag{23}$$

(23) indicates that contributions are determined so that the politician and lobbyists have a common objective to maximize the weighted sum of social welfare and lobbyists' welfare.

Endogenous tariff determination. The politician sets tariff rates $d\ln\tau_{jt}$ for $j \in T$ to maximize the common objective function (23). The FOC yields the following proposition.

Proposition 2. *Tariffs are endogenously determined to satisfy*

$$\begin{aligned} &\underbrace{\tilde{\boldsymbol{h}}^{j\prime}\frac{\partial\ln \boldsymbol{S}_t}{\partial\ln\tau_{jt}}}_{\textit{Average loss/gain}} + \underbrace{\frac{IM_j}{S}(1+d\ln IM_{jt}) + d\ln\boldsymbol{\tau}_t'\,diag\left(\frac{\boldsymbol{IM}}{S}\right)\frac{\partial\ln \boldsymbol{IM}_t}{\partial\ln\tau_{jt}}}_{\textit{Tariff revenue increase/decrease}} \\ &= \underbrace{\sigma}_{\textit{Inequality aversion}}\underbrace{\left(d\ln\boldsymbol{S}_t - \mathbf{1}\overline{d\ln S_t}\right)'diag(\tilde{\boldsymbol{h}}^j)\left(\frac{\partial\ln\boldsymbol{S}_t}{\partial\ln\tau_{jt}} - \mathbf{1}\frac{\partial\overline{\ln S_t}}{\partial\ln\tau_{jt}}\right)}_{\textit{Equality gain/loss}}, \end{aligned} \tag{24}$$

where $\tilde{\boldsymbol{h}}^j$ is a n-by-1 column vector with the i-th element being ηh_i for $i \neq j$ and h_i for $i = j$.

(24) indicates that tariffs are determined by the trade-off between average losses (or gains)

[4] We assume that the government cannot commit to a future policy, as a consequence of which lobbying and tariffs are determined each period.

and gains (or losses) in equality. Notice that the gains and losses of individual sectors are weighted by $\tilde{\boldsymbol{h}}^j$, distorted by lobbying. Rearranging the FOC yields the following corollary.

Corollary 1. *The optimal response function of sectoral tariffs is given by*

$$d\ln\tau_{jt} = F_j\left(d\ln\boldsymbol{A}_t^f, d\ln\boldsymbol{\tau}_t^f, d\ln\boldsymbol{\tau}_{-jt}\right), \tag{25}$$

where $d\ln\boldsymbol{\tau}_{-jt}$ collects other sectors' tariffs, i.e., $d\ln\tau_{it}$ in the i-the element for $i \neq j$ and 0 in the j-th element.

The detail is presented in Appendix. Sectoral tariffs depend on foreign productivity $d\ln\boldsymbol{A}_t^f$ and tariffs $d\ln\boldsymbol{\tau}_t^f$, as well as other sectors' tariffs $d\ln\boldsymbol{\tau}_{-jt}$. Intuitively, these variables affect the state of $d\ln\boldsymbol{S}_t$ as well as tariff revenues, thereby impacting the trade off facing $d\ln\tau_{jt}$ as described in (24). For example, growth in $\boldsymbol{A}_t^f$ can lead to higher domestic inequality, which should be compensated by higher tariffs that mitigate the inequality.

Strategic complementarity and substitutability. (25) also implies sectoral interactions. To see this point, it is convenient to define the response of sector j to sector i's tariff imposition of sectoral tariff policies:

$$\frac{d\ln\tau_{jt}}{d\ln\tau_{it}} = \boldsymbol{\Theta}(j,i). \tag{26}$$

$d\ln\tau_{jt}/d\ln\tau_{it} > 0$ implies strategic complementarity in that sector i's tariff leads to a higher tariff in sector j, while $d\ln\tau_{jt}/d\ln\tau_{it} < 0$ indicates strategic substitutability.

In the two-sector examples discussed earlier, a horizontal production structure—where sectors do not rely on each other for inputs—implies no interaction in tariff responses.

By contrast, when sectors are connected in a vertical network and both are tradable, the interaction becomes more complex, and the sign of the tariff response is ambiguous. On one hand, if the upstream sector (sector 1) raises its tariff, it increases input costs for the downstream sector (sector 2). This weakens sector 2's competitiveness, potentially strengthening its incentive to lobby for additional protection—suggesting strategic complementarity in tariff setting. On the other hand, if the downstream sector (sector 2) raises its tariff, it reduces foreign competition and supports domestic demand for upstream inputs, improving sector 1's position and thus reducing its incentive to seek protection—implying strategic substitutability.

The net effect depends on the strength of these opposing forces and the relative lobbying

power of the sectors. Further theoretical details are presented in the Appendix.

In the quantitative analysis in the following section, we calculate the full impact of an arbitrary change in tariff $\boldsymbol{\Delta}$ through these sectoral interactions:

$$\boldsymbol{\Theta\Delta} + \boldsymbol{\Theta}^2\boldsymbol{\Delta} + \boldsymbol{\Theta}^3\boldsymbol{\Delta} + ... = \boldsymbol{\Theta}(\boldsymbol{I} - \boldsymbol{\Theta})^{-1}\boldsymbol{\Delta}. \tag{27}$$

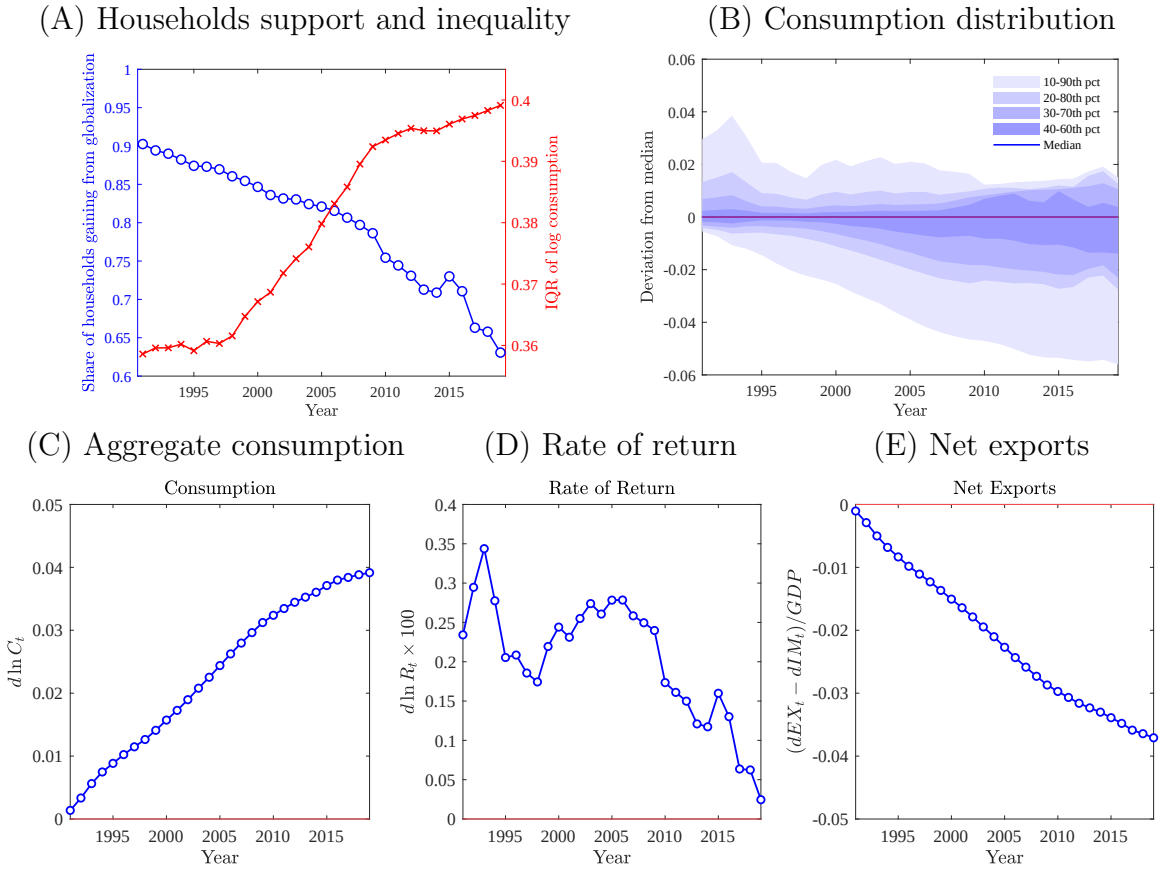
4 Results

4.1 Calibration

We construct a sectoral dataset for the U.S. and China at an annual frequency from 1991 to 2019 with the end period setting prior to the COVID-19 pandemic. The primary data sources are the KLEMS project for sectoral TFP $\boldsymbol{A}_t^f$ and factor inputs $\boldsymbol{X}_t^f$, which aggregate labor and capital inputs. Chinese data are sourced from the China Industrial Productivity (CIP) 4.0 Database, compiled by the Research Institute of Economy, Trade and Industry (RIETI), Hitotsubashi University, and Peking University Growth Lab. As the CIP database spans from 1988 to 2017, series after 2018 are interpolated by value added growth of respective sectors compiled by the National Bureau of Statistics of China. U.S. data are obtained from the Bureau of Economic Analysis (BEA). We harmonize sectoral classifications, constructing 31 sectors in the private economy (19 tradable and 12 non-tradable) by mapping 63 U.S. sectors and 34 Chinese sectors, as reported in Appendix B. The input-output matrix $\boldsymbol{W}$ and intermediate share $(\boldsymbol{I} - \boldsymbol{\alpha})$ are derived for 1997 data, corresponding to the earliest available input-output tables for the U.S. Sectoral outputs in the steady state $\boldsymbol{S}$ and $\boldsymbol{S}^f$ are directly taken from the KLEMS data. The steady-state import shares $\boldsymbol{\xi}$ and $\boldsymbol{\xi}^f$ are calibrated from bilateral trade data in Comtrade. Comtrade's HS6-digit codes are converted to 4-digit NAICS codes using Pierce and Schott (2012)'s conversion table and then to the harmonized 31 sectors. Final consumption shares $\boldsymbol{v}$ and $\boldsymbol{v}^f$ are computed to satisfy the market clearing conditions. Sectoral trade elasticities $\boldsymbol{\theta}$ are taken from Caliendo and Parro (2015) and Baqaee and Farhi (2024). We calibrate tariff rates for individual tradable sectors $\boldsymbol{\tau}_t$ and $\boldsymbol{\tau}_t^f$ using the tariff data, compiled by the World Integrated Trade Solution (WITS) and Fajgelbaum et al. (2019). We assume no tariffs in the steady state and capture actual tariffs by $d\ln\boldsymbol{\tau}_t$ and $d\ln\boldsymbol{\tau}_t^f$.

The wealth share ω^{jh} for U.S. households is calibrated using data from the Survey of Consumer Finance (SCF), compiled by the Federal Reserve Bank of New York. We use the net worth and wage income as measures of W and S in the model. The SCF categorizes employment into 7 broad sectors. For each sector, we compute percentiles of household

Figure 3: Effects of globalization: Support, inequality, consumption, returns, and net exports



Notes: A 5-year centered moving average is shown.

wealth sahre, defined as $\omega^{jh} = (1-\beta)W_h/((1-\beta)W_h + \alpha_j/h_j S_j)$, with a discount factor of $\beta = 0.96$, using 1998 data. These estimates are then mapped to corresponding sectors in the KLEMS dataset. Sectoral labor income S_j and sectoral household employment shares h_j are obtained from the average hourly earnings and full-time worker-equivalent employment data, compiled by the Bureau of Labor Statistics (BLS). The inverse of intertemporal substitution is set to $\gamma = 1.5$.

4.2 Assessing the economic impact of Chinese economic growth

We examine the impact of Chinese economic growth by feeding the calibrated foreign TFP $\boldsymbol{A}_t^f$ and factor inputs $\boldsymbol{X}_t^f$, along with tariffs $\boldsymbol{\tau}_t$ and $\boldsymbol{\tau}_t^f$, into the model.

Aggregate impact and support for globalization

Figure 3 presents model-implied outcomes, highlighting the U.S. economic impact of Chinese growth, interpreted as globalization in our context. Panel (A) displays the share of households that benefit from globalization—i.e., those with $d \ln C_t^{hj} > 0$—and therefore support globalization in the model simulation. Support for globalization rose sharply in the early 1990s, peaking at 90%, but then steadily declined to around 60% by the end of our sample. Panel (A) shows this decline coincides with a falling share of households benefiting from globalization and a widening interquartile range (IQR) of log consumption, pointing to growing inequality. Panel (B) echoes this pattern, showing a shift in the overall consumption distribution consistent with rising dispersion.

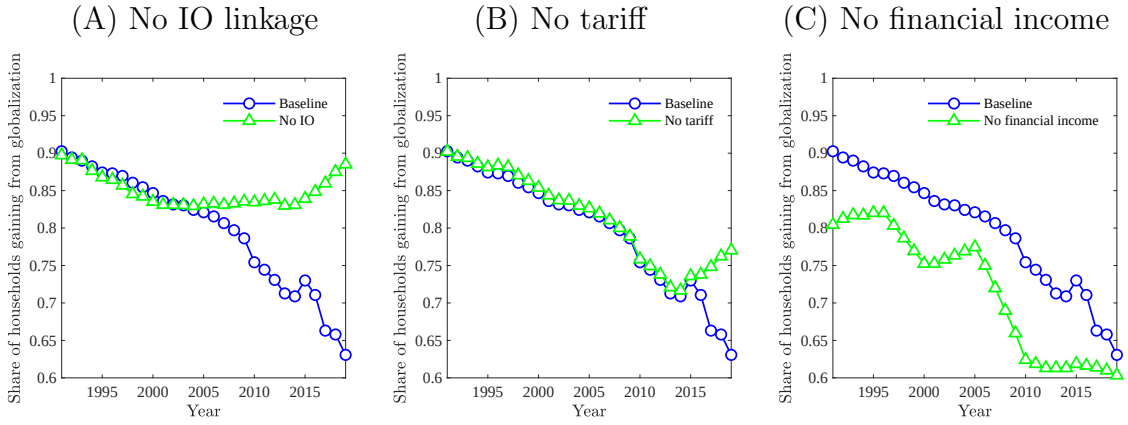
In contrast to the declining trend in overall support, Panel (C) illustrates that aggregate consumption continues to grow as a result of globalization, albeit with a diminishing but still positive impact on the rate of return, as displayed in Panel (D). The decline in asset returns following the Global Financial Crisis (GFC) likely reflects the deceleration of China's economic growth. Furthermore, the model replicates the observed deterioration in the trade balance as a share of GDP in Panel (E), consistent with empirical data. It is also noteworthy that, despite rising imports, domestic value-added production (measured as consumption minus net exports) remains slightly positive—suggesting that the gains in purchasing power from cheaper imports more than offset the displacement of domestic production.

