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

Jesús Fernández-Villaverde
University of Pennsylvania, CEPR, NBER

Tomohide Mineyama
International Monetary Fund

Dongho Song
Johns Hopkins University

December 30, 2025

Abstract

We study how uneven gains from globalization can endogenously generate protectionism as a political equilibrium. Using U.S. data, we document that regions more exposed to import competition display stronger opposition to globalization, especially among households with little financial wealth, and that firms in trade-exposed sectors sharply increase lobbying expenditures. To interpret these patterns, we develop and quantify a general equilibrium Ricardian model with heterogeneous households, input–output linkages, and endogenous trade policy shaped by voting and lobbying. Distributional shocks reallocate political support among voters, while lobbying propagates through production networks, generating strategic complementarities that sustain protectionism. Calibrated to U.S.–China sectoral data from 1991–2019, the model accounts for rising inequality, declining support for globalization, and key aggregate trends in consumption and trade.

JEL Classification: D57, D58, D63, D72, F1, F2, F4, F6

Keywords: Globalization, heterogeneous households, multi-sector, production network, Ricardian trade, voting, political lobbying.

*We thank Laura Alfaro, James Anderson, Filipe Campante, Jaedo Choi, Daisuke Fujii, Oleg Itskhoki, Daisoon Kim, Enrique Mendoza, Alessandro Rebucci, Linda Tesar, Jing Zhang, and participants in numerous conferences and seminars for their comments and suggestions. The views expressed herein are those of the authors and should not be attributed to the IMF, its Executive Board, or its management. Correspondence: `jesusfv@econ.upenn.edu` (Jesús Fernández-Villaverde), `TMineyama@imf.org` (Tomohide Mineyama), `dongho.song@jhu.edu` (Dongho Song)

1 Introduction

Trade generates substantial aggregate gains (e.g., Arkolakis et al., 2012, Costinot and Rodríguez-Clare, 2014, Melitz and Redding, 2015), but these gains are far from evenly shared. Import competition has produced localized economic dislocation and declines in well-being (Pierce and Schott, 2020, Adda and Fawaz, 2020) and has been closely linked to the rise of populism (Autor et al., 2020, Pástor and Veronesi, 2021, Rodrik, 2021, Colantone et al., 2022, Guriev and Papaioannou, 2022). Over the same period, many countries have shifted toward more protectionist trade policies. Together, these developments raise a central question: how do uneven gains from globalization translate into a durable unraveling of political support for openness?

This paper combines new empirical evidence with a quantitative framework that clarifies how changes in import penetration give rise to protectionist policies as equilibrium political responses. We bring together microdata on economic exposure, political attitudes, and firm-level political activity, and interpret these patterns through a general equilibrium Ricardian model in which the unequal effects of globalization feed back into political mobilization and endogenous trade policy.

On the empirical side, we show, using voting outcomes and survey evidence, that individuals in regions more exposed to import competition are significantly more likely to oppose globalization, especially when they hold little financial wealth. This pattern underscores the causal role of changes in labor and asset income in shaping anti-globalization sentiment. We then turn to firms and document that those operating in trade-exposed industries respond to import shocks by sharply increasing lobbying expenditures. These outlays far exceed campaign contributions and provide a more direct measure of firms' efforts to influence trade policy.

On the theoretical side, we develop a rich yet disciplined general equilibrium Ricardian model with two countries (the U.S. and China), heterogeneous households, a multisector input–output structure, and endogenous trade policy shaped by voting and lobbying. Households vote over trade liberalization versus protection based on their gains from trade, while affected sectors lobby for tariffs, even when trade raises aggregate welfare. Because protection in one sector affects costs and incentives in others through production networks, lobbying becomes mutually reinforcing, generating dynamics that can sustain protectionism in equilibrium.

The model's structure closely parallels the political forces highlighted in the empirical analysis. Production features sector-specific factor endowments embedded in an input–output network that transmits shocks across sectors. At the household level, heterogeneity arises

from sector-specific factor income and differences in financial wealth, generating dispersion both across households and within sectors. As in classical trade theory, factor income falls in sectors exposed to import competition. However, the associated consumption losses depend on households' asset holdings. Financial wealth is invested in a single global asset (in our setup, effectively a risk-free world bond) that captures the shadow value of intertemporal consumption smoothing in an integrated world economy.

Building on this structure, the model integrates the insights of Mayer (1984) on voting and Grossman and Helpman (1994) on lobbying within a unified political economy framework. Voting outcomes can diverge from the preferences of the median household, as losses receive greater political weight, while sectors exert pressure through lobbying. The policymaker trades off aggregate efficiency, inequality, and political contributions, so shifts in voting and lobbying induced by import competition translate into changes in tariff outcomes. Through input–output linkages, these effects are further amplified by strategic complementarities across sectors.[1]

To evaluate the model quantitatively, we assemble a detailed sectoral dataset for the U.S. and China covering 1991–2019, drawing on data from the KLEMS project, the China Industrial Productivity Database, and the U.S. Bureau of Economic Analysis (BEA). We harmonize sectoral classifications across sources into 31 sectors (19 tradable and 12 nontradable), construct input–output matrices, and calibrate key parameters. These include sectoral trade elasticities (Caliendo and Parro, 2015 and Baqaee and Farhi, 2024), household wealth shares from the Survey of Consumer Finances (SCF), factor income and employment shares, risk aversion, and tariff rates from the World Integrated Trade Solution (WITS) and Fajgelbaum et al. (2019).

The calibrated model predicts rising aggregate consumption alongside declining net exports as a share of output, consistent with observed trends. It also captures rising inequality and a shrinking share of households that benefit from globalization. This erosion of support reflects three forces: (i) input–output linkages, (ii) tariff changes, and (iii) financial income. Through input–output linkages, globalization affects nontradable sectors, which account for most U.S. employment (with tradable sectors comprising only 9% in 2023). Tariff changes, particularly those enacted during the 2018–2019 U.S.–China trade tensions, further reduce support for globalization by lowering aggregate welfare. Financial income amplifies these dynamics, as slower Chinese growth depresses returns on invested wealth.

To better understand how these mechanisms translate into political pressure, we examine

[1] Bombardini et al. (2021) document sharp increases in lobbying expenditures in U.S. industries exposed to Chinese import competition. Bombardini and Trebbi (2020) review evidence on lobbying effectiveness. Bown et al. (2021) and Zhang (2025) show coordinated lobbying driven by sectoral interdependence.

sectoral and household-level drivers of inequality. Tradable sectors are not uniformly affected: 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, generating uneven incentives for protection and helping to lay the groundwork for political mobilization.

Our model links the declining share of households that benefit from globalization to voting outcomes that favor trade protection. It shows that the distribution of gains has become increasingly dispersed, taking on a bimodal shape in recent years, with a small group experiencing large losses. As a result, households gradually withdraw support for globalization, a pattern that has been especially pronounced since the mid-2000s. Rising support for protection emerges directly from the model's distributional forces rather than from factors often left unmodeled, such as ideology or political sentiment. Allowing the median voter to differ from the median household through salience weighting, whereby more negatively affected households exert greater political influence, further strengthens the shift toward protection.

Similarly, lobbying in the model originates from sectors directly affected by trade policy. When the government assigns greater weight to inequality, tariffs rise, compressing the distribution of gains by benefiting households harmed by trade while hurting those that would otherwise gain, at the cost of lower aggregate consumption. This tradeoff echoes Pástor and Veronesi (2021) and Rodrik (2021), who emphasize that societies averse to inequality may accept lower efficiency to limit the extremes of globalization. The mechanism also helps explain why, as shown by Grossman and Helpman (2020) and Guriev and Papaioannou (2022), populist leaders often pursue protectionist policies despite macroeconomic costs. It further mirrors the logic of costly redistribution discussed by Antràs et al. (2017). Taken together, the framework offers a unified explanation for the decline and resurgence of protectionism in recent decades. For example, in counterfactual scenarios resembling the U.S. in the 1950s, characterized by faster growth, a broader tradable base, and smaller foreign economies, the model predicts lower tariffs, consistent with historical evidence.

We next assess robustness along two important dimensions. First, the baseline model restricts lobbying to firms' own sectors. Motivated by the concept of counter-lobbying (Bhagwati et al., 1992) and evidence that global value chains generate cross-sector incentives to support openness (Alfaro et al., 2019; Antràs and Chor, 2022; Kim, 2017; Choi, 2025), we allow for cross-sector lobbying. Results remain nearly identical, as lobbying by adversely affected sectors and counter-lobbying by trade beneficiaries largely offset each other. Second, the baseline model assumes sector-specific factor incomes, shaping the persistence of inequality and voting behavior. While this captures medium-term adjustment frictions documented

by Artuç et al. (2010) and Dix-Carneiro and Kovak (2017), evidence from Autor et al. (2014) and Foschi et al. (2025) indicates that workers eventually reallocate across sectors. We document that allowing for such mobility leaves the main voting implications largely unchanged.

Our paper speaks to several literatures. We contribute to the work on the backlash against globalization, including, beyond the papers already cited, Autor et al. (2013, 2021), Che et al. (2022), Choi et al. (2024), Galle et al. (2022), and Jensen et al. (2017), among others. More broadly, the paper relates to the political economy of trade, which studies how distributional effects shape policy outcomes through voting and lobbying. For instance, recent work has shown that voting on trade responds to firm-level exposure through production networks (Méndez and Van Patten, 2025) and to trade-induced labor market adjustments (Dippel et al., 2022). Heblich et al. (2024) document how trade shocks reshape income and production, and Gawande et al. (2012) link sectors' lobbying influence to trade exposure. We add to this literature by integrating voting and lobbying within a unified general equilibrium framework that connects distributional effects of trade to policy outcomes. Rather than treating policy reversals as exogenous or purely ideological, we show how distributional shocks generated by trade translate systematically into political outcomes.

Our tariff analysis also relates to the literature on optimal tariffs, which emphasizes importers' market power and other strategic considerations in tariff setting (e.g., Ossa, 2014, Soderbery, 2018, Itskhoki and Mukhin, 2025), as well as work on the distributional consequences of trade and the globalization backlash discussed above.

Finally, the paper connects to recent contributions on geopolitical fragmentation (e.g., Aiyar et al., 2023, Gopinath et al., 2025, Fernández-Villaverde et al., 2024, Mohr and Trebesch, 2024) and to the growing literature on geoeconomics, 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. Our contribution links macro fragmentation to its micro foundations by showing how unequal gains from globalization generate political pressure, through voting and lobbying, that sustains fragmentation over time.