The stark contrast between substantial aggregate gains from globalization (Panel C) and the shrinking share of benefiting households (Panel A), along with the increasing concentration of these gains among a smaller fraction of the population (Panel B), underscores the importance of accounting for sectoral and household heterogeneity when analyzing political support for globalization or the forces driving economic fragmentation.

Figure 4 illustrates three key model features that drive the time-varying support for globalization: (i) input-output linkages, (ii) tariffs, and (iii) financial income. Without (i), as shown in Panel (A), rising imports from China do not necessarily harm non-tradable sectors, which employ the vast majority of U.S. workers—an important feature of the economy—resulting in relatively stable support for globalization over time. Regarding (ii), although the average effect is modest across the sample period, Panel (B) shows that tariff hikes during the 2018–19 U.S.–China trade war reduced support for globalization. Finally, in Panel (C), (iii) financial income further amplifies the decline in support, as the benefits from higher returns have diminished in recent years (see Figure 3).

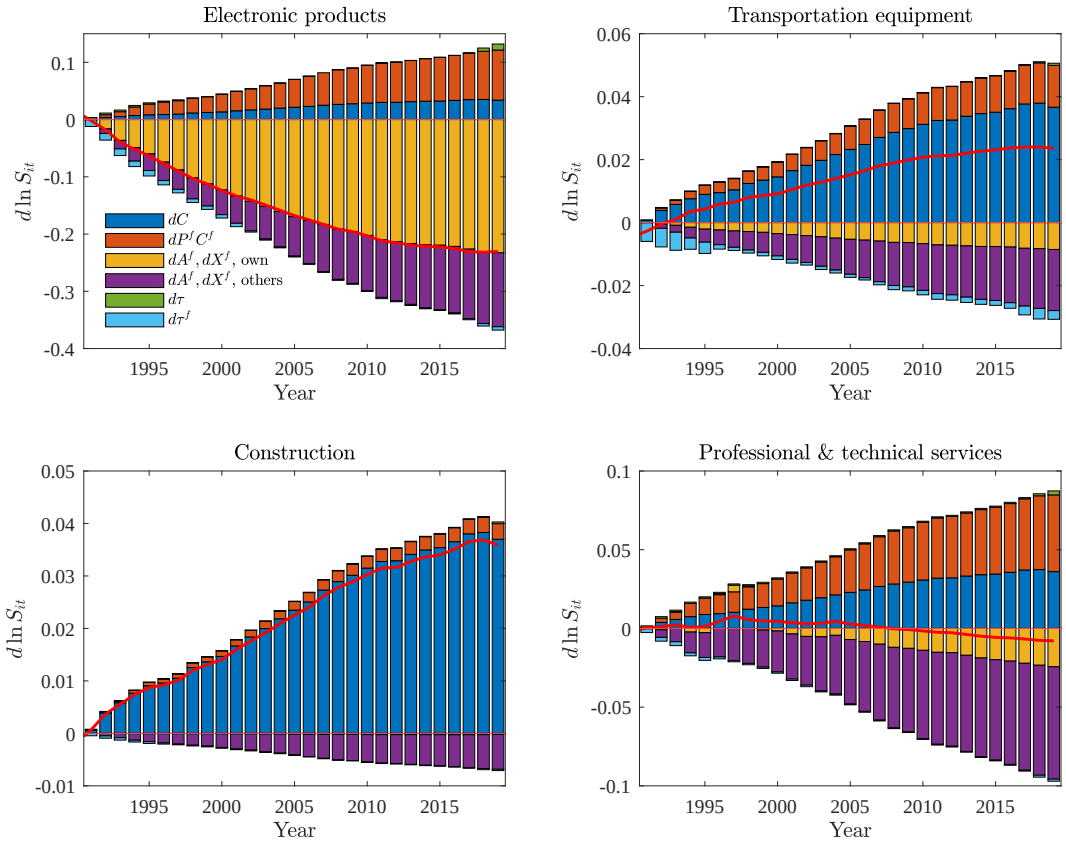
By developing a microfounded framework that highlights economic inequality as a central

Figure 4: Effects of globalization: Contributions of model ingredients



Notes: A 5-year centered moving average is shown.

Figure 5: Effects of globalization: Sectoral output



Notes: The decomposition follows from Proposition 1 in (13). The red solid line indicates the total effect.

force behind backlash against globalization, we contribute to the literature by capturing time-varying support patterns that align with narratives in the media and policy discourse.

Sectoral impact

Figure 5 illustrates the consumption impacts of globalization across selected sectors, highlighting key mechanisms in the model. Full sectoral results are provided in the Appendix Figure A-1.

The adverse effects of foreign productivity and factor input growth on the domestic economy are particularly pronounced in tradable goods sectors. For instance, in the electronic sector (top-left panel), rapid growth of the Chinese industry since the 1990s led to significant displacement of U.S. domestic production. However, globalization can also benefit tradable goods sectors since imports at lower costs, as foreign industries expand, increase the purchasing power of the home country. For example, this effect is apparent in the transportation equipment sector (top-right panel), with its relatively low trade elasticity further reinforcing this benefit.

In non-manufacturing sectors, which are not directly exposed to foreign competition, households generally benefit from globalization through two channels: lower costs of intermediate inputs due to increased trade and more favorable sectoral output prices relative to tradables. This is evident in the construction sector (bottom-left panel). However, some non-tradable sectors may experience negative spillovers if they supply inputs to tradable sectors that face heightened foreign competition. For instance, as discussed in Example 2 of Section 3.3, the professional and technical services sector (bottom-right panel) is deeply interconnected with manufacturing, providing critical services to the sector. As manufacturing contracts under competitive pressures from globalization, reduced intermediate input demand negatively affects this sector as well.

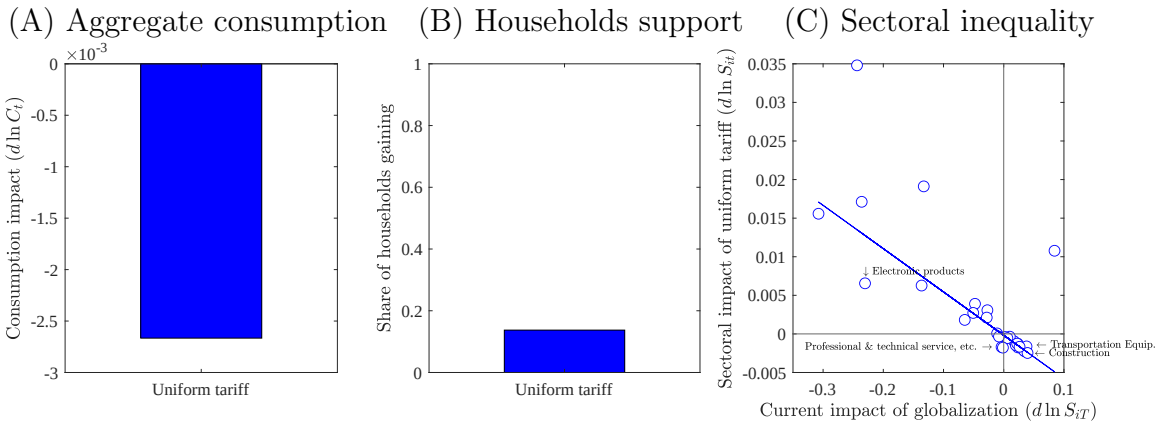
Moreover, Figure A-2 in Appendix shows that differences in wealth holdings introduce additional heterogeneity in globalization's impact. Financial asset not only generates financial income but also mitigates the adverse effects on labor income, creating within-sector disparities. In several tradable sectors, despite the overall negative impact of globalization, a subset of households with substantial financial assets experiences net positive gains.

4.3 Assessing the economic impact of counterfactual tariffs

We further explore the effects of additional tariffs in a counterfactual analysis. Specifically, we consider a uniform tariff increase of 10% on all tradable goods, i.e., $d \ln \tau_{it} = 0.1$ for all $i \in T$.

Figure 6 demonstrates that such a uniform tariff leads to a sizable negative impact on aggregate consumption (0.27% decline in response to 10% uniform tariff). The magnitude is

Figure 6: Counterfactual analysis of uniform tariffs



Notes: Uniform tariff of 10% on all tradable goods is considered. In panel (C), the fitted line is obtained based on the weighted least square.

somewhat larger than prior studies. For instance, Fajgelbaum et al. (2019) estimated that the cost of the higher tariffs in the 2018-19 US China trade war (around 13% increase in the average tariff rate) was 0.04% of GDP. A potential reason is that we take into account sectoral network including non-tradable sectors and thus the cost of tariffs also propagates to non-tradable sectors. We verified that without production network, the aggregate consumption decline due to a uniform tariff is 0.12%, closer to Fajgelbaum et al. (2019)'s estimates.

Importantly, the key takeaway is that the uniform tariff policy does not benefit the majority of households, see Panel (B). While tariffs on a sector's own goods may improve income within that sector, their effects vary across tradable sectors. Additionally, uniform tariffs generally reduce household income due to negative spillovers to other sectors.

However, the uniform tariff policy mitigates inequality by benefiting sectors that have been adversely affected by globalization. Panel (C) illustrates the sectoral impact of the uniform tariff relative to the current effects of globalization. The clearly negative slope indicates that sectors currently negatively (positively) impacted by globalization gain (lose) from the uniform tariff policy.

4.4 Understanding the role of lobbying in trade policy formation

How do such harmful tariffs emerge through political processes? We analyze this question by examining sectoral lobbying in our model.

We recap that η denotes the weight placed on aggregate welfare (higher values of η) versus political contributions (lower values of η), and that σ governs the penalty for output

inequality, with higher values placing more weight on sectoral dispersion, which reduces welfare in the social planner's objective, see (20).

In the five cases we consider, we examine a range of scenarios in which the policymaker places varying emphasis on inequality reduction (via higher σ), both with and without taking lobbying contributions into account:

(C1)	Low σ (No inequality aversion),	No lobbying:	$\sigma = 0$,	$\eta = 1$
(C2)	Med σ (Moderate inequality aversion),	No lobbying:	$\sigma = 1.5$,	$\eta = 1$
(C3)	Med σ (Moderate inequality aversion),	With lobbying:	$\sigma = 1.5$,	$\eta = 0.7$
(C4)	High σ (Strong inequality aversion),	No lobbying:	$\sigma = 5$,	$\eta = 1$
(C5)	High σ (Strong inequality aversion),	With lobbying:	$\sigma = 5$,	$\eta = 0.7$

Figure 7 displays simulated tariffs according to (25).[5]

The left figure in Panel (A) shows a rising trend in implied tariffs over time, with higher inequality aversion (σ) and lower weight on social welfare (η) both contributing to higher tariffs as we move monotonically from C1 to C5. When inequality aversion is absent (C1), the implied tariff rate remains essentially flat.[6] In contrast, increasing σ leads to higher tariffs, as seen by comparing C1 (no inequality aversion) to C2 and C3 (moderate aversion), and further to C4 and C5 (strong aversion). These higher tariffs reflect efforts to reduce sectoral inequality, even at the expense of aggregate consumption. Holding σ fixed, lowering η from 1 to 0.7 (i.e., comparing C2 to C3 and C4 to C5) further raises tariffs due to stronger lobbying influence. Since sectoral lobbying does not internalize the negative externalities its own tariff imposes on other sectors, this leads to additional consumption losses.

Consider (C2), which sets $\eta = 1$, implying no lobbying and a policymaker who maximizes social welfare. Inequality aversion is set at $\sigma = 1.5$, equal to the coefficient of risk aversion, so the policymaker's concern for inequality aligns with households' risk preferences. This configuration results in a moderate increase in tariffs over time, rising to about 12 percentage points above the 2000 level by the end of the sample.

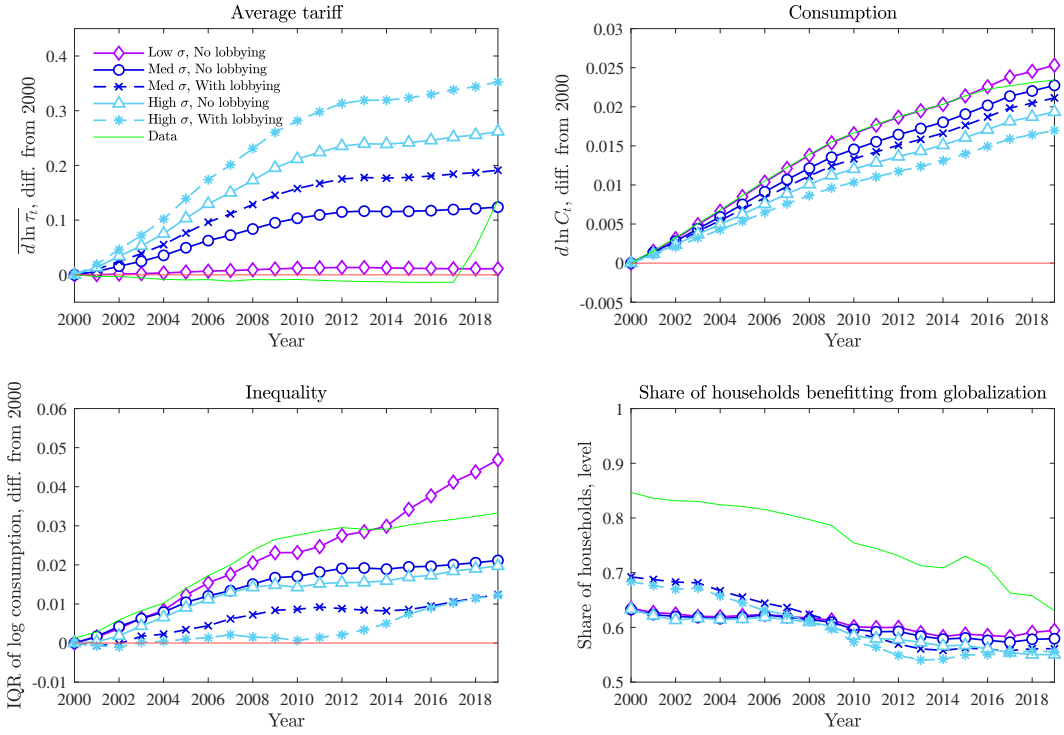
The actual tariff increase during the 2018–19 U.S.–China trade war (green line) is of a similar magnitude. However, it is important to note that sectoral composition differs considerably, as displayed in Panel (B). While actual tariffs are concentrated around 15–25% across most sectors, the model-implied tariffs vary significantly—from 0 to 25%—depending on the underlying conditions of each sector. The social-welfare-maximizing policymaker with

[5] To isolate the role of inequality, we abstract the tariff term in (24); we verify in Appendix that including it does not alter our main findings.