The remainder of the paper is organized as follows. Section 2 establishes the link between import penetration and policy shifts. Section 3 introduces a Ricardian two-country, multisector model with input–output linkages. Section 4 develops the political economy of trade policy. Section 5 presents the model's quantitative implications, and Section 6 analyzes endogenous trade policy. Section 7 reports on some extensions of the model. Section 8 concludes. The Appendix contains additional details.

2 Empirical Evidence

In this section, we present empirical evidence on how rising imports from China have shaped political attitudes and political activity in the United States.

Import penetration and public attitudes. We begin by examining how exposure to Chinese import competition affects attitudes toward globalization. Our point of departure is Autor et al. (2020), who build on the "China shock" of Autor et al. (2013) to show that regions more exposed to Chinese imports increased their support for Republican candidates in the 2008 and 2016 U.S. presidential elections.

We follow Autor et al. (2013) and adopt an instrumental-variables strategy to identify the causal effect of China's supply-driven component of U.S. imports on political outcomes. Regional exposure to Chinese import competition is measured by changes in industry-level imports from China, weighted by industry employment shares in local labor markets (commuting zones, CZs):

$$\Delta IP_{i\tau} = \sum_{j} s_{ijt} \Delta IP_{j\tau}^{CHN \to US},$$

where $\Delta IP_{j\tau}^{CHN \to US} \equiv \Delta M_{j\tau}^{CHN \to US} / (Y_{jt} + M_{jt} - X_{jt})$ denotes the change in imports from China in U.S. manufacturing industry j over period τ (2000–2014), expressed relative to domestic absorption in the base year $t = 2000$. The weight $s_{ijt} = L_{ijt}/L_{it}$ is industry j's share of total employment in CZ i in the base year (2000).

Because observed import penetration may reflect both Chinese supply shocks and U.S. demand conditions, it is instrumented using growth in Chinese exports to other high-income countries:

$$\Delta IP_{i\tau}^{IV} = \sum_{j} s_{ijt-10} \Delta IP_{j\tau}^{CHN \to Others},$$

where employment shares are lagged by ten years to mitigate endogeneity arising from contemporaneous local labor-market adjustments.

We extend this analysis by studying the role of household wealth. Financial income may partially offset trade-induced losses in labor income, leading to heterogeneous political responses across wealth levels. Thus, we combine regional wealth estimates from Suss et al. (2024), constructed using the Survey of Consumer Finances, with regional import penetration and voting data from Autor et al. (2020). We use wealth data measured in 2000, which predates the period over which the dependent variable is constructed. To the best of our knowledge, this is the first study to combine a trade-induced globalization shock with granular wealth data to study heterogeneous political effects across the wealth distribution.

Table 1 reports the results. Columns (1)–(2) show that a one-stadard-deviation greater

Table 1: 2016 Presidential election change in Republican vote share

	(1)	(2)	(3)	(4)	(5)	(6)
Import penetration	2.75***	1.94***				
	(0.89)	(0.65)				
ln(Wealth)	-6.71***	-15.95***				
	(1.79)	(3.05)				
Import penetration						
× 1(Wealth 1st quantile)			4.89***	2.70***	3.48***	1.81*
			(0.95)	(0.81)	(1.20)	(0.93)
× 1(Wealth 2nd quantile)			4.16***	2.81***	4.08***	1.59*
			(1.23)	(0.78)	(1.37)	(0.83)
× 1(Wealth 3rd quantile)			1.07	1.29**	0.93	1.61***
			(1.34)	(0.59)	(1.21)	(0.62)
× 1(Wealth 4th quantile)			0.70	-0.30	1.99	1.01
			(1.25)	(0.88)	(2.86)	(1.16)
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: The dependent variable is the change in the Republican two-party vote share between the 2000 (Bush) and 2016 (Trump) presidential elections. Observations are counties, excluding Alaska and Hawaii. The main independent variables are the change in import penetration of Chinese products from 2000 to 2014 $\Delta IP_{j\tau}$ and median net wealth in 2000 for each commuting zone (CZ). We employ the updated import penetration series through 2014 from Autor et al. (2021). The import penetration is normalized so that the coefficients represent the impact of a one-standard-deviation change. Net wealth data come from the Geographic Wealth Inequality Database of Suss et al. (2024). All regressions are estimated by 2SLS, using the supply-driven components of import penetration (and their interactions with wealth quantiles) as instruments. Observations are weighted by total votes cast in 2000, 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), we use the full set of controls from Autor et al. (2020): the CZ manufacturing-employment share, the Autor and Dorn (2013) routine-task share, the offshorability index of occupations, census-division dummies, and demographic variables (population shares by age group, and female, college-educated, foreign-born, white, Hispanic, and black shares), as well as the Republican vote share in 1992 and 1996. From the Geographic Wealth Inequality Database, we include the logarithm of average income, average age (and its square), the wealth Gini coefficient, and average household size.

exposure to Chinese imports (import penetration), instrumented by the supply-driven component, leads to a politically meaningful increase in support for the Republican candidate (Trump) in the 2016 election relative to the Republican candidate (Bush) in 2000, ranging from 1.9 to 2.7 percentage points in the two-party vote share, depending on the specification. In contrast, median household wealth in 2000 (ln(Wealth)) is negatively associated with the change in Republican vote share. While multiple mechanisms may link higher wealth to declining Republican support over this period, the estimate is consistent with our hypothesis that wealthier households are more likely to benefit from globalization and therefore less

likely to oppose it. Columns (3)–(6) allow the effect of import penetration to vary across wealth quantiles. The estimates indicate that the political response to import exposure is substantially stronger in lower-wealth regions.

Table 2: Individuals' attitude toward foreign trade (opportunity=1, threat=0) in the Gallup Poll Social Series

	(1)	(2)	(3)	(4)	(5)	(6)
Import penetration	-2.01***	-2.00***				
	(0.60)	(0.59)				
ln(Wealth)	10.61***	10.79***				
	(1.46)	(1.43)				
Import penetration						
× 1(Wealth 1st quantile)			-3.39***	-3.41***	-2.07**	-2.02**
			(0.67)	(0.66)	(1.00)	(0.99)
× 1(Wealth 2nd quantile)			-2.43***	-2.40***	-2.25**	-2.24**
			(0.79)	(0.78)	(0.92)	(0.90)
× 1(Wealth 3rd quantile)			-1.26	-1.20	-1.34	-1.30
			(1.36)	(1.33)	(0.1.73)	(1.72)
× 1(Wealth 4th quantile)			2.00**	2.03**	-1.02	-1.10
			(0.88)	(0.88)	(1.74)	(1.75)
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 constructed from the 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?" It equals one if the respondent answers "opportunity for economic growth" and zero if the response is "threat to the economy from foreign imports." Observations are individuals, and the survey spans 2000 to 2023. The main independent variables are the change in import penetration of Chinese products from 2000 and median net wealth in 2000 for each commuting zone (CZ), obtained from the Geographic Wealth Inequality Database of Suss et al. (2024). The import penetration is normalized so that the coefficients represent the impact of a one-standard-deviation change in the independent variable. Coefficients are multiplied by 100. These CZ-level measures are linked to individual survey responses via zip codes. All regressions are estimated by 2SLS, using the supply-driven components of import penetration (and their interactions with wealth quantiles) as instruments. In columns (5) and (6), controls include wealth-quantile dummies. In columns (2), (4), and (6), the full set of controls includes age and age squared. Time and individual fixed effects are included in all specifications.

A limitation of presidential voting outcomes is that they may reflect broader political forces beyond attitudes toward globalization. To complement this analysis, we turn to individual-level survey data from the Gallup Poll Social Series, which reports annual responses on perceptions of foreign trade from 2000 to 2023. The panel structure of the survey allows us to control for individual and year fixed effects, unlike cross-sectional election data.

We capture the evolution of import exposure by exploiting the time-varying estimates of import penetration constructed by Autor et al. (2021).[2] We merge survey responses with regional import penetration and wealth at the commuting-zone level using respondents' zip codes.[3]

Table 2 confirms that individuals residing in regions more exposed to import competition are more likely to perceive foreign trade as a threat, while wealthier individuals are more likely to view trade as an opportunity. These patterns closely mirror the voting results in Table 1 and are robust to the inclusion of additional controls.

Import penetration and political activity. We next examine whether import exposure also affects political activity through campaign contributions. Using campaign contribution data from the Database on Ideology, Money in Politics, and Elections (DIME), compiled by Bonica (2015), we conduct an analysis analogous to the previous subsection. While the DIME data are frequently employed in the political economy literature (see, e.g., Autor et al., 2020), they have seen relatively little use in the macroeconomic literature.

Table 3 reports the results. Column (1) shows that regions with lower wealth respond more strongly to rising Chinese imports by increasing campaign contributions to Republican. Because these regions experience larger labor-market losses from import competition while benefiting less from globalization-induced asset returns, they contribute more to political campaigns favoring trade protection. This pattern remains stable across alternative specifications in columns (2)–(4). In contrast, regions in the highest wealth quantile exhibit the smallest coefficients, which are consistently insignificant at conventional levels.

We then turn to lobbying activity. Under the Lobbying Disclosure Act of 1995, as amended by the Honest Leadership and Open Government Act of 2007, lobbying expenditures and associated policy issues must be publicly disclosed. Aggregate lobbying spending averaged between 3 and 3.5 billion dollars per year during the 2010s, nearly double its level in 1998, the earliest year for which data are available, even though prices increased by only 46% over this period. This scale far exceeds campaign contributions by Political Action Committees,

[2] Autor et al. (2021) provide estimates of changes in import penetration from 2000 to 2007, 2010, 2012, and 2014. We map these measures to the annual survey data as follows:

$$\Delta IP_{it} = \begin{cases} \Delta IP_{i,2000\to2007} & \text{for } t \leq 2009, \\ \Delta IP_{i,2000\to2010} & \text{for } 2010 \leq t \leq 2011, \\ \Delta IP_{i,2000\to2012} & \text{for } 2012 \leq t \leq 2013, \\ \Delta IP_{i,2000\to2014} & \text{for } t \geq 2014. \end{cases}$$

[3] To the best of our knowledge, we are the first to link the Gallup Poll Social Series to measures of import penetration and household wealth. We treat this analysis as complementary rather than primary, since stated preferences in surveys need not translate into actual voting behavior.

Table 3: Campaign contributions to Republican relative to Democrat

	(1)	(2)	(3)	(4)
Import penetration				
× 1(Wealth 1st quantile)	0.62***	0.57***	0.33*	0.54***
	(0.160)	(0.18)	(0.19)	(0.19)
× 1(Wealth 2nd quantile)	0.45***	0.49***	0.51***	0.45***
	(0.12)	(0.16)	(0.14)	(0.17)
× 1(Wealth 3rd quantile)	0.27*	0.38**	0.39**	0.49**
	(0.14)	(0.16)	(0.18)	(0.21)
× 1(Wealth 4th quantile)	0.04	0.26	0.01	0.19
	(0.17)	(0.19)	(0.26)	(0.23)
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 election cycles. Observations are county–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 1. The import penetration is normalized so that the coefficients represent the impact of a one-standard-deviation change. Control variables include those in Table 1, as well as the share of campaign contributions received by Republican candidates and the CF scores of each Republican and Democrat candidate 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 two-way clustered by CZ and congressional district.

which totaled roughly 200 to 250 million dollars annually (Bombardini and Trebbi, 2020). Importantly, disclosure requirements identify the policy issues targeted by lobbying, allowing us to isolate trade-related expenditures.

We compile firm-level lobbying data from filings with the Senate Office of Public Records. While these data have been used in political economy and corporate finance (e.g., Kang, 2015; Bertrand et al., 2014; Borisov et al., 2015), they have received limited attention in macroeconomic applications.[4]

Figure 1 shows a pronounced rise in lobbying expenditures related to trade and tariffs, peaking during the 2018–2019 trade tensions. By contrast, total lobbying expenditures relative to GDP remain comparatively stable. Although trade-related lobbying declined after 2019, it remains well above its level a decade earlier.

Table 4 examines the relationship between Chinese import exposure and firms' lobbying activity using annual data from 2002 to 2024. Following Acemoglu et al. (2016), we construct

[4]Because filings are reported at the legal-entity level, we aggregate affiliated entities to the parent-company level to construct a firm-by-year dataset.

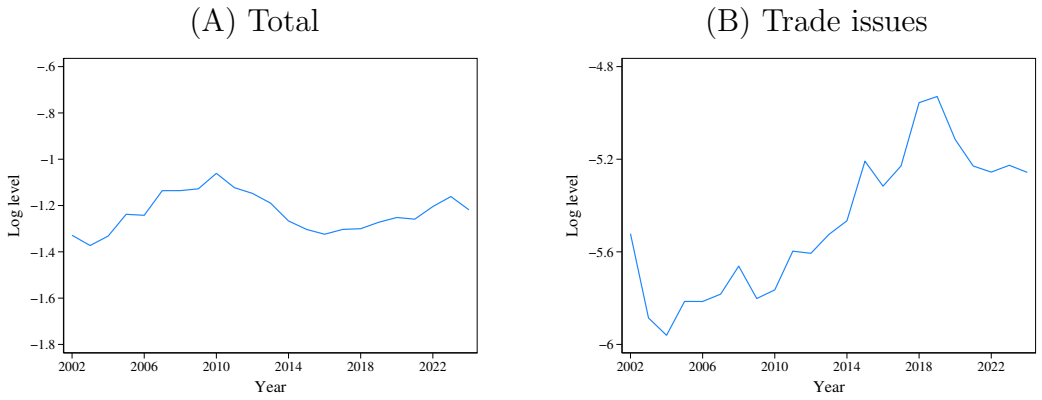


Figure 1: Lobbying expenditure-to-GDP ratio

Notes: Lobbying expenditures are normalized by nominal GDP. Data are from the Senate Office of Public Records and linked to firms using S&P Capital IQ. Company fixed effects are removed.

Table 4: Lobbying expenditure

Dependent var:	ln(lobbying expenditure on trade)		1 for lobbying on trade	
	(1)	(2)	(3)	(4)
Import penetration – own	0.268***	0.484***	0.053***	0.082***
	(0.063)	(0.075)	(0.010)	(0.012)
Import penetration – upstream		0.155***		0.040***
		(0.049)		(0.008)
Import penetration – downstream		-0.498**		-0.081***
		(0.065)		(0.010)
N of obs.	2,775	2,775	2,775	2,775
Full controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Notes: The dependent variable is the logarithm of lobbying expenditures on trade issues in columns (1)–(2) and an indicator variable equal to one if a firm reports positive lobbying expenditures on trade issues in columns (3)–(4). Observations are firm by year, and pooled across the sample years (2002-2024). The main independent variables are the change in import penetration of Chinese products from 1999 to 2011 at the SIC 4-digit level, and its upstream and downstream propagation, as provided by Acemoglu et al. (2016). These variables are normalized so that the coefficients represent the impact of a one-standard-deviation change in an independent variable. Controls include the logarithm of total revenue, the logarithm of total assets, profits before tax, firm age, and age squared. All regressions are estimated by 2SLS, using the supply-driven components of import penetration as exogenous instruments. Time fixed effects are included in all specifications. Robust standard errors are reported.

measures of upstream and downstream exposure using input–output tables. The upstream measure captures shocks transmitted from customer industries, while the downstream measure captures shocks originating in supplier industries.

Consistent with our earlier findings, higher import exposure in a firm's industry is associated with higher lobbying expenditures on trade issues (column (1)) and a higher probability of engaging in lobbying (column (3)). These effects propagate through production networks. Firms in upstream industries respond in the same direction, plausibly reflecting reduced de-

mand from customers exposed to import competition. By contrast, downstream firms respond in the opposite direction, consistent with benefiting from lower-cost imported inputs.

Discussion. Taken together, the evidence indicates that rising Chinese import penetration has shifted public sentiment away from openness and increased political activity aimed at influencing trade policy. The effects operate through multiple channels. Local labor-market disruptions interact with household wealth, while firms and organized interests respond through campaign contributions and lobbying. Production networks further complicate the picture by creating both winners and losers across sectors.

A full assessment of the political consequences of import penetration, therefore, requires accounting for all these forces. We turn now to this task.

3 A Ricardian Model

We consider a discrete-time world economy with a home country (e.g., the U.S.) and a foreign country (e.g., China). Each economy has n sectors and is relatively more efficient in producing the goods for which it has a comparative advantage.

We describe only the home country because the foreign country is symmetric, except that each variable carries a superscript f (for "foreign"). After introducing the environment and defining a competitive equilibrium, we study consumption dynamics and the effects of foreign shocks on the home economy. We conclude with three two-sector examples that illustrate the main mechanisms.

3.1 The environment

Households. Each sector in the home country is inhabited by a continuum of households with mass m_i, where $\sum_{i=1}^{n} m_i = 1$. As in Anderson (2011), in period t each household in sector i is endowed with a fixed amount of a sector-specific factor input X_{it}/m_i, which, in general, comprises both capital and labor. Households supply this factor inelastically to production in that sector in exchange for earnings E_{it}. We interpret X_{it} as sector-specific skills or capital.

For simplicity, this factor input is non-transferable across sectors. This environment can be viewed as a limiting case of low transferability capital and skills across sectors. The assumption allows us to abstract from endogenous investment and labor-supply decisions, thereby keeping the model focused on the mechanisms of interest, without materially affecting the economic forces we seek to highlight.

The consumption basket. Consumption by household h in sector j at time t is an aggregate of sectoral goods:

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

with $v_i > 0$ and $\sum_{i=1}^{n} v_i = 1$.

Each good C_{it}^{hj} is a CES bundle of a home H and a foreign F i good:

$$C_{it}^{hj} = \left(\xi_i (C_{it}^{Hhj})^{\frac{\theta_i - 1}{\theta_i}} + (1 - \xi_i)(C_{it}^{Fhj})^{\frac{\theta_i - 1}{\theta_i}} \right)^{\frac{\theta_i}{\theta_i - 1}}. \tag{2}$$

Here, θ_i is the elasticity of substitution and ξ_i governs the import share. This parameter may reflect differences in tastes, implicit trade barriers, or other unmodeled mechanisms that tilt consumption toward locally produced goods. We assume $\xi_i \in (0, 1)$ for $i \in T = \{1, 2, ..., n_T\}$ and $\xi_i = 1$ for $i \in N = \{n_{T+1}, ..., n\}$, so goods in T are tradable and the rest are non-tradable.

Given a tariff τ_{it} on the imported good, the price of good i is:

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

where P_{it}^H and P_{it}^F are the prices of home- and foreign-produced i goods. The domestic price level is $P_t = \prod_{i=1}^{n} (P_{it})^{v_i}$. We normalize $P_t = 1$ (but, obviously, not the foreign price level).

We assume tariff revenue is dumped into the ocean. Since we will work below with a first-order approximation around a steady state calibrated to the early 1990s (when imports from China were small), this assumption is quantitatively negligible.[5]

Preferences. Households choose $\{C_t^{hj}\}_{t=0}^{\infty}$ to maximize

$$U_0^{hj} = \sum_{t=0}^{\infty} \beta^t \frac{(C_t^{hj})^{1-\gamma} - 1}{1 - \gamma} \tag{3}$$

$$\text{s.t.} \quad C_t^{hj} + W_{t+1}^{hj} = R_t W_t^{hj} + E_{jt} \frac{X_{jt}}{m_j}, \tag{4}$$

where W_t^{hj} is net wealth at the beginning of period t and R_t is its gross nominal return.

Wealth represents claims on other households' (domestic or foreign) future income flows. With complete markets, the specific assets implementing these claims are irrelevant for our purposes, and we do not need to describe international financial flows. The key point is that

[5]The steady state is calibrated with data mostly from 1991. In that year, U.S. tariff revenue was \$16.8 billion. Using China's import share of 3.9% (tariff revenue is not available by country of origin), imputed tariff revenue from China was \$0.66 billion, roughly 0.01% of nominal GDP (\$6.2 trillion).

the equilibrium consumption path determines the asset return.

Production. Gross output in sector i, Y_{it}, is produced by a representative firm with a constant-returns-to-scale Cobb–Douglas technology:

$$Y_{it} = A_{it} X_{it}^{\alpha_i} \prod_{j=1}^{n} Y_{ijt}^{(1-\alpha_i)w_{ij}}, \tag{5}$$

which bundles the (exogenous) sector-specific factor input X_{it} and intermediate inputs Y_{ijt} produced by sector j and used in sector i. Here, $(1-\alpha_i) \in [0,1]$ is the intermediate input share and $\sum_{j=1}^{n} w_{ij} = 1$. The term A_{it} denotes the sector's productivity, treated as exogenous and taken as given by agents. This gross output is used either for final consumption or as intermediate inputs.