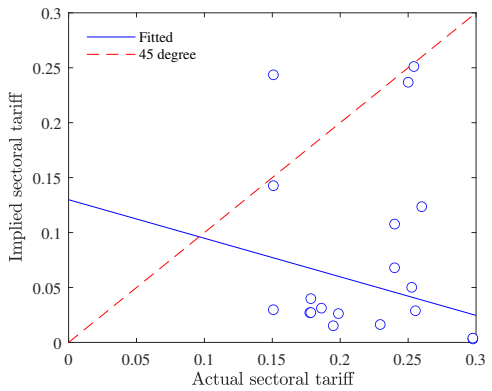
[6] Minor deviations from zero reflect fluctuations in import values, which mechanically affect effective tariff rates.

Figure 7: Endogenous tariff determination

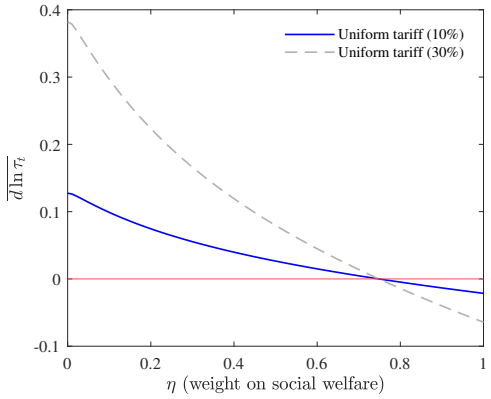
(A) Implied tariff, consumption, and inequality



(B) Actual vs. implied sectoral tariffs



(C) Responses to other sectors' tariffs



Notes: To isolate the role of inequality, we abstract the tariff term in (24). For all panels, we set $\gamma = 1.5$. The average tariff is computed as the effective ratiff rates over import values: $\overline{d\ln\tau_t} = \sum_{i=1}^{n_T} w_{IMi}(d\ln\tau_{it} + d\ln IM_{it})$ where $w_{IMi} = IM_i/IM = D_i(1-\tilde{\xi}_i)/\sum_{i=1}^{n_T} D_i(1-\tilde{\xi}_i)$. Panel (A) sets parameter values as follows: (C1) No inequality aversion, no lobbying: $\sigma = 0$, $\eta = 1$; (C2) Moderate inequality aversion, no lobbying: $\sigma = 1.5$, $\eta = 1$; (C3) Moderate inequality aversion, with lobbying: $\sigma = 1.5$, $\eta = 0.7$; (C4) Strong inequality aversion, no lobbying: $\sigma = 5$, $\eta = 1$; (C5) Strong inequality aversion, with lobbying: $\sigma = 5$, $\eta = 0.7$. Panel (B) shows the actual and model implied sectoral tariffs in 2019, with the model parameters set to (C2). The fitted line is obtained through the WLS. Panel (C) displays the full responses of (26) under $\sigma = 1.5$.

moderate inequality aversion would have imposed more targeted protection, offering greater support to severely impacted sectors while applying lower tariffs elsewhere. This highlights how actual trade policy may have deviated from a socially optimal benchmark due to political distortions.

The implications of these policy scenarios for support for globalization are nuanced. Higher tariffs reduce aggregate consumption but also mitigate inequality, producing offsetting effects on household outcomes. As shown in the bottom-right panel of Panel (A), support for globalization declines relative to the baseline but remains relatively stable—above 50%—indicating that a majority of households continue to benefit from trade even under more protective policies.

Note that we consider values of η equal to 0.7 and 1 to contrast cases in which the government does versus does not value political contributions—effectively capturing the strength of lobbying influence. The literature offers no consensus on the empirical magnitude of η. For example, Goldberg and Maggi (1999) and Gawande and Bandyopadhyay (2000) report values near 1 based on U.S. non-tariff barriers in 1983, while rejecting the null of pure welfare maximization ($\eta = 1$). Irwin and Soderbery (2021) estimate η between 0.15 and 0.27 outside trade agreements, and Ma and McLaren (2018) find values around 0.7 when swing state interests are involved. While precise estimation of η is beyond this paper's scope, we view values strictly below 1 as more realistic; otherwise, the scale of political spending in U.S. politics—as emphasized by Bombardini and Trebbi (2025)—would be difficult to rationalize. We further show that as lobbying influence increases (i.e., as η decreases), rich strategic interactions emerge—highlighting the core mechanism of our model.

Panel (C) is particularly important for our paper, as it illustrates the static intuition behind sectoral interactions, as captured in equation (27). It compares two scenarios with a uniform tariff of either 10% or 30%. In the absence of sectoral interactions, the response lines would be flat. Instead, we observe strongly downward-sloping curves—especially under the 30% uniform tariff, where the slope is markedly steeper. These interactions are shaped by the value of η. When η is high—meaning the policymaker places greater weight on social welfare—strategic substitutability dominates. Sectors partially offset each other's tariffs by reducing lobbying contributions, resulting in an effective average tariff below 10% under the 10% uniform tariff. In contrast, when η is low and lobbying incentives dominate, strategic complementarity emerges: sectors reinforce each other's protection demands, pushing effective tariffs above the initial uniform level.

Panel (C) illustrates the static relationship implied by sectoral complementarity, showing

how each sector responds simultaneously to others as described in equation (27). In practice, however, sectors may react with a lag, giving rise to dynamic escalation: higher protection in one sector can trigger additional lobbying by others, potentially fueling a self-reinforcing cycle of rising tariffs.

5 Conclusion

This paper demonstrates how protectionism emerges endogenously from the unequal distribution of globalization's gains.

We achieve this in two steps. First, our empirical analysis establishes a causal link between economic discontent and policy shifts, showing that households exposed to trade competition with lower wealth are more likely to oppose globalization, while wealthier households—who benefit from financial integration—remain supportive. At the firm level, we document that trade-affected industries engage in lobbying, reinforcing protectionist pressures.

Next, building on these empirical findings, we develop a Ricardian trade model with input-output linkages, heterogeneous households, and endogenous sectoral lobbying. A key feature is dual-layer income heterogeneity, where households' income differs in labor and financial wealth across sectors and within households, leading to asymmetric effects of globalization and creating distinct winners and losers. For example, workers in tradable sectors face wage pressures from import competition, while wealthier households in the same sector might still benefit through financial globalization. This asymmetry widens consumption dispersion and concentrates inequality within a small fraction of the population. Our calibrated model replicates the observed decline in public support for globalization, reflecting shifts in sectoral foreign exposure, wealth distribution, and trade policies.

In the model, the government's policy preferences—particularly inequality aversion—play a central role in shaping tariff outcomes, if trade policy is used to address the distributional consequences of globalization. Higher inequality aversion tends to result in more extensive use of trade protection, even when trade liberalization is efficiency-enhancing at the aggregate level. However, the model also suggests that such support should be targeted specifically to the sectors most affected by trade, while accounting for spillovers through production networks.

Furthermore, trade-affected sectors drive lobbying efforts, which exhibit strategic complementarities or substitutabilities, where one sector's lobbying influences others through input-output linkages. These mechanisms create a self-reinforcing cycle of lobbying-induced protectionism, even when globalization remains beneficial in the aggregate. A welfare im-

plication of this process is that while trade restrictions reduce sectoral disparities, they significantly lower aggregate consumption and economic efficiency. The model highlights how protectionism, once set in motion, can escalate endogenously through lobbying dynamics, making globalization's reversal not just a policy choice but an outcome of economic and political forces.

The results of this paper reinforce an orthodox view of policy framework that emphasizes a coordinated policy approach: rule-based open trade policies to ensure efficiency gains from trade, and domestic redistribution policies to address consequencial disparities. Multilateral institutions such as the WTO play a crucial role in anchoring trade openness by providing a rules-based framework. The externalities introduced by lobbying interdependencies in our model suggest an additional rationale for international coordination—particularly in mitigating unintended spillovers that may arise from domestic distributional concerns.

References

Acemoglu, D., Akcigit, U., and Kerr, W. (2015). Networks and the macroeconomy: An empirical exploration. *NBER Macro Annual*, 30:274–335.

Acemoglu, D., Autor, D., Dorn, D., Hanson, G., and Price, B. (2016). Import competition and the great U.S. employment sag of the 2000s. *Journal of Labor Economics*, 34:S141–S198.

Adão, R., Arkolakis, C., and Ganapati, S. (2020). Aggregate implications of firm heterogeneity: A nonparametric analysis of monopolistic competition trade models. Technical report, National Bureau of Economic Research.

Adda, J. and Fawaz, Y. (2020). The health toll of import competition. *The Economic Journal*, 130(630):1501–1540.

Aiyar, S., Chen, J., Ebeke, C., Ebeke, C. H., Garcia-Saltos, R., Gudmundsson, T., Ilyina, A., Kangur, A., Kunaratskul, T., Rodriguez, M. S. L., et al. (2023). *Geo-economic Fragmentation and the Future of Multilateralism*. International Monetary Fund.

Ambrosino, L., Chan, J., and Tenreyro, S. (2024). *Trade Fragmentation, Inflationary Pressures and Monetary Policy*. Bank for International Settlements, Monetary and Economic Department.

Antràs, P. (2020). De-globalisation? Global value chains in the post-COVID-19 age. Technical report, National Bureau of Economic Research.

Arkolakis, C., Costinot, A., Donaldson, D., and Rodríguez-Clare, A. (2019). The elusive pro-competitive effects of trade. *The Review of Economic Studies*, 86(1):46–80.

Arkolakis, C., Costinot, A., and Rodríguez-Clare, A. (2012). New trade models, same old gains? *American Economic Review*, 102(1):94–130.

Attinasi, M. G., Boeckelmann, L., and Meunier, B. (2023). The economic costs of supply chain decoupling. ECB Working Paper No. 2023/2839.

Autor, D., Dorn, D., Hanson, G., and Majlesi, K. (2020). Importing political polarization? The electoral consequences of rising trade exposure. *American Economic Review*, 110(10):3139–3183.

Autor, D. H. and Dorn, D. (2013). The growth of low-skill service jobs and the polarization of the US labor market. *American Economic Review*, 103(6):2121–68.

Autor, D. H., Dorn, D., and Hanson, G. H. (2013). The China syndrome: Local labor market effects of import competition in the United States. *American Economic Review*, 103(6):2121–68.

Autor, D. H., Dorn, D., and Hanson, G. H. (2021). On the persistence of the China shock. *Brookings Papers on Economic Activity*, Fall 2021:381–447.

Bai, X., Fernández-Villaverde, J., Li, Y., and Zanetti, F. (2024). The causal effects of global supply chain disruptions on macroeconomic outcomes: Evidence and theory. Working Paper 32098, National Bureau of Economic Research.

Baqaee, D. R. (2018). Cascading failures in production networks. *Econometrica*, 86:1819–1838.

Baqaee, D. R. and Farhi, E. (2024). Networks, barriers, and trade. *Econometrica*, 92:505–541.

Becko, J. S. and O'Connor, D. (2024). Strategic (dis) integration. Technical report, Working Paper.

Bertrand, M., Bombardini, M., and Trebbi, F. (2014). Is it whom you know or what you know? An empirical assessment of the lobbying process. *American Economic Review*, 104:3885–3920.

Blanga-Gubbay, M. and Rubinova, S. (2023). Is the global economy fragmenting? World Trade Organization Staff Working Paper 2023-10.

Bloom, N., Bunn, P., Chen, S., Mizen, P., Smietanka, P., and Thwaites, G. (2019). The impact of Brexit on UK firms. NBER Working Paper No. 26218.

Boehm, C., Levchenko, A. A., Pandalai-Nayar, N., and Toma, H. (2024). Dynamic models, new gains from trade? Working Paper 32565, National Bureau of Economic Research.

Bolhuis, M. A., Chen, J., and Kett, B. (2023). Fragmentation in global trade: Accounting for commodities. IMF Working Paper WP/23/73, International Monetary Fund.

Bombardini, M., Cutinelli Rendina, O., and Trebbi, F. (2021). Lobbying behind the frontier. Working Paper 29120, National Bureau of Economic Research.

Bombardini, M. and Trebbi, F. (2020). Empirical models of lobbying. *Annual Review of Economics*, 12:391–413.

Bombardini, M. and Trebbi, F. (2025). The political power of firms. Working Paper 33696, National Bureau of Economic Research.

Bonadio, B., Huo, Z., Kang, E., Levchenko, A. A., Pandalai-Nayar, N., Toma, H., and Topalova, P. (2024). Playing with blocs: Quantifying decoupling. Technical report, EMPCT Working Paper Series 202407, University of Texas.

Bonica, A. (2015). Mapping the ideological marketplace. *American Journal of Political Science*, 58(2):367–386.

Borisov, A., Goldman, E., and Gupta, N. (2015). The corporate value of (corrupt) lobbying. *Review of Financial Studies*, 29:1039–1071.

Bown, C. P., Conconi, P., Erbahar, A., and Trimarchi, L. (2021). Trade protection along supply chains.

Broda, C., ao, N. L., and Weinstein, D. E. (2008). Optimal tariffs and market power: The evidence. *American Economic Review*, 98:2032–65.

Broner, F., Martin, A., Meyer, J., and Trebesch, C. (2024). Hegemonic globalization. Technical report, Working Paper.

Caliendo, L. and Parro, F. (2015). Estimates of the trade and welfare effects of NAFTA. *The Review of Economic Studies*, 82(1):1–44.

Campos, R. G., Estefania-Flores, J., Furceri, D., and Timin, J. (2023). Geopolitical fragmentation and trade. *Journal of Comparative Economics*, 51(4):1289–1315.

Cerdeiro, D. A., Eugster, J., Mano, R. C., Muir, D., and Peiris, S. J. (2021). Sizing up the effects of technological decoupling. IMF Working Paper, WP/21/69.

Che, Y., Lu, Y., Pierce, J. R., Schott, P. K., and Tao, Z. (2022). Did trade liberalization with China influence US elections? *Journal of International Economics*, 139:103652.

Choi, J., Kuziemko, I., Washington, E., and Wright, G. (2024). Local economic and political effects of trade deals: Evidence from NAFTA. *American Economic Review*, 114(6):1540–75.

Clayton, C., Maggiori, M., and Schreger, J. (2024). A theory of economic coercion and fragmentation. Working Paper 33309, National Bureau of Economic Research.

Colantone, I., Ottaviano, G., and Stanig, P. (2022). The backlash of globalization. In *Handbook of international economics*, volume 5, pages 405–477. Elsevier.

Costinot, A. and Rodríguez-Clare, A. (2014). Trade theory with numbers: Quantifying the consequences of globalization. In *Handbook of international economics*, volume 4, pages 197–261. Elsevier.

Davis, B. (2024). How Washington learned to stop worrying and embrace protectionism. *Foreign Policy*. Accessed: 2025-07-15.

Dippel, C., Gold, R., Heblich, S., and Pinto, R. (2022). The effect of trade on workers and voters. *The Economic Journal*, 132(641):199–217.

Dix-Carneiro, R., Pessoa, J. P., Reyes-Heroles, R., and Traiberman, S. (2023). Globalization, trade imbalances, and labor market adjustment. *The Quarterly Journal of Economics*, 138(2):1109–1171.

Di Tella, R. and Rodrik, D. (2020). Labour market shocks and the demand for trade protection: Evidence from online surveys. *The Economic Journal*, 130(628):1008–1030.

Eaton, J. and Kortum, S. (2002). Technology, geography, and trade. *Econometrica*, 70(5):1741–1779.

Fajgelbaum, P. D., Goldberg, P. K., Kennedy, P. J., and Khandelwal, A. K. (2019). Return to protectionism. *Quarterly Journal of Economics*, 135:1–55.

Fajgelbaum, P. D. and Khandelwal, A. K. (2022). The economic impacts of the US–China trade war. *Annual Review of Economics*, 14:205–228.

Fernández-Villaverde, J., Li, Y., Xu, L., and Zanetti, F. (2025). Charting the uncharted: The (un)intended consequences of oil sanctions and dark shipping. Working Paper 33486, National Bureau of Economic Research.

Fernández-Villaverde, J., Mineyama, T., and Song, D. (2024). Are we fragmented yet? Measuring geopolitical fragmentation and its causal effect. Working Paper 32638, National Bureau of Economic Research.

Flaaen, A. and Pierce, J. (2019). Disentangling the effects of the 2018-2019 tariffs on a globally connected U.S. manufacturing sector. Finance and Economics Discussion Series 2019-086, Federal Reserve Board.

Galí, J. (1999). Technology, employment, and the business cycle: Do technology shocks explain aggregate fluctuations? *American Economic Review*, 89(1):249–271.

Galle, S., Rodríguez-Clare, A., and Yi, M. (2022). Slicing the pie: Quantifying the aggregate and distributional effects of trade. *The Review of Economic Studies*, 90(1):331–375.

Gawande, K. and Bandyopadhyay, U. (2000). Is protection for sale? Evidence on the Grossman-Helpman theory of endogenous protection. *Review of Economics and Statistics*, 82(1):139–152.

Góes, C. and Bekkers, E. (2022). The impact of geopolitical conflicts on trade, growth, and innovation. World Trade Organization, Staff Working Paper ERSD-2022-09.

Goldberg, P. and Reed, T. (2023). Is the global economy deglobalizing? *Brookings Papers on Economic Activity Spring*, (2).

Goldberg, P. K. and Maggi, G. (1999). Protection for sale: An empirical investigation. *American Economic Review*, 89(5):1135–1155.

Gopinath, G., Gourinchas, P.-O., Presbitero, A. F., and Topalova, P. (2025). Changing global linkages: A new cold war? *Journal of International Economics*, 153:104042.

Grossman, G. M. and Helpman, E. (1994). Protection for sale. *American Economic Review*, 84(4):833–850.

Grossman, G. M. and Helpman, E. (2020). Identity politics and trade policy. *The Review of Economic Studies*, 88(3):1101–1126.

Guriev, S. and Papaioannou, E. (2022). The political economy of populism. *Journal of Economic Literature*, 60(3):753–832.

Hakobyan, S., Meleshchuk, S., and Zymek, R. (2023). Divided we fall: Differential exposure to geopolitical fragmentation in trade. IMF Working Paper No. 2023/270.

Hirschman, A. O. (1945). *National power and the structure of foreign trade*, volume 105. Univ of California Press.

Irwin, D. A. and Soderbery, A. (2021). Optimal tariffs and trade policy formation: U.S. evidence from the Smoot-Hawley era. NBER Working Paper No. 29115.

Itskhoki, O. and Mukhin, D. (2025). The optimal macro tariff. NBER Working Paper No. 33839.

Javorcik, B. S., Kitzmueller, L., Schweiger, H., and Yıldırım, M. A. (2024). Economic costs of friendshoring. *The World Economy*, 00:1–38.

Jensen, J. B., Quinn, D. P., and Weymouth, S. (2017). Winners and losers in international trade: The effects on US presidential voting. *International Organization*, 71(3):423–457.

Johnson, H. G. (1953). Optimum tariffs and retaliation get access arrow. *The Review of Economic Studies*, 21:142–153.

Jones, W. (1971). A three factor model in theory, trade, and history. *Trade, balance of payments and growth*, pages 3–21.

Kang, K. (2015). Policy influence and private returns from lobbying in the energy sector. *The Review of Economic Studies*, 83(1):269–305.

Keohane, R. O. (1984). *After hegemony: Cooperation and discord in the world political economy*. Princeton university press.

Keohane, R. O. and Nye, J. S. (1973). Power and interdependence. *Survival*, 15(4):158–165.

Kleinman, B., Liu, E., and Redding, S. J. (2024). International friends and enemies. *American Economic Journal: Macroeconomics*, 16(4):350–385.

Leamer, E. E. (1996). In search of Stolper-Samuelson effects on US wages.

Levchenko, A. A. (2016). *Globalization The macroeconomic implications of microeconomic heterogeneity*. World Scientific.

Levchenko, A. A. and Zhang, J. (2014). Ricardian productivity differences and the gains from trade. *European Economic Review*, 65:45–65.

Liu, E. and Yang, D. Y. (2025). International power. Working Paper 34006, National Bureau of Economic Research.

Ma, X. and McLaren, J. (2018). A swing-state theorem, with evidence. NBER Working Paper No. 24425.

Margalit, Y. (2011). Costly jobs: Trade-related layoffs, government compensation, and voting in us elections. *American Political Science Review*, 105(1):166–188.

Melitz, M. J. and Redding, S. J. (2015). New trade models, new welfare implications. *American Economic Review*, 105(3):1105–1146.

Mohr, C. and Trebesch, C. (2024). Geoeconomics. CESifo Working Paper 11564, Munich.

Mussa, M. (1974). Tariffs and the distribution of income: The importance of factor specificity, substitutability, and intensity in the short and long run. *Journal of Political Economy*, 82(6):1191–1203.

Ossa, R. (2014). Trade wars and trade talks with data. *American Economic Review*, 104:4104–4146.

Ossa, R. (2015). Why trade matters after all. *Journal of International Economics*, 97(2):266–277.

Pástor, L. and Veronesi, P. (2021). Inequality aversion, populism, and the backlash against globalization. *The Journal of Finance*, 76(6):2857–2906.

Pflueger, C. and Yared, P. (2024). Global hegemony and exorbitant privilege. Technical report, National Bureau of Economic Research.

Pierce, J. R. and Schott, P. K. (2012). A concordance between ten-digit us harmonized system codes and sic/naics product classes and industries. *Journal of Economic and Social Measurement*, 37:61–96.

Pierce, J. R. and Schott, P. K. (2020). Trade liberalization and mortality: Evidence from US counties. *American Economic Review: Insights*, 2(1):47–64.

Ramondo, N. and Rodríguez-Clare, A. (2013). Trade, multinational production, and the gains from openness. *Journal of Political Economy*, 121(2):273–322.

Rodrik, D. (2021). Why does globalization fuel populism? Economics, culture, and the rise of right-wing populism. *Annual review of economics*, 13(1):133–170.

Sampson, T. (2017). Brexit: The economics of international disintegration. *Journal of Economic Perspectives*, 31:163–184.

Soderbery, A. (2018). Trade elasticities, heterogeneity, and optimal tariffs. *Journal of International Economics*, 114:44–62.

Stolper, W. F. and Samuelson, P. A. (1941). Protection and real wages. *The Review of Economic Studies*, 9(1):58–73.

Suss, J., Kemeny, T., and Connor, D. S. (2024). GEOWEALTH-US: Spatial wealth inequality data for the United States, 1960–2020. *Scientific Data*, 11(253).

Utar, H., Ruiz, L. B. T., and Zurita, A. C. (2023). The US-China trade war and the relocation of global value chains to Mexico. CESifo Working Paper No. 10638.

Zhang, H. (2025). Commerce, coalitions, and global value chains: Coordinated and collective lobbying on trade. *American Journal of Political Science*, n/a(n/a).

Appendix

How Globalization Unravels: A Ricardian Model of Endogenous Trade Policy

A Model Solution

A.1 Lemma 1 (12) and Proposition 1 (13)

Households. The cost minimization over the consumption basket (1)–(2) in the main text yields

$$C_{it}^{Hjh} = \left(\frac{P_{it}}{\lambda_{it}\xi_i}\right)^{-\theta_i} C_{it}^{jh}, \tag{A-1}$$

$$C_{it}^{Fjh} = \left(\frac{\tau_{it}P_{it}^{f}}{\lambda_{it}(1-\xi_i)}\right)^{-\theta_i} C_{it}^{jh}, \tag{A-2}$$

$$C_{it}^{jh} = v_i \left(\frac{\lambda_{it}}{P_t}\right)^{-1} C_t^{jh}, \tag{A-3}$$

$$P_t = \prod_{i=1}^{n} (\lambda_{it})^{v_i}, \tag{A-4}$$

$$\lambda_{it} = \left(\xi_i^{\theta_i} P_{it}^{1-\theta_i} + (1-\xi_i)^{\theta_i} (\tau_{it}P_{it}^{f})^{1-\theta_i}\right)^{\frac{1}{1-\theta_i}}, \tag{A-5}$$

where τ_i is an iceberg trade cost and λ_{it} is a domestic price, which is a composite of home- and foreign-produced goods prices.

The FOC for the intertemporal decision (4)–(5) in the main text leads to the consumption Euler equation:

$$1 = \mathbb{E}_t \left[\beta \left(\frac{C_{t+1}^{jh}}{C_t^{jh}}\right)^{-\gamma} \tilde{R}_{t+1}\right], \tag{A-6}$$

where $\tilde{R}_{t+1} = R_{t+1}/(P_{t+1}/P_t)$ is the real rate of return.

Firms. Profit maximization leads to

$$Y_{ijt}^{H} = \left(\frac{P_{jt}}{\lambda_{jt}\xi_j}\right)^{-\theta_j} Y_{ijt}, \tag{A-7}$$

$$Y_{ijt}^{F} = \left(\frac{\tau_{jt}P_{jt}^{f}}{\lambda_{jt}(1-\xi_j)}\right)^{-\theta_j} Y_{ijt}, \tag{A-8}$$

$$E_{it}X_{it} = \alpha_i P_{it}Y_{it}, \tag{A-9}$$

$$\lambda_{jt}Y_{ijt} = (1-\alpha_i)w_{ij}P_{it}Y_{it}, \tag{A-10}$$

Equation (A-9) indicates that sectoral earnings $E_{it}X_{it}$ are proportional to sales $P_{it}Y_{it}$.

Foreign households and firms. Given the symmetric structure, the FOC are given by

$$C_{it}^{fFjh} = \left(\frac{P_{it}^{f}}{\lambda_{it}^{f}\xi_i^{f}}\right)^{-\theta_i} C_{it}^{fjh}, \tag{A-11}$$

$$C_{it}^{fHjh} = \left(\frac{\tau_{it}^{f}P_{it}}{\lambda_{it}^{f}(1-\xi_i^{f})}\right)^{-\theta_i} C_{it}^{fjh}, \tag{A-12}$$

$$C_{it}^{fjh} = v_i^{f}\left(\frac{\lambda_{it}^{f}}{P_t^{f}}\right)^{-1} C_t^{fjh}, \tag{A-13}$$

$$P_t^{f} = \prod_{i=1}^{n}\left(\lambda_{it}^{f}\right)^{v_i^{f}}, \tag{A-14}$$

$$\lambda_{it}^{f} = \left((\xi_i^{f})^{\theta_i}(P_{it}^{f})^{1-\theta_i} + (1-\xi_i^{f})^{\theta_i}(\tau_{it}^{f}P_{it})^{1-\theta_i}\right)^{\frac{1}{1-\theta_i}}, \tag{A-15}$$

$$1 = \mathbb{E}_t\left[\beta\left(\frac{C_{t+1}^{fjh}}{C_t^{fjh}}\right)^{-\gamma}\tilde{R}_{t+1}^{f}\right], \tag{A-16}$$

$$Y_{ijt}^{fF} = \left(\frac{P_{jt}^{f}}{\lambda_{jt}^{f}\xi_j^{f}}\right)^{-\theta_j} Y_{ijt}^{f}, \tag{A-17}$$

$$Y_{ijt}^{fH} = \left(\frac{\tau_{jt}^{f}P_{jt}}{\lambda_{jt}^{f}(1-\xi_j^{f})}\right)^{-\theta_j} Y_{ijt}^{f}, \tag{A-18}$$

$$E_{it}^{f}X_{it}^{f} = \alpha_i^{f}P_{it}^{f}Y_{it}^{f}, \tag{A-19}$$

$$\lambda_{jt}^{f}Y_{ijt}^{f} = (1-\alpha_i^{f})w_{ij}^{f}P_{it}^{f}Y_{it}^{f}, \tag{A-20}$$

Market clearing. Substituting the FOCs into the market clearing conditions yield

$$\xi_i^{\theta_i}\left(\frac{P_{it}}{\lambda_{it}}\right)^{-\theta_i+1} D_{it} + (1-\xi_i^f)^{\theta_i}(\tau_{it}^f)^{-\theta_i}\left(\frac{P_{it}}{\lambda_{it}^f}\right)^{-\theta_i+1} D_{it}^f = S_{it}, \tag{A-21}$$

$$(1-\xi_i)^{\theta_i}\tau_{it}^{-\theta_i}\left(\frac{P_{it}^f}{\lambda_{it}}\right)^{-\theta_i+1} D_{it} + (\xi_i^f)^{\theta_i}\left(\frac{P_{it}^f}{\lambda_{it}^f}\right)^{-\theta_i+1} D_{it}^f = S_{it}^f, \tag{A-22}$$

$$\text{where} \quad D_{it} = v_i P_t C_t + \sum_{j=1}^{n}(1-\alpha_j) w_{ji} S_{jt}, \tag{A-23}$$

$$D_{it}^f = v_i^f P_t^f C_t^f + \sum_{j=1}^{n}(1-\alpha_j^f) w_{ji}^f S_{jt}^f. \tag{A-24}$$

$S_{it} = P_{it}Y_{it}$ is nominal output and D_{it} and D_{it}^f collect final and intermediate goods demand in the home and foreign economies, respectively.