Each intermediate good is produced by a CES aggregator of home- and foreign-produced goods:

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

For simplicity, θ_j and ξ_j are the same as in equation (2) for each sector j.

Market clearing. Market clearing in each sector i equates supply to the sum of home and foreign demands, each of which aggregates final and intermediate demands:

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

GDP. The demand approach to national accounting yields nominal GDP:

$$GDP_t = C_t + \underbrace{\sum_{i=1}^{n} (1-\xi_i^f)^{\theta_i} (\tau_{it}^f)^{-\theta_i} \left(\frac{P_{it}}{P_{it}^f} \right)^{-\theta_i+1} D_{it}^f}_{=EX_t\text{: Exports}} - \underbrace{\sum_{i=1}^{n} (1-\xi_i)^{\theta_i} \tau_{it}^{-\theta_i} \left(\frac{P_{it}^f}{P_{it}} \right)^{-\theta_i+1} D_{it}}_{=IM_t\text{: Imports}}, \tag{6}$$

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

The production approach yields the equivalent expression

$$GDP_t = \sum_{i=1}^{n} \alpha_i S_{it}, \tag{7}$$

where $S_{it} = P_{it} Y_{it}$ denotes sectoral nominal output. We use both equations (6) and (7) below.

Equilibrium. To define a competitive equilibrium, we take home and foreign productivity, factor inputs, and tariffs as exogenously given.

Definition 1 *Given an exogenous sequence* $\{A_{it}, A_{it}^f, X_{it}, X_{it}^f, \tau_{it}, \tau_{it}^f\}_{t=0}^{\infty}$ *for all* $i = \{1, ..., n\}$, *a competitive equilibrium for the world economy is a sequence of prices* $\{P_{it}, P_{it}^f, R_t, R_t^f\}_{t=0}^{\infty}$ *and allocations* $\{C_{it}^{hj}, C_{it}^{Fhj}, C_{it}^{hjf}, C_{it}^{Fhjf}, Y_{it}, Y_{it}^f\}_{t=0}^{\infty}$ *such that, given prices, households maximize their utility, firms minimize costs, markets clear, and the income identity and production feasibility of the home and foreign countries are satisfied.*

This competitive equilibrium is computed as the solution to a system of linear equations. Details are provided in Appendix A.

A steady state is defined (and computed) analogously: it is a competitive equilibrium in which all variables are constant over time.

We analyze dynamics using a first-order (log-linear) approximation. Specifically, define

$$d\ln x_t \equiv \ln x_t - \ln x \approx \frac{dx_t}{x} \equiv \frac{x_t - x}{x},$$

as the log deviation of x_t from its steady-state value x. For example, the consumption Euler equation implies that the real return $\tilde{R}_{t+1}$ on wealth satisfies

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

A boldface letter denotes a matrix or vector. For instance, $\boldsymbol{S}_t$ is an n-by-1 vector that collects sectoral nominal output S_{it} in the i-th element.

3.2 Consumption dynamics

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

$$\underbrace{d\ln C_t^{hj}}_{\text{Individual consumption}} = \underbrace{\frac{\omega^{hj}}{1-\beta} d\ln R_t}_{\text{Financial income}} + \underbrace{(1-\omega^{hj}) d\ln S_{jt}}_{\text{Factor income}}, \tag{8}$$

where $\omega^{hj} = (1-\beta)W^{hj}/((1-\beta)W^{hj} + \frac{\alpha_j}{m_j}S_j)$ is the wealth share. Equation (8) shows that the relative importance of financial income and sectoral factor income is determined by ω^{hj}.

3.3 Impact of changes in the foreign country

Sectoral output. Before solving the full model, it is useful to characterize how the foreign economy affects the domestic one using a few equilibrium conditions. Our focus is on sectoral

output S_{it}, since it is proportional to sectoral factor income $E_{it}X_{it}/m_i$ by the firm's first-order condition with respect to sector-specific inputs.

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

$$\underbrace{d\boldsymbol{S}_t}_{\text{Sectoral output}} = \underbrace{\tilde{\boldsymbol{V}}'}_{\text{Network}} \left\{ \underbrace{\tilde{\boldsymbol{v}} d(P_t C_t)}_{\text{Home aggregate demand}} \quad \underbrace{+\tilde{\boldsymbol{v}}^f d(P_t^f C_t^f)}_{\text{Foreign aggregate demand}} \right. \\ \left. \underbrace{-\tilde{\boldsymbol{\theta}}}_{\text{Trade elasticity}} \underbrace{(d\ln \boldsymbol{P}_t - d\ln \boldsymbol{P}_t^f)}_{\text{Relative price}} \quad \underbrace{+\boldsymbol{\eta} d\ln \boldsymbol{\tau}_t - \boldsymbol{\eta}^f d\ln \boldsymbol{\tau}_t^f}_{\text{Tariff}} \right\}. \tag{9}$$

Here, $\tilde{\boldsymbol{V}}$ is the Leontief inverse implied by (5), adjusted for trade. The vectors $\tilde{\boldsymbol{v}}$ and $\tilde{\boldsymbol{v}}^f$ capture sectoral elasticities with respect to aggregate demand, $\tilde{\boldsymbol{\theta}}$ is an n-by-n diagonal matrix with $\tilde{\theta}_i$ in the (i,i) element, and the n-by-n matrices $\boldsymbol{\eta}$ and $\boldsymbol{\eta}^f$ govern the effects of tariffs. Appendix A derives this lemma from the equilibrium conditions of the model.

Equation (9) implies that sectoral outputs fall with the relative price of home goods (relative to foreign goods) and rise with home and foreign aggregate demand. Thus, foreign productivity and factor input growth affect the domestic economy through two channels: lower price competitiveness (a negative effect) and higher foreign aggregate demand (a positive effect). Tariffs $d\ln \boldsymbol{\tau}_t$ create wedges between domestic and foreign prices and benefit or harm domestic sectors depending on the corresponding elements of $\boldsymbol{\eta}$, conditional on aggregate demand. These effects propagate through intermediate input demand in the production network captured by $\tilde{\boldsymbol{V}}'$. Without trade, equation (9) collapses to $d\boldsymbol{S}_t = \boldsymbol{V}'\boldsymbol{v}\, d(P_t C_t)$, where fluctuations in $P_t C_t$ affect sectoral output through the Leontief inverse $\boldsymbol{V}$.

Using the production function, we can derive the following proposition (see Appendix A).

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

$$\underbrace{d\boldsymbol{S}_t}_{\text{Sectoral output}} = \underbrace{\check{\boldsymbol{V}}'}_{\text{Network}} \left[\underbrace{\check{\boldsymbol{v}} d(P_t C_t)}_{\text{Home aggregate demand}} \quad \underbrace{+\check{\boldsymbol{v}}^f d(P_t^f C_t^f)}_{\text{Foreign aggregate demand}} \right. \\ + \check{\boldsymbol{\theta}} \underbrace{\left\{ \boldsymbol{V}(d\ln \boldsymbol{A}_t + \boldsymbol{\alpha} d\ln \boldsymbol{X}_t) - \boldsymbol{V}^f (d\ln \boldsymbol{A}_t^f + \boldsymbol{\alpha}^f d\ln \boldsymbol{X}_t^f) \right\}}_{\text{Differential of home and foreign production}} \\ \left. \underbrace{+\check{\boldsymbol{\eta}} d\ln \boldsymbol{\tau}_t - \check{\boldsymbol{\eta}}^f d\ln \boldsymbol{\tau}_t^f}_{\text{Tariff}} \right]. \tag{10}$$

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 from sectoral productivity, factor inputs, and tariffs. The third term in brackets is the differential between home and foreign production, which affects relative prices and, in turn, sectoral outputs.

The production network appears twice. First, foreign productivity and factor input growth propagate through the foreign supply chain represented by $\boldsymbol{V}^f$ in the third term. Second, they spill over upstream into home sectors through $\check{\boldsymbol{V}}'$.

3.4 Illustrative two-sector examples

We present three simple examples of a 2-sector economy to provide intuition for the model's behavior. For illustration, set

$$d\ln \boldsymbol{A}_t = d\ln \boldsymbol{X}_t = d\ln \boldsymbol{X}_t^f = d\ln \boldsymbol{\tau}_t = d\ln \boldsymbol{\tau}_t^f = 0$$

and focus on foreign productivity changes $d\ln \boldsymbol{A}_t^f$. Figure 2 illustrates these examples, and Appendix A provides further details.

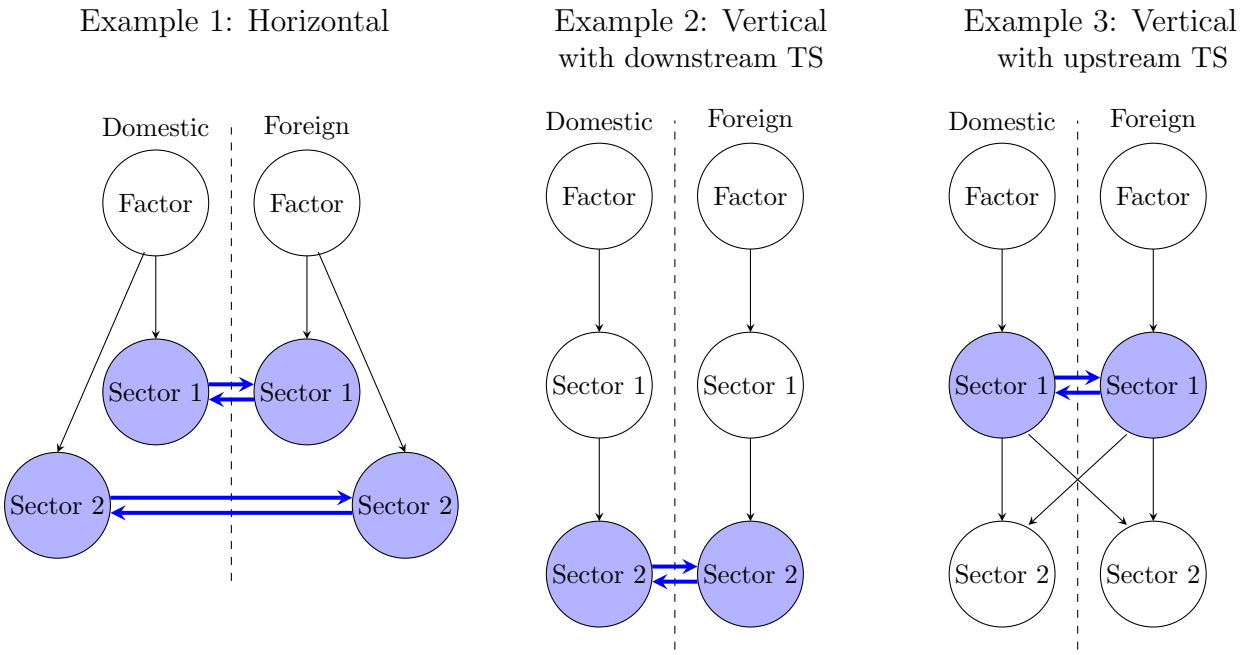


Figure 2: Examples of production network

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

Example 1: Horizontal network. As a starting point, suppose production is conducted horizontally without sectoral input-output linkages, i.e., $\boldsymbol{\alpha} = \boldsymbol{\alpha}^f = \boldsymbol{I}$. Then, according to