The first-order approximation. Consider the first-order approximation around $P_i = P_i^f$. Variables without t subscript denote steady-state values. (A-21)–(A-24) lead to

$$-\left\{\tilde{\xi}_i(1-\tilde{\xi}_i)D_i + \tilde{\xi}_i^f(1-\tilde{\xi}_i^f)(\tau_i^f)^{-1}D_i^f\right\}(\theta_i-1)(d\ln P_{it} - d\ln P_{it}^f) + \tilde{\xi}_i D_i d\ln D_{it} \tag{A-25}$$
$$+ (1-\tilde{\xi}_i^f)(\tau_i^f)^{-1}D_i^f d\ln D_{it}^f + \tilde{\xi}_i(1-\tilde{\xi}_i)D_i(\theta_i-1)d\ln\tau_{it}$$
$$-\left\{-(1-\tilde{\xi}_i^f)(\theta_i-1)+\theta_i\right\}(1-\tilde{\xi}_i^f)(\tau_i^f)^{-1}D_i^f d\ln\tau_{it}^f = S_i d\ln S_{it}, \tag{A-26}$$

$$\left\{\tilde{\xi}_i(1-\tilde{\xi}_i)\tau_i^{-1}D_i + \tilde{\xi}_i^f(1-\tilde{\xi}_i^f)D_i^f\right\}(\theta_i-1)(d\ln P_{it} - d\ln P_{it}^f) + (1-\tilde{\xi}_i)\tau_i^{-1}D_i d\ln D_{it} + \tilde{\xi}_i^f D_i^f d\ln D_{it}^f$$
$$+\tilde{\xi}_i^f(1-\tilde{\xi}_i^f)D_i^f(\theta_i-1)d\ln\tau_{it}^f - \left\{-(1-\tilde{\xi}_i)(\theta_i-1)+\theta_i\right\}(1-\tilde{\xi}_i)\tau_i^{-1}D_i d\ln\tau_{it} = S_i^f d\ln S_{it}^f, \tag{A-27}$$

$$\text{where} \quad D_i d\ln D_{it} = v_i d\ln(P_t C_t) + \sum_{j=1}^{n}(1-\alpha_j)w_{ji}S_j d\ln S_{jt}, \tag{A-28}$$

$$D_i^f d\ln D_{it}^f = v_i^f P^f C^f d\ln(P_t^f C_t^f) + \sum_{j=1}^{n}(1-\alpha_j^f)w_{ji}^f S_j^f d\ln S_{jt}^f. \tag{A-29}$$

$\tilde{\xi}_i = \xi_i^{\theta_i}/(\xi_i^{\theta_i} + (1-\xi_i)^{\theta_i}\tau_i^{1-\theta_i})$ and $\tilde{\xi}_i^f = (\xi_i^f)^{\theta_i}/((\xi_i^f)^{\theta_i} + (1-\xi_i^f)^{\theta_i}(\tau_i^f)^{1-\theta_i})$ are the steady-state share of domestic goods. The derivation used the first-order approximation of (A-5) and (A-15):

$$d\ln\lambda_{it} = \tilde{\xi}_i d\ln P_{it} + (1-\tilde{\xi}_i)(d\ln P_{it}^f + d\ln\tau_{it}), \tag{A-30}$$

$$d\ln\lambda_{it}^f = \tilde{\xi}_i^f d\ln P_{it}^f + (1-\tilde{\xi}_i^f)(d\ln P_{it} + d\ln\tau_{it}^f), \tag{A-31}$$

We also assume $\tau_i = \tau_i^f = 1$ in the baseline case. In a matrix form,

$$-\left\{\tilde{\boldsymbol{\xi}}(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})\boldsymbol{D}+\tilde{\boldsymbol{\xi}}^f(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\boldsymbol{D}^f\right\}(\boldsymbol{\theta}-\boldsymbol{I})(d\ln\boldsymbol{P}_t-d\ln\boldsymbol{P}_t^f)+\tilde{\boldsymbol{\xi}}\boldsymbol{D}d\ln\boldsymbol{D}_t+(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\boldsymbol{D}^f d\ln\boldsymbol{D}_t^f$$
$$+\tilde{\boldsymbol{\xi}}(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})\boldsymbol{D}(\boldsymbol{\theta}-\boldsymbol{I})d\ln\boldsymbol{\tau}_t-\left\{-(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)(\boldsymbol{\theta}-\boldsymbol{I})+\boldsymbol{\theta}\right\}(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\boldsymbol{D}^f d\ln\boldsymbol{\tau}_t^f=\boldsymbol{S}d\ln\boldsymbol{S}_t, \tag{A-32}$$

$$\left\{\tilde{\boldsymbol{\xi}}(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})\boldsymbol{D}+\tilde{\boldsymbol{\xi}}^f(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\boldsymbol{D}^f\right\}(\boldsymbol{\theta}-\boldsymbol{I})(d\ln\boldsymbol{P}_t-d\ln\boldsymbol{P}_t^f)+(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})\boldsymbol{D}d\ln\boldsymbol{D}_t+\tilde{\boldsymbol{\xi}}^f\boldsymbol{D}^f d\ln\boldsymbol{D}_t^f$$
$$+\tilde{\boldsymbol{\xi}}^f(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\boldsymbol{D}^f(\boldsymbol{\theta}-\boldsymbol{I})d\ln\boldsymbol{\tau}_t^f-\left\{-(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})(\boldsymbol{\theta}-\boldsymbol{I})+\boldsymbol{\theta}\right\}(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})\boldsymbol{D}d\ln\boldsymbol{\tau}_t=\boldsymbol{S}^f d\ln\boldsymbol{S}_t^f, \tag{A-33}$$

where
$$\boldsymbol{D}d\ln\boldsymbol{D}_t=\boldsymbol{v}PCd\ln(P_tC_t)+(\boldsymbol{I}-\boldsymbol{\alpha})\boldsymbol{W}'\boldsymbol{S}d\ln\boldsymbol{S}_t, \tag{A-34}$$
$$\boldsymbol{D}^f d\ln\boldsymbol{D}_t^f=\boldsymbol{v}^f P^f C^f d\ln(P_t^f C_t^f)+(\boldsymbol{I}-\boldsymbol{\alpha}^f)\boldsymbol{W}^{f'}\boldsymbol{S}^f d\ln\boldsymbol{S}_t^f. \tag{A-35}$$

Combining (A-32) and (A-33) yields

$$\boldsymbol{D}d\ln\boldsymbol{D}_t+\boldsymbol{D}^f d\ln\boldsymbol{D}_t^f-(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})\boldsymbol{D}d\ln\boldsymbol{\tau}_t-(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\boldsymbol{D}^f d\ln\boldsymbol{\tau}_t^f=\boldsymbol{S}d\ln\boldsymbol{S}_t+\boldsymbol{S}^f d\ln\boldsymbol{S}_t^f, \tag{A-36}$$

or

$$\boldsymbol{v}PCd\ln(P_tC_t)+\boldsymbol{v}^f P^f C^f d\ln(P_t^f C_t^f)-(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})\boldsymbol{D}d\ln\boldsymbol{\tau}_t-(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\boldsymbol{D}^f d\ln\boldsymbol{\tau}_t^f$$
$$=\boldsymbol{V}'^{-1}\boldsymbol{S}d\ln\boldsymbol{S}_t+\boldsymbol{V}^{f'-1}\boldsymbol{S}^f d\ln\boldsymbol{S}_t^f, \tag{A-37}$$

where $\boldsymbol{V}=\{\boldsymbol{I}-(\boldsymbol{I}-\boldsymbol{\alpha})\boldsymbol{W}\}^{-1}$ and $\boldsymbol{V}^f=\left\{\boldsymbol{I}-(\boldsymbol{I}-\boldsymbol{\alpha}^f)\boldsymbol{W}^f\right\}^{-1}$ are the Leontief inverse.

Substituting (A-37) back to (A-32) yields

$$\underbrace{\boldsymbol{S}d\ln\boldsymbol{S}_t}_{\text{Output}}=\underbrace{\tilde{\boldsymbol{V}}'}_{\text{Network}}\Bigg\{\underbrace{-\tilde{\boldsymbol{\theta}}}_{\text{Elasticity}}\underbrace{(d\ln\boldsymbol{P}_t-d\ln\boldsymbol{P}_t^f)}_{\text{Relative price}}\underbrace{+\tilde{\boldsymbol{v}}PCd\ln(P_tC_t)}_{\text{Home aggregate demand}}\underbrace{+\tilde{\boldsymbol{v}}^f P^f C^f d\ln(P_t^f C_t^f)}_{\text{Foreign aggregate demand}}$$
$$\underbrace{+\boldsymbol{\eta}d\ln\boldsymbol{\tau}_t-\boldsymbol{\eta}^f d\ln\boldsymbol{\tau}_t^f}_{\text{Tariff}}\Bigg\}, \tag{A-38}$$

where
$$\tilde{\boldsymbol{V}}'=\underbrace{\boldsymbol{V}'}_{\text{Production network}}\underbrace{\left\{\boldsymbol{I}+(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})(\boldsymbol{V}'-\boldsymbol{I})+(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)(\boldsymbol{V}^{f'}-\boldsymbol{I})\right\}^{-1}}_{\text{Effect of trade}}$$

and

$$\tilde{\boldsymbol{\theta}} = \left\{ \underbrace{\tilde{\boldsymbol{\xi}}}_{\frac{\partial(d\ln \boldsymbol{P}_t - d\ln \boldsymbol{\lambda}_t)}{\partial(d\ln \boldsymbol{P}_t - d\ln \boldsymbol{P}_t^f)}} \underbrace{(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})\boldsymbol{D}}_{\text{Imports}} + \underbrace{\tilde{\boldsymbol{\xi}}^f}_{\frac{\partial(d\ln \boldsymbol{P}_t - d\ln \boldsymbol{\lambda}_t^f)}{\partial(d\ln \boldsymbol{P}_t - d\ln \boldsymbol{P}_t^f)}} \underbrace{(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\boldsymbol{D}^f}_{\text{Exports}} \right\} (\boldsymbol{\theta}-\boldsymbol{I})$$

are the Leontief inverse and demand elasticity, respectively, adjusted with trade. $\tilde{\boldsymbol{V}}$ reflects propagation through domestic production net work $\boldsymbol{V}$, but the impact is mitigated as the imported goods part $(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})$ falls out from domestic propagation. $\tilde{\boldsymbol{\theta}}$ is adjusted with the amounts of imports and exports ($(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})\boldsymbol{D}$ and $(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\boldsymbol{D}^f$) and rescaled to the impact of the home and foreign price differential ($\tilde{\boldsymbol{\xi}}$ and $\tilde{\boldsymbol{\xi}}^f$).

$\tilde{\boldsymbol{v}} = \left\{\tilde{\boldsymbol{\xi}} + (\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)(\boldsymbol{V}^{f'}-\boldsymbol{I})\right\}\boldsymbol{v}$ and $\tilde{\boldsymbol{v}}^f = (\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\boldsymbol{V}^{f'}\boldsymbol{v}^f$ represent sectoral elasticity with respect to aggregate demand. $\boldsymbol{\eta} = \left\{\tilde{\boldsymbol{\xi}}(\boldsymbol{\theta}-\boldsymbol{I}) - (\boldsymbol{I}-\tilde{\boldsymbol{\xi}})(\boldsymbol{V}^{f'}-\boldsymbol{I})\right\}(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})\boldsymbol{D}$ and $\boldsymbol{\eta}^f = \left\{\tilde{\boldsymbol{\xi}}^f(\boldsymbol{\theta}-\boldsymbol{I}) + (\boldsymbol{I}-\tilde{\boldsymbol{\xi}})(\boldsymbol{V}^{f'}-\boldsymbol{I}) + \boldsymbol{\theta}\right\}(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\boldsymbol{D}^f$. (A-38) indicates that sectoral outputs are inversely related to the relative price between home and foreign goods while positively affected by home and foreign aggregate demand, which is amplified by production network. The sign of $\boldsymbol{\eta}$ is ambiguous as higher tariffs attenuate imports of foreign goods on the one hand while they reduce domestic demand on the other hand. Note that, without trade, i.e., $\tilde{\boldsymbol{\xi}} = \boldsymbol{I}$, (A-38) collapses to

$$\boldsymbol{S}d\ln \boldsymbol{S}_t = \boldsymbol{V}'\boldsymbol{v}PCd\ln(P_tC_t). \tag{A-39}$$

In another simplified example, without production network, i.e., $\boldsymbol{\alpha} = \boldsymbol{\alpha}^f = \boldsymbol{I}$, we can show $\tilde{\boldsymbol{V}} = \boldsymbol{V} = \boldsymbol{I}$, $\tilde{\boldsymbol{v}} = \tilde{\boldsymbol{\xi}}\boldsymbol{v}$, $\tilde{\boldsymbol{v}}^f = (\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\boldsymbol{v}^f$, $\boldsymbol{\eta} = \tilde{\boldsymbol{\xi}}(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})(\boldsymbol{\theta}-\boldsymbol{I})\boldsymbol{D}$, $\boldsymbol{\eta}^f = \{\tilde{\boldsymbol{\xi}}^f(\boldsymbol{\theta}-\boldsymbol{I})+\boldsymbol{\theta}\}(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\boldsymbol{D}^f$, $\boldsymbol{D} = \boldsymbol{v}PC$, and $\boldsymbol{D}^f = \boldsymbol{v}^fP^fC^f$, implying that $\tilde{\boldsymbol{V}}$, $\boldsymbol{\eta}$, $\boldsymbol{\eta}^f$ are diagonal and thus there is no sectoral propagation.

National accounting.

Home country's nominal GDP is given by

$$GDP_t = P_tC_t + \underbrace{\sum_{i=1}^{n}(1-\xi_i^f)^{\theta_i}(\tau_{it}^f)^{-\theta_i}\left(\frac{P_{it}}{\lambda_{it}^f}\right)^{-\theta_i+1}D_{it}^f}_{=EX_t:\text{Exports}} - \underbrace{\sum_{i=1}^{n}(1-\xi_i)^{\theta_i}\tau_{it}^{-\theta_i}\left(\frac{P_{it}^f}{\lambda_{it}}\right)^{-\theta_i+1}D_{it}}_{=IM_t:\text{Imports}}. \tag{A-40}$$

In the first order,

$$\begin{aligned} dGDP_t &= d(P_tC_t) + \sum_{i=1}^{n}(1-\tilde{\xi}_i^f)\left\{-\theta_i D_i^f d\ln\tau_{it}^f - (\theta_i-1)D_i^f(d\ln P_{it} - d\ln\lambda_{it}^f) + dD_{it}^f\right\} \\ &\quad - \sum_{i=1}^{n}(1-\tilde{\xi}_i)\left\{-\theta_i D_i d\ln\tau_{it} - (\theta_i-1)D_i(d\ln P_{it}^f - d\ln\lambda_{it}) + dD_{it}\right\} \\ &= d(P_tC_t) + \mathbf{1}'(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)d\boldsymbol{D}_t^f - \mathbf{1}'(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})d\boldsymbol{D}_t - \mathbf{1}'\tilde{\boldsymbol{\theta}}(d\ln\boldsymbol{P}_t - d\ln\boldsymbol{P}_t^f) \\ &\quad + \mathbf{1}'(\boldsymbol{I}+(\boldsymbol{\theta}-\boldsymbol{I})\tilde{\boldsymbol{\xi}})(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})\boldsymbol{D}d\ln\boldsymbol{\tau}_t - \mathbf{1}'(\boldsymbol{I}+(\boldsymbol{\theta}-\boldsymbol{I})\tilde{\boldsymbol{\xi}}^f)(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\boldsymbol{D}^f d\ln\boldsymbol{\tau}_t^f. \end{aligned} \tag{A-41}$$

The production approach yields

$$GDP_t = \sum_{i=1}^{n}\alpha_i S_{it}, \tag{A-42}$$

and

$$dGDP_t = \mathbf{1}'\boldsymbol{\alpha}d\boldsymbol{S}_t. \tag{A-43}$$

Using the symmetry of home and foreign economies, (A-41) and (A-43) imply

$$\mathbf{1}'\boldsymbol{\alpha}d\boldsymbol{S}_t + \mathbf{1}'\boldsymbol{\alpha}^f d\boldsymbol{S}_t^f = d(P_tC_t) + d(P_t^fC_t^f). \tag{A-44}$$

Production function. Production function together with FOCs determines the relation of sales with prices and factor inputs:

$$\boldsymbol{\alpha}d\ln\boldsymbol{S}_t = d\ln\boldsymbol{A}_t + \boldsymbol{\alpha}d\ln\boldsymbol{X}_t + \boldsymbol{V}^{-1}d\ln\boldsymbol{P}_t + (\boldsymbol{I}-\boldsymbol{\alpha})\boldsymbol{W}(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})(d\ln\boldsymbol{P}_t - d\ln\boldsymbol{P}_t^f - d\ln\boldsymbol{\tau}_t), \tag{A-45}$$

$$\boldsymbol{\alpha}^f d\ln\boldsymbol{S}_t^f = d\ln\boldsymbol{A}_t^f + \boldsymbol{\alpha}^f d\ln\boldsymbol{X}_t^f + \boldsymbol{V}^{f-1}d\ln\boldsymbol{P}_t^f - (\boldsymbol{I}-\boldsymbol{\alpha}^f)\boldsymbol{W}^f(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)(d\ln\boldsymbol{P}_t + d\ln\boldsymbol{\tau}_t^f - d\ln\boldsymbol{P}_t^f), \tag{A-46}$$

Combining (A-45) and (A-46), we obtain

$$\begin{aligned} d\ln\boldsymbol{P}_t - d\ln\boldsymbol{P}_t^f &= \left\{\boldsymbol{I}+(\boldsymbol{V}-\boldsymbol{I})(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}) + (\boldsymbol{V}^f-\boldsymbol{I})(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\right\}^{-1} \\ &\quad \left\{\boldsymbol{V}(\boldsymbol{\alpha}d\ln\boldsymbol{S}_t - d\ln\boldsymbol{A}_t - \boldsymbol{\alpha}d\ln\boldsymbol{X}_t) - \boldsymbol{V}^f(\boldsymbol{\alpha}^f d\ln\boldsymbol{S}_t^f - d\ln\boldsymbol{A}_t^f - \boldsymbol{\alpha}^f d\ln\boldsymbol{X}_t^f)\right. \\ &\quad \left.+(\boldsymbol{V}-\boldsymbol{I})(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})d\ln\boldsymbol{\tau}_t - (\boldsymbol{V}^f-\boldsymbol{I})(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)d\ln\boldsymbol{\tau}_t^f\right\}, \end{aligned} \tag{A-47}$$

Closed-form solution. (A-32), (A-37), (A-41), (A-43), (A-44), (A-47) solve for
$\{d\ln \boldsymbol{S}_t, d\ln \boldsymbol{S}_t^f, d\ln(P_tC_t), d\ln(P_t^fC_t^f), d\ln \boldsymbol{P}_t - d\ln \boldsymbol{P}_t^f\}$,
given $\{d\ln \boldsymbol{A}, d\ln \boldsymbol{A}^f, d\ln \boldsymbol{X}, d\ln \boldsymbol{X}^f, d\ln \boldsymbol{\tau}, d\ln \boldsymbol{\tau}^f\}$.

Substituting (A-37) into (A-47) eliminates $d\ln \boldsymbol{S}_t^f$:

$$\begin{aligned} d\ln \boldsymbol{P}_t - d\ln \boldsymbol{P}_t^f = \boldsymbol{c}_1^{-1}\Big\{&\boldsymbol{c}_2\boldsymbol{S}d\ln \boldsymbol{S}_t - \boldsymbol{c}_3(\boldsymbol{v}PCd\ln P_tC_t + \boldsymbol{v}^fP^fC^fd\ln P_t^fC_t^f) \\ &-\boldsymbol{V}(d\ln \boldsymbol{A}_t + \boldsymbol{\alpha}d\ln \boldsymbol{X}_t) + \boldsymbol{V}^f(d\ln \boldsymbol{A}_t^f + \boldsymbol{\alpha}^f d\ln \boldsymbol{X}_t^f) \\ &+\boldsymbol{c}_4 d\ln \boldsymbol{\tau}_t - \boldsymbol{c}_5 d\ln \boldsymbol{\tau}_t^f\Big\}, \end{aligned} \tag{A-48}$$

where $\boldsymbol{c}_1 = \boldsymbol{I} + (\boldsymbol{V}-\boldsymbol{I})(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}) + (\boldsymbol{V}^f-\boldsymbol{I})(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)$, $\boldsymbol{c}_2 = \boldsymbol{V}\boldsymbol{\alpha}\boldsymbol{S}^{-1} + \boldsymbol{V}^f\boldsymbol{\alpha}^f\boldsymbol{S}^{f-1}\boldsymbol{V}^{f\prime}\boldsymbol{V}'^{-1}$, $\boldsymbol{c}_3 = \boldsymbol{V}^f\boldsymbol{\alpha}^f\boldsymbol{S}^{f-1}\boldsymbol{V}^{f\prime}$, $\boldsymbol{c}_4 = \{\boldsymbol{V}^f\boldsymbol{\alpha}^f\boldsymbol{S}^{f-1}\boldsymbol{V}^{f\prime}\boldsymbol{D} + (\boldsymbol{V}-\boldsymbol{I})\}(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})$, and $\boldsymbol{c}_5 = \{\boldsymbol{V}^f\boldsymbol{\alpha}^f\boldsymbol{S}^{f-1}\boldsymbol{V}^{f\prime}\boldsymbol{D}^f + (\boldsymbol{V}^f-\boldsymbol{I})\}(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)$. Combining (A-38) and (A-48) finally pins down the relation between $\boldsymbol{S}_t$ and exogenous variables as well as aggregate demand, eliminating relative price:

$$\begin{aligned} \boldsymbol{S}d\ln \boldsymbol{S}_t = \check{\boldsymbol{V}}'\Big[&\check{\boldsymbol{v}}PCd\ln(P_tC_t) + \check{\boldsymbol{v}}^fP^fC^fd\ln(P_t^fC_t^f) \\ &+\check{\boldsymbol{\theta}}\Big\{\boldsymbol{V}(d\ln \boldsymbol{A}_t + \boldsymbol{\alpha}d\ln \boldsymbol{X}_t) - \boldsymbol{V}^f(d\ln \boldsymbol{A}_t^f + \boldsymbol{\alpha}^f d\ln \boldsymbol{X}_t^f)\Big\} + \check{\boldsymbol{\eta}}d\ln \boldsymbol{\tau}_t - \check{\boldsymbol{\eta}}^f d\ln \boldsymbol{\tau}_t^f\Big], \end{aligned} \tag{A-49}$$

where

$$\check{\boldsymbol{V}}' = \left\{\tilde{\boldsymbol{V}}'^{-1} + \underbrace{\tilde{\boldsymbol{\theta}}\boldsymbol{c}_1^{-1}\boldsymbol{c}_2}_{\text{Price effect}}\right\}^{-1},$$

and $\check{\boldsymbol{v}} = \tilde{\boldsymbol{v}} + \tilde{\boldsymbol{\theta}}\boldsymbol{c}_1^{-1}\boldsymbol{c}_3\boldsymbol{v}$, $\check{\boldsymbol{v}}^f = \tilde{\boldsymbol{v}}^f + \tilde{\boldsymbol{\theta}}\boldsymbol{c}_1^{-1}\boldsymbol{c}_3\boldsymbol{v}^f$, $\check{\boldsymbol{\theta}} = \tilde{\boldsymbol{\theta}}\boldsymbol{c}_1^{-1}$, $\check{\boldsymbol{\eta}} = \boldsymbol{\eta} - \tilde{\boldsymbol{\theta}}\boldsymbol{c}_1^{-1}\boldsymbol{c}_4$, $\check{\boldsymbol{\eta}}^f = \boldsymbol{\eta}^f + \tilde{\boldsymbol{\theta}}\boldsymbol{c}_1^{-1}\boldsymbol{c}_5$. Note that the propagation through $\check{\boldsymbol{V}}'$ is mitigated, compared to $\tilde{\boldsymbol{V}}'$, due to the price impact of output fluctuations. That is, higher sectoral output leads to higher domestic prices in (A-48), which carve out demand.

A.2 Equilibrium computation

Conditions (A-32), (A-33), (A-41), (A-43), (A-44), (A-45), (A-46), and identities

$$d\ln \boldsymbol{S}_t = d\ln \boldsymbol{P}_t + d\ln \boldsymbol{Y}_t, \tag{A-50}$$

$$d\ln \boldsymbol{S}_t^f = d\ln \boldsymbol{P}_t^f + d\ln \boldsymbol{Y}_t^f, \tag{A-51}$$

provide 8 sets of linear equations to solve for 8 endogenous variables (vectors)
$\{\boldsymbol{S}_t, \boldsymbol{S}_t^f, \boldsymbol{P}_t, \boldsymbol{P}_t^f, \boldsymbol{Y}_t, \boldsymbol{Y}_t^f, P_tC_t, P_t^fC_t^f\}$ given exogenous variables $\{\boldsymbol{A}_t, \boldsymbol{A}_t^f, \boldsymbol{X}_t, \boldsymbol{X}_t^f, \boldsymbol{\tau}_t, \boldsymbol{\tau}_t^f\}$. Other

variables are calculated accordingly using respective conditions.

A.3 Examples

A.3.1 Example 1 (14)

We need $\check{\boldsymbol{V}}$ and $\check{\boldsymbol{\theta}}$ to obtain the derivative $d\ln \boldsymbol{S}_t / d\ln \boldsymbol{A}_t^f$ as

$$\left.\frac{d\ln \boldsymbol{S}_t}{d\ln \boldsymbol{A}_t^f}\right|_{P_tC_t, P_t^f C_t^f \text{ fixed}} = -\check{\boldsymbol{V}}\check{\boldsymbol{\theta}}\boldsymbol{V}^f. \tag{A-52}$$

In the horizontal network case, $\boldsymbol{V} = \tilde{\boldsymbol{V}} = \boldsymbol{I}$, $c_1 = \boldsymbol{I}$, and $c_2 = \boldsymbol{S}^{-1} + \boldsymbol{S}^{f-1}$. It follows $\check{\boldsymbol{V}} = \left(\boldsymbol{I} + \tilde{\boldsymbol{\theta}}(\boldsymbol{S}^{-1} + \boldsymbol{S}^{f-1})\right)^{-1}$ and $\check{\boldsymbol{\theta}} = \tilde{\boldsymbol{\theta}}$. Then, we obtain

$$\left[\begin{array}{cc} \frac{dS_{1t}}{d\ln A_{1t}} & \frac{dS_{1t}}{d\ln A_{2t}} \\ \frac{dS_{2t}}{d\ln A_{1t}} & \frac{dS_{2t}}{d\ln A_{2t}} \end{array}\right]\Bigg|_{P_tC_t, P_t^f C_t^f \text{ fixed}} = \left[\begin{array}{cc} -\frac{\tilde{\theta}_1}{1+\tilde{\theta}_1(S_1^{-1}+S_1^{f-1})} & 0 \\ 0 & -\frac{\tilde{\theta}_2}{1+\tilde{\theta}_2(S_2^{-1}+S_2^{f-1})} \end{array}\right]. \tag{A-53}$$

A.3.2 Example 2 (16)

As sector 1 is non-tradable, $\tilde{\xi}_1 = 1$ and $\tilde{\theta}_1 = 0$. Then,

$$\boldsymbol{V} = \left[\begin{array}{cc} 1 & 0 \\ 1 & 1 \end{array}\right],\ \tilde{\boldsymbol{V}} = \left[\begin{array}{cc} 1 & 0 \\ 1 & 1 \end{array}\right],\ c_1 = \left[\begin{array}{cc} 1 & 0 \\ 0 & 1 \end{array}\right],\ c_2 = \left[\begin{array}{cc} S^{-1}+S^{f-1} & 0 \\ S^{-1}+S^{f-1} & 0 \end{array}\right]. \tag{A-54}$$

It follows that

$$\check{\boldsymbol{V}} = \frac{1}{1+\tilde{\theta}_2(S_1^{-1}+S_1^{f-1})}\left[\begin{array}{cc} \tilde{\theta}_2(S_2^{-1}+S_2^{f-1}) & -\tilde{\theta}_2(S_1^{-1}+S_1^{f-1}) \\ 1 & 1 \end{array}\right],\ \check{\boldsymbol{\theta}} = \left[\begin{array}{cc} 0 & 0 \\ 0 & \tilde{\theta}_2 \end{array}\right]. \tag{A-55}$$