equation (10), the impact of foreign productivity conditional on aggregate consumption is

$$\left[\begin{array}{cc} \frac{dS_{1t}}{d\ln A_{1t}^f} & \frac{dS_{1t}}{d\ln A_{2t}^f} \\ \frac{dS_{2t}}{d\ln A_{1t}^f} & \frac{dS_{2t}}{d\ln A_{2t}^f} \end{array}\right]\Bigg|_{P_tC_t,\, P_t^fC_t^f \text{ fixed}} = -\left[\begin{array}{cc} \frac{\tilde{\theta}_1}{1+\tilde{\theta}_1(S_1^{-1}+S_1^{f-1})} & 0 \\ 0 & \frac{\tilde{\theta}_2}{1+\tilde{\theta}_2(S_2^{-1}+S_2^{f-1})} \end{array}\right]. \tag{11}$$

Sectoral output is negatively affected, conditional on aggregate demand, by foreign productivity $d\ln A_{it}^f$ because higher foreign supply lowers relative prices. Without input-output linkages, sectoral shocks do not spill over to other sectors under fixed aggregate consumption.

If a good is non-tradable, equation (11) reduces to

$$\frac{dS_{it}}{d\ln A_{it}^f}\Bigg|_{P_tC_t,\, P_t^fC_t^f \text{ fixed}} = 0, \tag{12}$$

for $i = 1, 2$, which shows that non-tradable goods are not affected by the same sector abroad. If a foreign productivity shock raises aggregate consumption in the home country, non-tradable sectors may benefit even when the corresponding tradable sectors contract.

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

Example 2: Downstream tradable sector. Now consider a nontrivial input-output linkage in a vertical network. Suppose good 1 is used as an input in sector 2, i.e., $\boldsymbol{W} = \boldsymbol{W}^f = \left[\begin{array}{cc} 0 & 0 \\ 1 & 0 \end{array}\right]$, 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 activities, such as transportation and construction, supplying inputs to tradable manufacturing). Then, we obtain:

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

which shows that, conditional on aggregate consumption, foreign productivity shocks in either sector affect domestic output in both sectors through the shared use of good 1 as an input.

Consider first a foreign productivity shock in sector 2 (the downstream tradable sector), $d\ln A_{2t}^f$. As foreign sector 2 becomes more productive, it expands and puts competitive pressure on domestic sector 2, which contracts. This contraction lowers domestic sector 2's demand for inputs from sector 1 (the upstream non-tradable sector), causing sector 1 to contract as well.

Importantly, sector 1 is not directly exposed to foreign competition, but is affected indirectly through the fall in intermediate demand from sector 2. Since sector 1 is non-tradable, it cannot offset this decline through export markets. This result contrasts with Acemoglu et al. (2015), who show that supply shocks propagate only downstream under perfect competition.[6]

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 the foreign sector 2 expands, the domestic sector 2 again contracts due to stronger competition, which reduces its demand for inputs from sector 1 and leads to a contraction in sector 1. Thus, even a foreign shock in a non-tradable upstream sector can 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. Finally, consider the same vertical network as in Example 2, but now assume that sector 2 is non-tradable instead of sector 1. We obtain:

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

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. The domestic sector 1 contracts due to direct import competition, as tradable goods from the foreign sector 1 become cheaper. In contrast, domestic sector 2 (downstream, non-tradable) 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, in which the non-tradable upstream sector contracts due to reduced domestic demand. Here, the non-tradable downstream sector gains through cost-side spillovers. The result highlights how tradability shapes both the sign and the strength of shock transmission within the production network.

4 The Political Economy of Trade Policy

In modern democracies, political outcomes reflect both electoral majorities and the concentrated influence of lobbying. Voting captures households' preferences over globalization,

[6] 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 arising from households' demand complementarity between tradable and non-tradable goods, whereas our mechanism operates through intermediate goods' demand.

such as openness to trade or autarky, and depends on their individual gains from globalization.

But many historical episodes suggest that trade policies, especially import tariffs, are often set outside electoral cycles. In particular, lobbying by firms reflects pressure from sectors that favor tariffs, while the government trades off aggregate efficiency, inequality, and political contributions. We will first explain how voting enters the model and then turn to lobbying.

4.1 Voting

We consider a simple voting function that maps gains from globalization $x = d \ln C_t^{jh}$ into the probability of voting for autarky $f(x)$:

$$f(x) = \frac{1}{1 + \exp\{-\theta_0 + \theta_1 x\}}. \tag{13}$$

The parameters θ_0 and θ_1 control the intercept and slope.

When $\theta_1 > 0$, $f'(x) < 0$, so households that gain more from globalization are less likely to vote for autarky. This captures the idea that voters weigh many motives (ideological, sociological, and others), but that economic incentives matter: households that benefit from globalization tend to support it more.

Building on the insights of Kahneman and Tversky (1979) and following Gabaix (2019), Bordalo et al. (2020), and Bordalo et al. (2022), we introduce salience weights to capture the tendency to overreact to losses $w(x) = \exp\{\alpha \max\{0, -x\}\}$, where $\alpha > 0$ increases the weight placed on households experiencing losses from globalization ($x < 0$), while $\alpha = 0$ implies no salience adjustment.

These weights formalize that losses loom larger than gains and therefore exert a stronger influence on political choices. As a result, the median household by consumption or income need not coincide with the median voter, since salient losses can disproportionately shape aggregate political preferences.

The aggregate voting share for autarky is

$$V = \frac{\mathbb{E}\left[w(x)f(x)\right]}{\mathbb{E}\left[w(x)\right]} = \frac{\int w(x)f(x)dG(x)}{\int w(x)dG(x)}, \tag{14}$$

where $G(x)$ denotes the distribution function of x.

4.2 Lobbying

We incorporate lobbying into our model inspired by Grossman and Helpman (1994) (GH, henceforth), but departing from these authors in several important respects. GH develop a partial-equilibrium setting in which prices are fixed except for tariffs, sectors do not interact,

and trade policy reflects a static trade-off between producers' gains and consumers' losses. In contrast, our model operates in general equilibrium. As a result, lobbying by one sector (and the trade restrictions it induces) affects the benefits and costs of globalization faced by all other sectors. Moreover, unlike GH's static environment, our setting allows the interaction between globalization and fragmentation to vary over time.

A politician's objective function U_t^{pj}, when choosing a sectoral tariff τ_{jt} after changes in the economy's driving forces, balances social welfare u_t and lobbying contributions Q_t^j:

$$U_t^{pj} = (1-\eta)u_t + \eta Q_t^j, \tag{15}$$

$$u_t = \underbrace{\overline{d\ln S_t}}_{\text{Average output}} \underbrace{-\frac{\sigma}{2}\sum_{j=1}^{n}\frac{S_j}{S}\left(d\ln S_{jt} - \overline{d\ln S_t}\right)^2}_{\text{Inequality}} + \underbrace{\sum_{j=1}^{n}\frac{IM_j}{S}(1+d\ln IM_{jt})d\ln\tau_{jt}}_{\text{Tariff revenue}},$$

where $\overline{d\ln S_t} = \sum_{j=1}^{n}(S_j/S)\,d\ln S_{jt}$ and $S = \sum_{j=1}^{n} S_j$. Both social welfare and lobbying contributions are measured in value terms and normalized by the domestic price index $P_t = 1$.

Note that, for voting, we model political choice as a discrete decision between globalization and autarky, whereas, for lobbying, governments choose tariffs along a continuous margin. This distinction is deliberate. Allowing voters to choose over a continuum of trade policies would be feasible, but adds little to the analysis, while a continuous tariff choice is essential for computing counterfactual tariff paths under alternative policy preferences and economic fundamentals.

The parameter $\eta \in [0,1]$ captures the weight the politician assigns to contributions, with $\eta = 0$ corresponding to a purely welfare-driven policy. The welfare component u_t has three elements: (i) average sectoral output, summarizing aggregate performance; (ii) a penalty for dispersion across sectors, scaled by the inequality aversion parameter σ; and (iii) tariff revenue, which captures the fiscal return from trade restrictions relative to the size of the economy.

This formulation reflects a policymaker who values not only changes in total output but also their distribution and fiscal capacity. Because sectoral output is determined in general equilibrium, lobbying by one sector affects its own tariff and generates feedback effects on other sectors' welfare and lobbying incentives.

The lobbying sector's payoff is

$$U_t^j = u_t^j - Q_t^j, \quad \text{where } u_t^j = \frac{S_j}{S}\left\{d\ln S_{jt} - \frac{\sigma}{2}\left(d\ln S_{jt} - \overline{d\ln S_t}\right)^2\right\}, \tag{16}$$

where the quadratic term captures households' diminishing marginal utility.

Nash bargaining. Following Goldberg and Maggi (1999), we assume Nash bargaining between the government and lobbyists, $(U_t^{pj})^{1-\phi}(U_t^j)^{\phi}$, where ϕ is the weight on lobbyists, which we show below is irrelevant in equilibrium. The government cannot commit to future policy, so lobbying and tariffs are determined period by period.

The first-order condition with respect to Q_t^j implies

$$U_t^{pj} \propto U_t^j \propto (1-\eta)u_t + \eta u_t^j, \tag{17}$$

so contributions are chosen as if the politician and lobbyists maximize a common objective, namely a weighted sum of social welfare and lobbyists' welfare.

Endogenous tariff determination. The politician sets tariff changes $d\ln\tau_{jt}$ for $j \in T$ to maximize the common objective (17). The first-order condition yields the following result.