We obtain

$$\left[\begin{array}{cc} \frac{dS_{1t}}{d\ln A_{1t}} & \frac{dS_{1t}}{d\ln A_{2t}} \\ \frac{dS_{2t}}{d\ln A_{1t}} & \frac{dS_{2t}}{d\ln A_{2t}} \end{array}\right]\Bigg|_{P_tC_t, P_t^f C_t^f \text{ fixed}} = -\frac{\tilde{\theta}_2}{1+\tilde{\theta}_2(S_1^{-1}+S_1^{f-1})}\left[\begin{array}{cc} 1 & 1 \\ 1 & 1 \end{array}\right]. \tag{A-56}$$

A.3.3 Example 3 (17)

In this case, $\tilde{\xi}_2 = 1$ and $\tilde{\theta}_2 = 0$. Also,

$$\boldsymbol{V} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}, \ \tilde{\boldsymbol{V}} = \begin{bmatrix} 1+2(1-\tilde{\xi}_1) & 2(1-\tilde{\xi}_1) \\ 1 & 1 \end{bmatrix}, \ c_1 = \begin{bmatrix} 1 & 0 \\ 2(1-\tilde{\xi}_1) & 1 \end{bmatrix}, \ c_2 = \begin{bmatrix} S^{-1}+S^{f-1} & 0 \\ S^{-1}+S^{f-1} & 0 \end{bmatrix}, \tag{A-57}$$

which lead to

$$\check{\boldsymbol{V}} = \frac{1}{\left(1+\tilde{\theta}_2(S_1^{-1}+S_1^{f-1})\right)\left(1+(1-\tilde{\xi}_1)\right)+2(1-\tilde{\xi}_1)} \begin{bmatrix} 1+(1-\tilde{\xi}_1) & -2(1-\tilde{\xi}_1) \\ 1 & 1+\tilde{\theta}_2(S_1^{-1}+S_1^{f-1}) \end{bmatrix},$$
$$\check{\boldsymbol{\theta}} = \begin{bmatrix} \tilde{\theta}_1 & 0 \\ 0 & 0 \end{bmatrix}. \tag{A-58}$$

Then,

$$\begin{bmatrix} \frac{dS_{1t}}{d\ln A_{1t}} & \frac{dS_{1t}}{d\ln A_{2t}} \\ \frac{dS_{2t}}{d\ln A_{1t}} & \frac{dS_{2t}}{d\ln A_{2t}} \end{bmatrix}\Bigg|_{P_tC_t, P_t^f C_t^f \text{ fixed}} = c \begin{bmatrix} -\left(1+(1-\tilde{\xi}_1)\right) & 0 \\ 2(1-\tilde{\xi}_1) & 0 \end{bmatrix}, \tag{A-59}$$

where $c = \tilde{\theta}_1 \left[\left\{1+\tilde{\theta}_1(S_1^{-1}+S_1^{f-1})\right\}\left\{1+(1-\tilde{\xi}_1)\right\}+2(1-\tilde{\xi}_1)\right]^{-1}$.

A.4 Endogenous tariff (25)

The optimality condition for τ_{jt} is obtained from the FOC of (23) in the main text:

$$\underbrace{\tilde{\boldsymbol{h}}^{j\prime} \underbrace{\frac{\partial \ln \boldsymbol{S}_t}{\partial \ln \tau_{jt}}}_{\equiv \boldsymbol{C}_{S\tau j}}}_{\text{Average loss/gain}} + \eta \underbrace{\left\{ \frac{IM_j}{S}(1+d\ln IM_{jt}) + \underbrace{\left(\frac{\partial \ln \boldsymbol{IM}_t}{\partial \ln \tau_{jt}}\right)'}_{\equiv \boldsymbol{C}'_{IM\tau j}} \operatorname{diag}\left(\frac{\boldsymbol{IM}}{S}\right) d\ln \boldsymbol{\tau}_t \right\}}_{\text{Tariff revenue increase/decrease}}$$
$$= \underbrace{\sigma}_{\text{Inequality aversion}} \underbrace{\left(\frac{\partial \ln \boldsymbol{S}_t}{\partial \ln \tau_{jt}}\right)'}_{\equiv \boldsymbol{C}'_{S\tau j}} (\boldsymbol{I}-\mathbf{1}\boldsymbol{h}')' \operatorname{diag}(\tilde{\boldsymbol{h}}^j)(\boldsymbol{I}-\mathbf{1}\boldsymbol{h}')\, d\ln \boldsymbol{S}_t, \tag{A-60}$$
$$\text{Equality gain/loss}$$

where $\tilde{\boldsymbol{h}}^j$ is a n-by-1 column vector with the i-th element being ηh_i for $i \neq j$ and h_i for $i = j$. The coefficients $\boldsymbol{C}$ satisfy a linear solution

$$d\ln \boldsymbol{S}_t = \boldsymbol{C}_{SA^f} d\ln \boldsymbol{A}_t^f + \boldsymbol{C}_{S\tau} d\ln \boldsymbol{\tau}_t + \boldsymbol{C}_{S\tau^f} d\ln \boldsymbol{\tau}_t^f, \tag{A-61}$$

$$d\ln \boldsymbol{IM}_t = \boldsymbol{C}_{IMA^f} d\ln \boldsymbol{A}_t^f + \boldsymbol{C}_{IM\tau} d\ln \boldsymbol{\tau}_t + \boldsymbol{C}_{IM\tau^f} d\ln \boldsymbol{\tau}_t^f, \tag{A-62}$$

and subscript j indicates the j-th column vector.

Stacking the FOC for tradable sectors, we obtain

$$\underbrace{\tilde{\boldsymbol{C}}'_{S\tau T}\mathbf{1}}_{\text{Average loss/gain}} + \eta \left\{ \underbrace{\text{diag}\left(\frac{\boldsymbol{IM}_T}{S}\right)(\mathbf{1} + d\ln \boldsymbol{IM}_{Tt}) + \boldsymbol{C}'_{IM\tau T}\text{diag}\left(\frac{\boldsymbol{IM}}{S}\right) d\ln \boldsymbol{\tau}_t}_{\text{Tariff revenue increase/decrease}} \right\}$$
$$= \underbrace{\sigma}_{\text{Inequality aversion}} \underbrace{\tilde{\tilde{\boldsymbol{C}}}'_{s\tau T} d\ln \boldsymbol{S}_t}_{\text{Equality gain/loss}}, \tag{A-63}$$

where $\tilde{\boldsymbol{C}}_{S\tau T}$ is a n-by-n_T matrix that collects $\text{diag}(\tilde{\boldsymbol{h}}^j)\boldsymbol{C}_{S\tau j}$ as the j-th column, and $\tilde{\tilde{\boldsymbol{C}}}_{S\tau T}$ is a n-by-n_T matrix with $(\boldsymbol{I} - \mathbf{1}\boldsymbol{h}')' \text{diag}(\tilde{\boldsymbol{h}}^j)(\boldsymbol{I} - \mathbf{1}\boldsymbol{h}')\boldsymbol{C}_{S\tau j}$ in the j-th column.

$$d\ln \boldsymbol{\tau}_{Tt} = \underbrace{\left[\sigma \tilde{\tilde{\boldsymbol{C}}}'_{S\tau T}\boldsymbol{C}_{s\tau T} - \eta\left\{\boldsymbol{C}'_{IM\tau T}\text{diag}\left(\frac{\boldsymbol{IM}_T}{S}\right) + \text{diag}\left(\frac{\boldsymbol{IM}_T}{S}\right)\boldsymbol{C}_{IM\tau T}\right\}\right]^{-1}}_{\equiv \Omega^{-1}}$$
$$\times \left[\tilde{\boldsymbol{C}}'_{S\tau T}\mathbf{1} - \sigma\tilde{\tilde{\boldsymbol{C}}}'_{s\tau T}\left(\boldsymbol{C}_{SA^f} d\ln \boldsymbol{A}_t^f + \boldsymbol{C}_{S\tau^f} d\ln \boldsymbol{\tau}_t^f\right)\right.$$
$$\left. + \eta\text{diag}\left(\frac{\boldsymbol{IM}_T}{S}\right)\left(\mathbf{1} + \boldsymbol{C}^T_{IMA^f} d\ln \boldsymbol{A}_t^f + \boldsymbol{C}^T_{IM\tau^f} d\ln \boldsymbol{\tau}_t^f\right)\right], \tag{A-64}$$

where $\boldsymbol{C}^T_{IMA^f}$ and $\boldsymbol{C}^T_{IM\tau^f}$ collects $j \in T$-th row of $\boldsymbol{C}_{IMA^f}$ and $\boldsymbol{C}_{IM\tau^f}$, respectively. It is also shown that

$$d\ln \tau_{jt} = \frac{1}{\Omega_{jj}}\left[-\Omega_j d\ln \boldsymbol{\tau}_{-jt} + \tilde{\boldsymbol{C}}'_{S\tau j}\mathbf{1} - \sigma\tilde{\tilde{\boldsymbol{C}}}'_{s\tau j}\left(\boldsymbol{C}_{SA^f} d\ln \boldsymbol{A}_t^f + \boldsymbol{C}_{S\tau^f} d\ln \boldsymbol{\tau}_t^f\right)\right.$$
$$\left. + \eta\left(\frac{\boldsymbol{IM}_j}{S}\right)\left(1 + \boldsymbol{C}^j_{IMA^f} d\ln \boldsymbol{A}_t^f + \boldsymbol{C}^j_{IM\tau^f} d\ln \boldsymbol{\tau}_t^f\right)\right], \tag{A-65}$$

where $d\ln \boldsymbol{\tau}_{-jt}$ has the i-th element of $d\ln \tau_{it}$ for $i \neq j$ and 0 for $i = j$.

$$\frac{d\ln \tau_{jt}}{d\ln \tau_{it}} = \underbrace{-\frac{\Omega_{ji}}{\Omega_{jj}}}_{\equiv \Theta(j,i)}. \tag{A-66}$$

B Supplementary Tables

Table A-1: Harmonized sectors

	Harmonized sector	US KLEMS	Chinese KLEMS
1	Agriculture, forestry, & fishing	1 Farms, 2 Forestry, fishing, and related activities	1 Agriculture, forestry, animal husbandry & fishery
2	Oil & gas	3 Oil and gas extraction	2 Oil & gas excavation
3	Mining	4 Mining, except oil and gas, 5 Support activities for mining	3 Coal mining, 4 Metal mining, 5 Non-metallic minerals mining
4	Utility	6 Utilities & 25 Power, steam, gas and tap water supply, 52 Waste management and remediation services	25 Power, steam, gas and tap water supply
5	Construction	7 Construction	26 Construction
6	Wood products & furniture	8 Wood products, 17 Furniture and related products	11 Saw mill products, furniture, fixtures
7	Nonmetallic mineral products	9 Nonmetallic mineral products	16 Stone, clay, and glass products
8	Primary metals	10 Primary metals	17 Primary & fabricated metal industries
9	Fabricated metal products	11 Fabricated metal products	18 Metal products (excluding rolling products)
10	Machinery	12 Machinery	19 Industrial machinery and equipment
11	Electronic products	13 Computer and electronic products	21 Electronic and telecommunication equipment
12	Electrical equipment	14 Electrical equipment, appliances, and components	20 Electric equipment
13	Transportation equipment	15 Motor vehicles, bodies and trailers, and parts, 16 Other transportation equipment	23 Motor vehicles & other transportation equipment
14	Miscellaneous manufacturing	18 Miscellaneous manufacturing,	22 Instruments and office equipment, 24 Miscellaneous manufacturing industries
15	Food, beverage & tobacco products	19 Food and beverage and tobacco products	6 Food and kindred products, 7 Tobacco products
16	Textile	20 Textile mills and textile product mills	8 Textile mill products
17	Apparel	21 Apparel and leather and allied products	9 Apparel and other textile products, 10 Leather and leather products
18	Paper products, printing & publishing	22 Paper products, 23 Printing and related support activities, 37 Publishing industries, except internet (includes software)	12 Paper products, printing & publishing
19	Petroleum & coal products	24 Petroleum and coal products	13 Petroleum and coal products
20	Chemical products	25 Chemical products	14 Chemicals and allied products

Table A-2: Harmonized sectors (continued)

	Harmonized sector	US KLEMS	Chinese KLEMS
20	Chemical products	25 Chemical products	14 Chemicals and allied products
21	Plastics & rubber products	26 Plastics and rubber products	15 Rubber and plastics products
22	Wholesale & retail trades	27 Wholesale trade, 28 Retail trade	27 Wholesale and retail trades
23	Transport, storage & post services	29 Air transportation, 30 Rail transportation, 31 Water transportation, 32 Truck transportation, 33 Transit and ground passenger transportation, 34 Pipeline transportation, 35 Other transportation and support activities, 36 Warehousing and storage	29 Transport, storage & post services
24	Information & computer services	38 Motion picture and sound recording industries, 39 Broadcasting and telecommunications, 40 Data processing, internet publishing, and other information services, 48 Computer systems design and related services	30 Information & computer services
25	Financial Intermediations	41 Federal Reserve banks, credit intermediation, and related activities, 42 Securities, commodity contracts, and investments, 43 Insurance carriers and related activities, 44 Funds, trusts, and other financial vehicles	31 Financial Intermediations
26	Real estate	45 Real estate	32 Real estate services
27	Professional & technical services	46 Rental and leasing services and lessors of intangible assets, 47 Legal services, 49 Miscellaneous professional, scientific, and technical services, 50 Management of companies and enterprises, 51 Administrative and support services	33 Leasing, technical, science & business services
28	Education	53 Educational services	35 Education
29	Healthcare & social security services	54 Ambulatory health care services, 55 Hospitals and nursing and residential care facilities, 56 Social assistance	36 Healthcare and social security services
30	Cultural, entertainment, & other services	57 Performing arts, spectator sports, museums, and related activities, 58 Amusements, gambling, and recreation industries, 60 Other services, except government	37 Cultural, sports, entertainment services; residential and other services
31	Hotels & restaurants	59 Accommodation, 60 Food services and drinking places	28 Hotels and restaurants

Table A-3: Harmonized sectors (continued)

	Harmonized sector	SCF	BLS earnings	Chinese value added	Service trade
1	Agriculture, forestry, & fishing	1 Agriculture, Forestry, Fishing and Hunting	1 Total private	1 Agriculture, Forestry, Animal Husbandry and Fishery industries	n.a.
2	Oil & gas	2 Mining; Construction	4 Mining and logging	2 Industry	n.a.
3	Mining	2 Mining; Construction	4 Mining and logging	2 Industry	n.a.
4	Utility	7 Others	13 Utilities	9 Others	n.a.
5	Construction	2 Mining; Construction	5 Construction	3 Construction	E Construction
6	Wood products & furniture	3 Manufacturing etc.	7 Durable Goods	2 Industry	n.a.
7	Nonmetallic mineral products	3 Manufacturing et al.	7 Durable Goods	2 Industry	n.a.
8	Primary metals	3 Manufacturing et al.	7 Durable Goods	2 Industry	n.a.
9	Fabricated metal products	3 Manufacturing et al.	7 Durable Goods	2 Industry	n.a.
10	Machinery	3 Manufacturing et al.	7 Durable Goods	2 Industry	n.a.
11	Electronic products	3 Manufacturing et al.	7 Durable Goods	2 Industry	n.a.
12	Electrical equipment	3 Manufacturing et al.	7 Durable Goods	2 Industry	n.a.
13	Transportation equipment	3 Manufacturing et al.	7 Durable Goods	2 Industry	n.a.
14	Miscellaneous manufacturing	3 Manufacturing et al.	8 Nondurable Goods	2 Industry	n.a.
15	Food, beverage & tobacco products	3 Manufacturing et al.	8 Nondurable Goods	2 Industry	n.a.
16	Textile	3 Manufacturing et al.	8 Nondurable Goods	2 Industry	n.a.
17	Apparel	3 Manufacturing et al.	8 Nondurable Goods	2 Industry	n.a.
18	Paper products, printing & publishing	3 Manufacturing et al.	8 Nondurable Goods	2 Industry	n.a.
19	Petroleum & coal products	3 Manufacturing et al.	8 Nondurable Goods	2 Industry	n.a.
20	Chemical products	3 Manufacturing et al.	8 Nondurable Goods	2 Industry	n.a.