Proposition 2 *Changes in tariffs satisfy:*

$$\underbrace{\tilde{\boldsymbol{S}}^{j\prime}\frac{\partial \ln \boldsymbol{S}_t}{\partial \ln \tau_{jt}}}_{\textit{Average loss/gain}} + \underbrace{\frac{IM_j}{S}(1+d\ln IM_{jt}) + d\ln \boldsymbol{\tau}_t{}' \operatorname{diag}\left(\frac{\boldsymbol{IM}}{S}\right)\frac{\partial \ln \boldsymbol{IM}_t}{\partial \ln \tau_{jt}}}_{\textit{Tariff revenue increase/decrease}} \tag{18}$$

$$= \underbrace{\sigma}_{\textit{Inequality aversion}} \underbrace{\left(d\ln \boldsymbol{S}_t - \mathbf{1}\,\overline{d\ln S_t}\right)' \operatorname{diag}(\tilde{\boldsymbol{S}}^j)\left(\frac{\partial \ln \boldsymbol{S}_t}{\partial \ln \tau_{jt}} - \mathbf{1}\frac{\partial \overline{\ln S_t}}{\partial \ln \tau_{jt}}\right)}_{\textit{Equality gain/loss}},$$

where $\tilde{\boldsymbol{S}}^j$ *is an* n*-by-*1 *vector whose* i*-th element equals* $(1-\eta)S_i/S$ *for* $i \neq j$ *and* S_j/S *for* $i = j$*.*

Equation (18) shows that tariff changes balance two forces: average gains or losses in sectoral output and changes in sectoral equality, both weighted by $\tilde{\boldsymbol{S}}^j$, which embeds the lobbying distortion. Rearranging the first-order condition yields the following corollary.

Corollary 1 *The optimal response function of sectoral tariffs is*

$$d\ln \tau_{jt} = F_j\left(d\ln \boldsymbol{A}_t^f, d\ln \boldsymbol{X}_t^f, d\ln \boldsymbol{A}_t, d\ln \boldsymbol{X}_t, d\ln \boldsymbol{\tau}_t^f, d\ln \boldsymbol{\tau}_{-jt}\right), \tag{19}$$

where $d\ln \boldsymbol{\tau}_{-jt}$ *collects other sectors' tariffs, that is, its* i*-th element equals* $d\ln\tau_{it}$ *for* $i \neq j$ *and zero in the* j*-th element.*

The derivation is presented in the Appendix. Sectoral tariffs depend on foreign and domestic economic conditions $(d\ln \boldsymbol{A}_t^f, d\ln \boldsymbol{X}_t^f, d\ln \boldsymbol{A}_t, d\ln \boldsymbol{X}_t)$, foreign tariffs $d\ln \boldsymbol{\tau}_t^f$, and other sectors' tariffs $d\ln \boldsymbol{\tau}_{-jt}$. These variables affect $d\ln \boldsymbol{S}_t$ and tariff revenues and therefore shape the trade-off underlying equation (18). For example, growth in $\boldsymbol{A}_t^f$ can raise domestic inequality, creating an incentive to increase tariffs to offset the distributional impact.

Strategic complementarity and substitutability. Equation (19) also implies sectoral interactions. Define the response of sector j to a tariff imposed by sector i:

$$\frac{d\ln\tau_{jt}}{d\ln\tau_{it}} = \boldsymbol{\Theta}(j,i). \tag{20}$$

A positive value indicates strategic complementarity, in the sense that a higher tariff in sector i induces a higher tariff in sector j, while a negative value 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 linked in a vertical network, and both are tradable, the sign of the tariff response is ambiguous. If the upstream sector (sector 1) raises its tariff, it increases input costs for the downstream sector (sector 2), weakens its competitiveness, and can strengthen its incentive to lobby for additional protection, suggesting strategic complementarity. Conversely, if the downstream sector raises its tariff, it reduces foreign competition and supports domestic demand for upstream inputs, improving sector 1's position and reducing its incentive to seek protection, implying strategic substitutability. The net effect depends on the strength of these opposing forces and on relative lobbying power. Further theoretical details are provided in the Appendix.

In the quantitative analysis that follows, we compute the full impact of an arbitrary tariff change $\boldsymbol{\Delta}$ through these sectoral interactions:

$$\boldsymbol{\Theta}\boldsymbol{\Delta} + \boldsymbol{\Theta}^2\boldsymbol{\Delta} + \boldsymbol{\Theta}^3\boldsymbol{\Delta} + \cdots = \boldsymbol{\Theta}(\boldsymbol{I} - \boldsymbol{\Theta})^{-1}\boldsymbol{\Delta}. \tag{21}$$

5 Quantitative Results

Calibration. We construct a sectoral dataset for the U.S. and China at an annual frequency from 1991 to 2019. We start in 1991 because the required trade data become available then and because this predates China's emergence as a major force in U.S. trade. We end in 2019 to avoid contamination from the COVID-19 pandemic.

The main data sources are KLEMS for sectoral TFP $\boldsymbol{A}_t^f$ and factor inputs $\boldsymbol{X}_t^f$, which aggregate labor and capital. Chinese data come from the China Industrial Productivity (CIP) 4.0 Database, compiled by the Research Institute of Economy, Trade and Industry (RIETI), Hitotsubashi University, and the Peking University Growth Lab. Since CIP covers 1988–2017, observations after 2018 are interpolated using sectoral value-added growth from the National Bureau of Statistics of China. U.S. data come from the Bureau of Economic Analysis (BEA).

In the baseline analysis, we set U.S. growth to zero, i.e., $d\ln\boldsymbol{A}_t = d\ln\boldsymbol{X}_t = 0$, in order to isolate the impact of Chinese growth on the U.S. (one can think then about China's growth

as expressed in relative terms to U.S. growth). We harmonize sectoral classifications by constructing 31 private sectors (19 tradable and 12 non-tradable) that map 63 U.S. sectors and 34 Chinese sectors, as detailed in Appendix B. The input–output matrix $\boldsymbol{W}$ and the intermediate share $(\boldsymbol{I} - \boldsymbol{\alpha})$ use 1997 data, the earliest available U.S. input–output tables. Steady-state sectoral outputs $\boldsymbol{S}$ and $\boldsymbol{S}^f$ are taken directly from KLEMS.

Steady-state import shares $\boldsymbol{\xi}$ and $\boldsymbol{\xi}^f$ are calibrated using bilateral trade data from UN Comtrade and the WTO–OECD Balanced Trade in Services database. Comtrade HS6 codes are converted to 4-digit NAICS codes using Pierce and Schott (2012) and then mapped to the 31 harmonized sectors. Final consumption shares $\boldsymbol{v}$ and $\boldsymbol{v}^f$ are chosen to satisfy market clearing. Sectoral trade elasticities $\boldsymbol{\theta}$ follow Caliendo and Parro (2015) and Baqaee and Farhi (2024) and are reported in Table (B.1). Sector-level tariff rates $\boldsymbol{\tau}_t$ and $\boldsymbol{\tau}_t^f$ are taken from the WITS and Fajgelbaum et al. (2019). We assume zero tariffs in the steady state and capture observed tariffs through $d\ln \boldsymbol{\tau}_t$ and $d\ln \boldsymbol{\tau}_t^f$.

The wealth share ω^{hj} for U.S. households is calibrated using the SCF, compiled by the Federal Reserve Bank of New York. We use net worth and wage income as empirical counterparts for W and S. The SCF reports employment in seven broad sectors. For each sector, we compute percentiles of the wealth share, defined as $\omega^{hj} = (1-\beta)W_h/((1-\beta)W_h + (\alpha_j/m_j)S_j)$, using the 1992 survey (the closest to our initial year) and a discount factor of $\beta = 0.96$. These estimates are mapped to the corresponding KLEMS sectors. Sectoral income S_j and employment shares m_j are computed from average hourly earnings and full-time-equivalent employment in 1991, using data from the Bureau of Labor Statistics (BLS). We set the inverse of the intertemporal elasticity of substitution to $\gamma = 1.5$ and calibrate the salience parameter to $\alpha = 6$.

Assessing the U.S. economic impact of Chinese productivity growth. We examine the U.S. economic 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.

Figure 3 presents the model-implied outcomes and illustrates the economic impact of Chinese growth on the U.S. economy. Panel (A) reports the share of households that benefit from globalization, defined as those with $d\ln C_t^{hj} > 0$. This share rises sharply in the early 1990s, peaks at about 90%, and then declines to roughly 60% by the end of the sample. The same panel shows that this decline is accompanied by a widening interquartile range (IQR) of log consumption, signaling rising inequality. Panel (B) reinforces this pattern by displaying a shift in the overall consumption distribution consistent with increasing dispersion.

Although the model is not calibrated to target inequality moments, it nevertheless captures the main features of the observed rise in inequality in the United States. In particular,

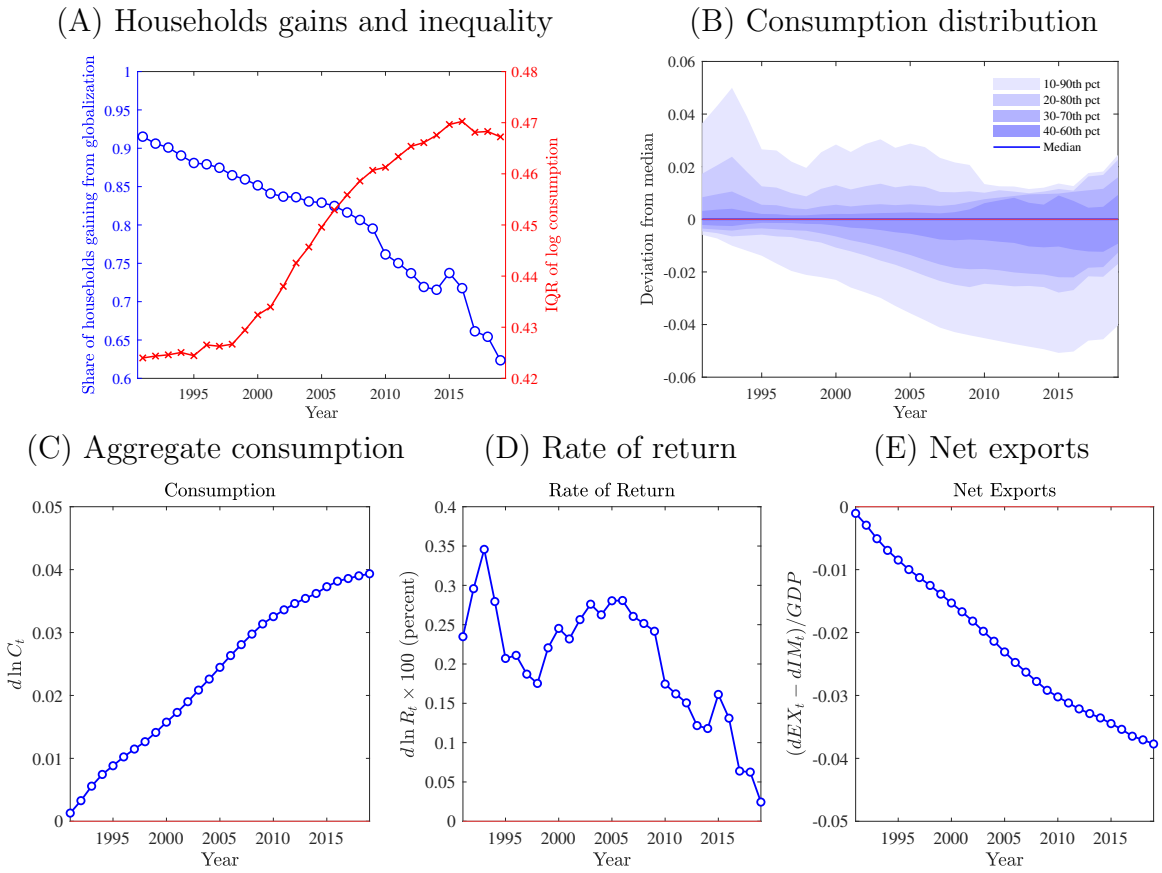


Figure 3: Effects of globalization: Gains, inequality, consumption, returns, and net exports

Notes: A 5-year centered moving average is shown. In Panel (A), the blue line displays the share of households that gain from globalization: $\sum_{j=1}^{n} \int_0^{m_j} 1_{d \ln C_t^{hj} > 0} dh$.

it reproduces the upward trend documented by Piketty and Saez (2003) and extended by Piketty et al. (2017), which accelerates after 2000.

In contrast to the declining share of households benefiting from globalization, Panel (C) shows that aggregate consumption continues to grow as a result of globalization, albeit with a diminishing yet still positive effect on returns, as shown in Panel (D). The decline in asset returns after the Global Financial Crisis (GFC) likely reflects the slowdown in Chinese growth. The model also reproduces the deterioration of the trade balance as a share of GDP shown in Panel (E), consistent with the data. Despite rising imports, domestic value-added production (measured as consumption minus net exports) remains slightly positive, indicating that gains in purchasing power from cheaper imports more than offset the displacement of domestic production.

The contrast between the sizable aggregate gains from globalization (Panel C) and the declining share of households that benefit (Panel A), together with the increasing concentration of these gains (Panel B), underscores the importance of sectoral and household heterogeneity

for understanding endogenous trade policy.

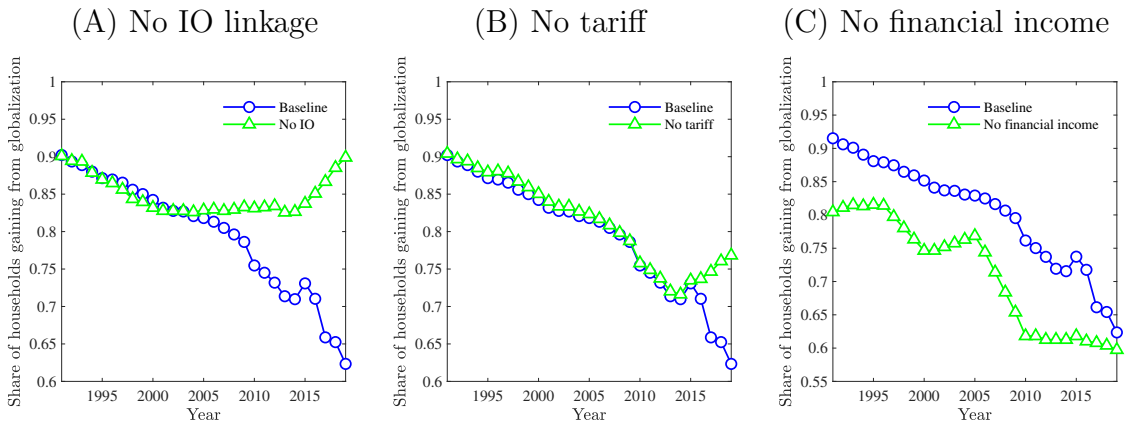


Figure 4: Effects of globalization: Contributions of model ingredients

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

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). As a result, support for globalization remains relatively stable over time. Regarding (ii), although the average effect is modest across the sample period, Panel (B) shows that tariff increases during the 2018–19 U.S.–China trade war reduced support for globalization. Finally, Panel (C) illustrates that (iii) financial income further amplifies the decline in support, since the benefits from higher returns have weakened in recent years (see Figure 3).

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 Figure C.2 in the Appendix.

The adverse effects of foreign productivity and factor input growth on the domestic economy are most pronounced in tradable goods sectors. In the electronics sector (first panel), for example, the rapid expansion of Chinese production since the 1990s led to substantial displacement of U.S. domestic output. At the same time, globalization can also benefit tradable sectors, as lower-cost imports associated with foreign expansion raise domestic purchasing power. This mechanism is evident in the transportation equipment sector (second panel), where a relatively low trade elasticity amplifies the gains from cheaper imports.

In non-manufacturing sectors, which are not directly exposed to foreign competition, households typically benefit from China's imports through two channels: lower intermediate input costs and more favorable relative prices compared with tradable goods. The construc-

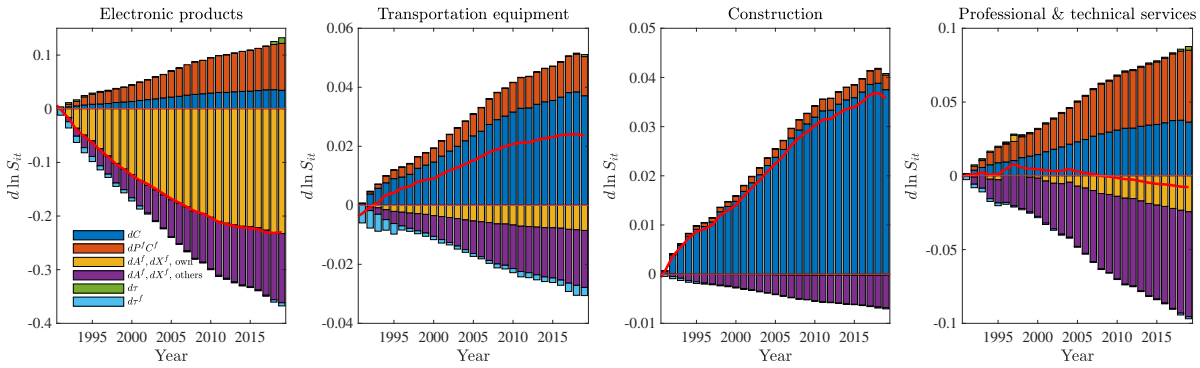


Figure 5: Effects of globalization: Sectoral output

Notes: The decomposition follows from Proposition 1 in equation (10). The red solid line indicates the total effect.

tion sector (third panel) illustrates this pattern clearly. However, some non-tradable sectors can experience negative spillovers when they supply inputs to tradable sectors subject to intensified foreign competition. As discussed in Example 2 of Section 3.4, the professional and technical services sector (fourth panel) is closely linked to manufacturing. When manufacturing contracts under globalization pressures, the associated decline in intermediate input demand also reduces activity in this sector.

Figure C.3 in the Appendix shows that heterogeneity in wealth holdings introduces an additional layer of dispersion in the gains from globalization. Financial assets generate capital income and cushion declines in sectoral income, creating substantial within-sector inequality. In several tradable sectors, even when globalization has a negative average effect, households with sufficiently large financial positions experience net positive gains.

6 Endogenous Trade Policy Formation

6.1 Voting

Given that the distribution of gains from globalization, $g(x)$, is obtained from model simulations, the voting share V can be mapped to the underlying voting parameters (θ_0, θ_1) in equation (13). We use an asterisk, (θ_0^*, θ_1^*), to denote the parameter values that generate a 50% voting share ($V = 0.5$) for the trade protectionist regime, corresponding to higher tariffs. Our focus is on the intercept parameter θ_0^*. A higher value of θ_0^* implies that forces orthogonal to the direct effects of globalization are required to generate sufficient political support for protectionism. We report two cases: one with salience calibrated to $\alpha = 6$, and another in which salience is shut down.

Panel (A) of Figure 6 illustrates the evolution of the distribution of gains from globalization, $g(x)$, by comparing three periods: 1991–95, 2005–09, and 2015–19. The distribution