Table A-4: Harmonized sectors (continued)

	Harmonized sector	SCF	BLS earnings	Chinese value added	Service trade
21	Plastics & rubber products	3 Manufacturing et al.	8 Nondurable Goods	2 Industry	n.a.
22	Wholesale & retail trades	4 Wholesale and retail trade	11 Retail trade	4 Wholesale and Retail Trades	n.a.
23	Transport, storage & post services	6 Transportation et al.	12 Transportation and warehousing	5 Transport, Storage and Post	C Transport
24	Information & computer services	6 Transportation et al.	14 Information	9 Others	I Telecommunications, computer, and information services
25	Financial Intermediations	5 Publishing, finance, etc.	15 Financial activities	7 Financial Intermediation	F Insurance and pension services, G Financial services
26	Real estate	Publishing, finance, etc.	15 Financial activities	8 Ral estate	n.a.
27	Professional & technical services	6 Transportation et al.	16 Professional and business services	9 Others	A Manufacturing services on physical inputs owned by others, B Maintenance and repair services n.i.e., DA Business travel, H Charges for the use of intellectual property n.i.e., J Other business services
28	Education	7 Others	17 Private education and health services	9 Others	n.a.
29	Healthcare & social security services	6 Transportation et al.	17 Private education and health services	9 Others	n.a.
30	Cultural, entertainment, & other services	3 Manufacturing; Arts, Entertainment, and Recreation	18 Leisure and hospitality	9 Others	K Personal, cultural, and recreational services
31	Hotels & restaurants	7 Others	18 Leisure and hospitality	6 Hotels and Catering Services	DB Personal travel

Notes: Full descriptions of the SCF sectors are: 3 Manufacturing; Arts, Entertainment, and Recreation; 5 Publishing Industries; Finance and Insurance; Real Estate and Rental and Leasing; Management, Administrative, and Waste Services; Repair and Maintenance; 6 Transportation and Warehousing; Other Information Services; Professional and Technical Services; Management, Administrative, and Waste Services; Health Care.

C Supplementary Figures

Figure A-1: Consumption impact of globalization by sector implied by the model

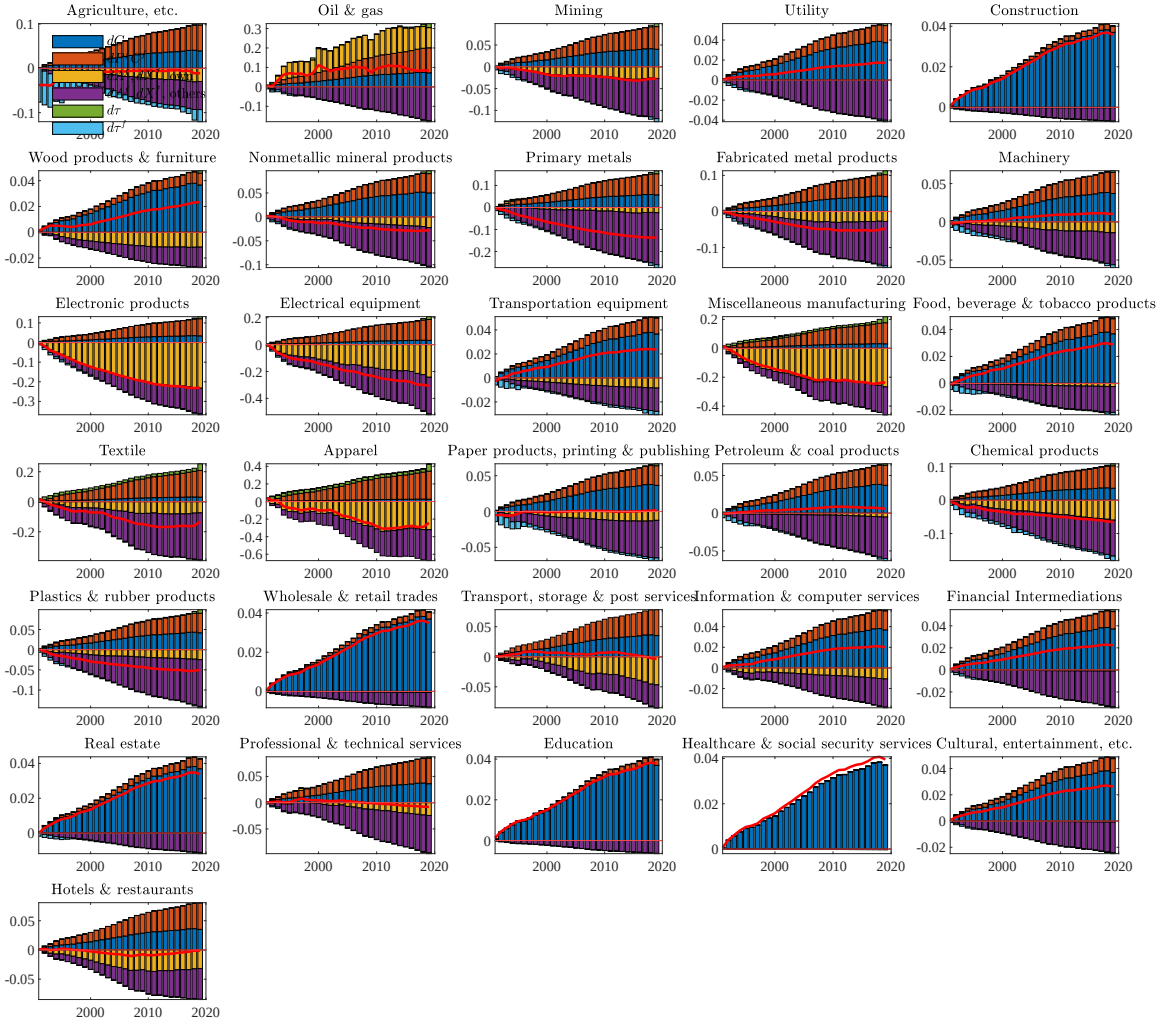


Figure A-2: Consumption impact of globalization by sector implied by the model

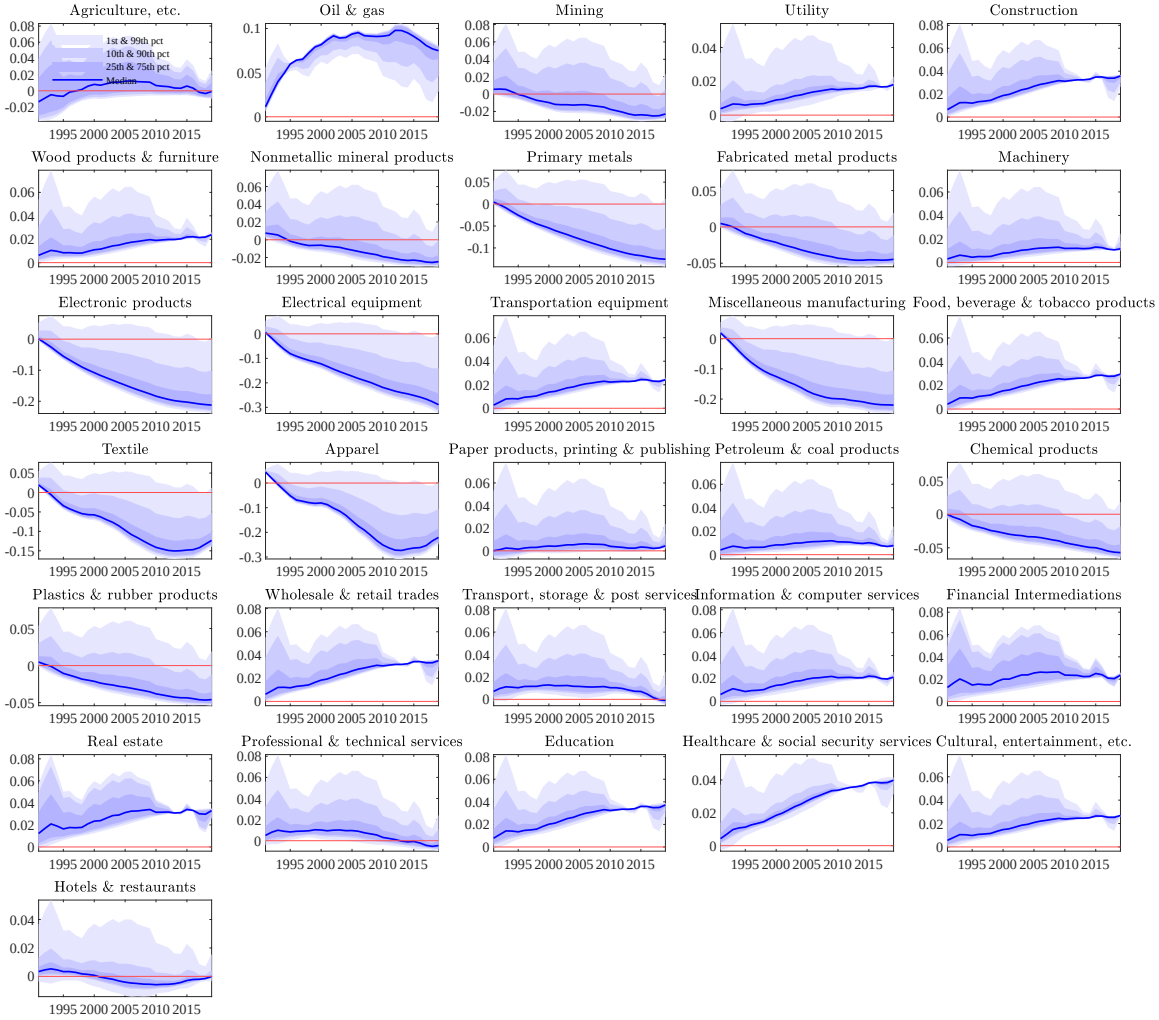
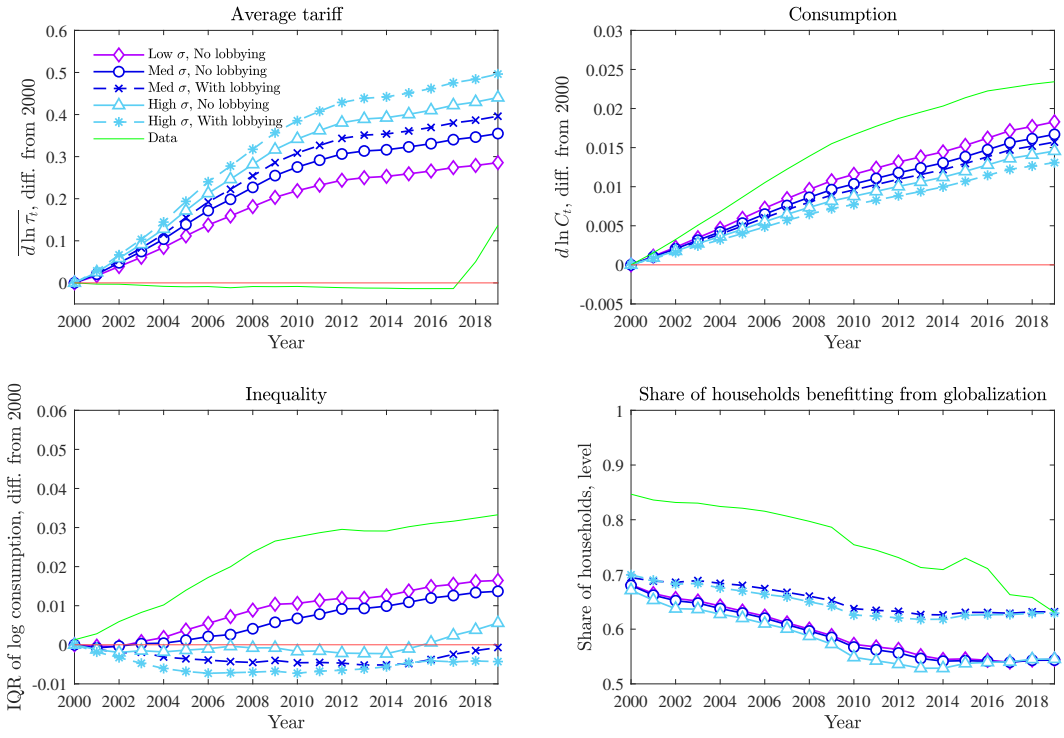


Figure A-3: Endogenous tariff determination: with tariff revenues



Notes: The average tariff is computed as the effective ratiff rates over import values: $\overline{d \ln \tau_t} = \sum_{i=1}^{n_T} w_{IMi}(d \ln \tau_{it} + d \ln IM_{it})$ where $w_{IMi} = IM_i/IM = D_i(1-\tilde{\xi}_i)/\sum_{i=1}^{n_T} D_i(1-\tilde{\xi}_i)$. Parameter values are set as follows: (C1) No inequality aversion, no lobbying: $\sigma = 0$, $\eta = 1$; (C2) Moderate inequality aversion, no lobbying: $\sigma = 1.5$, $\eta = 1$; (C3) Moderate inequality aversion, with lobbying: $\sigma = 1.5$, $\eta = 0.7$; (C4) Strong inequality aversion, no lobbying: $\sigma = 5$, $\eta = 1$; (C5) Strong inequality aversion, with lobbying: $\sigma = 5$, $\eta = 0.7$.