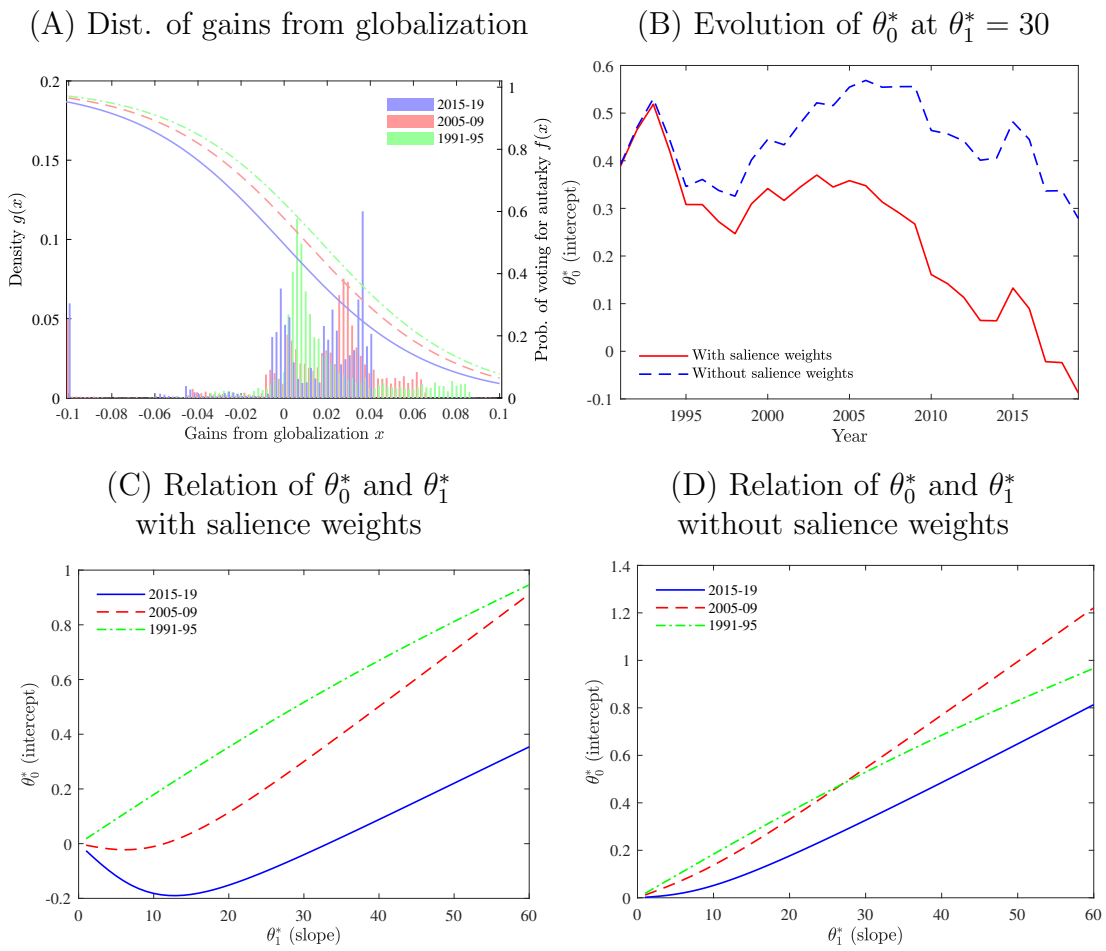


Figure 6: Voting outcomes

Notes: In Panel (A), the bars show the distribution of the gains from globalization, $x = d \ln C_t^{jh}$, where observations are pooled in each 5-year period. The voting function $f(x)$ is included as a reference with salient weights ($\alpha = 6$) and a calibrated slope ($\theta_1^* = 30$). Panel (B) reports the evolution of θ_0^*, the intercept in the voting function that yields a 50% voting share for autarky ($V = 0.5$), with salience weights ($\alpha = 6$) in the red solid line and without them ($\alpha = 0$) in the blue dashed line. θ_1^* is set to 30 in both cases. Panels (C) and (D) present θ_0^* over time for different values of θ_1^*, with and without salient weights, respectively.

widens markedly over time. In the early 1990s (green), gains are concentrated around modest positive values. By the 2000s (red), the distribution becomes more dispersed in both directions and shifts upward on average. By the late 2010s (blue), it turns bimodal. The growing mass of households experiencing losses from globalization shifts aggregate voting behavior toward the trade protectionism regime, outweighing the influence of households with positive gains. As a result, the intercept θ_0^* required to obtain an equal voting share declines over time. The voting functions overlaid in the panel reflect this pattern, with progressively lower intercepts ensuring $V = 0.5$.

Panel (B) shows the time path of θ_0^*. In the baseline case with salience weights ($\alpha = 6$,

red solid line), θ_0^* displays a secular decline. Even in the conservative case without salience ($\alpha = 0$, blue dashed line), θ_0^* begins to fall after the Global Financial Crisis, following a mild increase earlier in the sample.

Panels (C) and (D) confirm the recent decline in θ_0^* across alternative slope parameters θ_1^*, both with and without salience weights.

Taken together, these results indicate that organizing a protectionist coalition has become substantially easier than in the early 1990s, as a growing share of voters is a net loser from globalization.

6.2 Lobbying

Panel (A) of Figure 7 reports the model-implied tariff levels as functions of key parameters and initial conditions. Circles mark the reference values, corresponding to $\sigma = 1.5$, equal to the coefficient of risk aversion γ, and $\eta = 0$, so that the policymaker maximizes social welfare without accounting for sector-specific lobbying contributions (see equation (15)). The figure highlights the strong nonlinearities in the responses of tariffs to these parameters and initial conditions. The implied tariffs correspond to the year 2000.

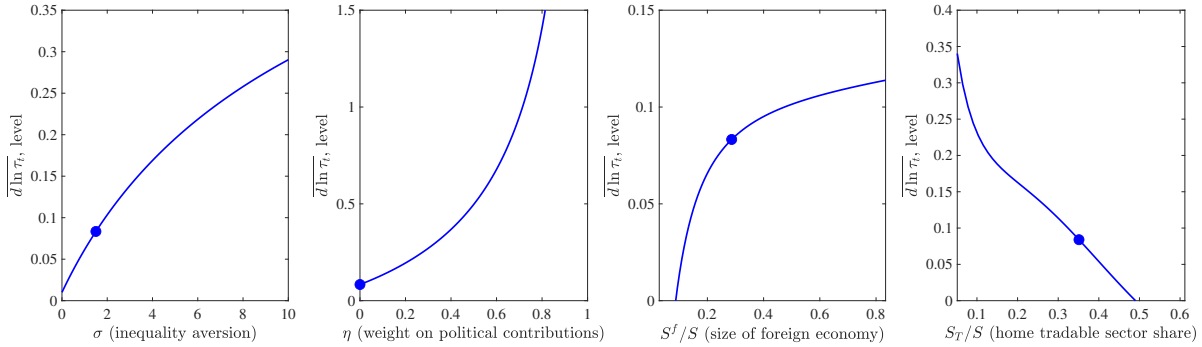
The two left panels show that tariffs rise with higher values of σ (inequality aversion) and η (the weight on political contributions). These results are intuitive: as the government places greater weight on reducing sectoral inequality or on the welfare of specific sectors, optimal tariffs increase.

As shown in the third panel, tariffs also depend on the relative size of the foreign economy. A larger foreign economy (measured by S^f/S) leads to higher tariffs, as greater import volumes exacerbate domestic inequality. China was substantially larger than earlier rapid-growth economies such as Japan and Korea when its growth accelerated, even though the path of per capita income growth was similar (Fernández-Villaverde et al., 2023). According to Penn World Table 10.01, China's total GDP was 38% of U.S. GDP in PPP terms in 1993. This was roughly four times Japan's share in 1950 (about 10%) and about 25 times Korea's share in 1972 (around 1.6%), when per capita GDP levels were comparable.[7] Counterfactually, if China's size had been comparable to Japan's (less than 10% of U.S. GDP at the start of our sample), the model would imply substantially lower tariffs.

The fourth panel highlights the role of the size of the domestic tradable sector. A larger tradable share (measured by S_T/S) spreads the adverse effects of trade across a broader base, mitigating distributional consequences. The tradable share has declined secularly in the United States (a pattern also observed in other advanced economies), increasing vulnerability

[7] China's per capita GDP in 1993 was 2,915 dollars in 2017 PPP-adjusted USD. Japan's was 2,879 dollars in 1950 (the earliest year available in Penn World Table 10.01), and Korea's was 2,788 dollars in 1972.

(A) Tariff levels as functions of key parameters and initial conditions



(B) Sectoral interactions of tariffs

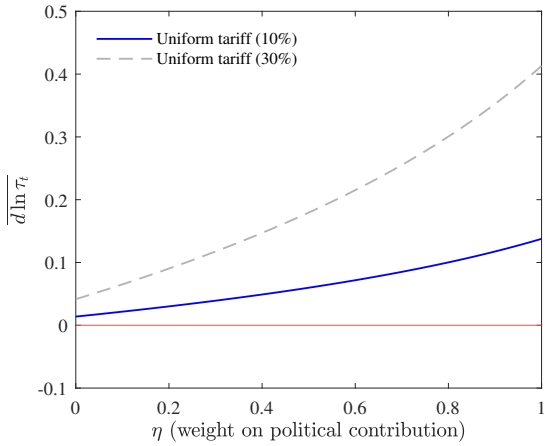


Figure 7: Tariff determinants in the model

Notes: Panel (A): Circles mark the reference values corresponding to $\sigma = 1.5$ (equal to the coefficient of risk aversion γ) and $\eta = 0$, so that the government maximizes welfare without accounting for sector-specific contributions (see equation (15)). The implied tariffs correspond to the year 2000. Panel (B): The figure reports the full responses implied by equations (20) and (21), evaluated at the reference values.

to foreign import competition.

Panel (B) of Figure 7 illustrates the sectoral interactions summarized by equation (21). The moderately positive slopes indicate that strategic complementarity dominates substitutability, so higher protection in one sector raises incentives for others to seek protection. The strength of this complementarity increases with η: when lobbying motives are stronger, sectors reinforce one another's demands, amplifying overall protection. Although Panel (B) depicts a static relationship, in practice these complementarities can unfold dynamically, as protection in one sector triggers additional lobbying elsewhere, generating a self-reinforcing increase in tariffs.

Counterfactual tariff paths under alternative policy preferences. To clarify how the model generates endogenous tariffs, we consider a set of scenarios in which the policymaker

places different weights on inequality reduction (higher σ), both with ($\eta > 0$) and without ($\eta = 0$) lobbying contributions. Lobbying is treated as a static decision each period, while tariffs evolve dynamically over time. Based on these five scenarios, Figure 8 plots the simulated tariff paths implied by equation (19).[8]

(C1)	Low σ (No inequality aversion),	No lobbying:	$\sigma = 0$,	$\eta = 0$
(C2)	Med σ (Moderate inequality aversion),	No lobbying:	$\sigma = 1.5$,	$\eta = 0$
(C3)	Med σ (Moderate inequality aversion),	With lobbying:	$\sigma = 1.5$,	$\eta = 0.3$
(C4)	High σ (Strong inequality aversion),	No lobbying:	$\sigma = 3$,	$\eta = 0$
(C5)	High σ (Strong inequality aversion),	With lobbying:	$\sigma = 3$,	$\eta = 0.3$

Echoing the patterns in Figure 7, Figure 8 shows that implied tariffs rise as inequality aversion (σ) and the weight on political contributions (η) increase. This reflects both the policymaker's effort to reduce sectoral inequality and the additional protectionist pressure generated by lobbying, as we move from C1 to C5. When inequality aversion is absent ($\sigma = 0$, C1), tariffs remain flat in the model. Holding σ fixed, an increase in η (for example, from C2 to C3 or from C4 to C5) leads to higher tariffs, as stronger lobbying incentives amplify strategic complementarities across sectors. In the reference case (C2), tariffs rise moderately over time, reaching about 10 percentage points above the 2000 level by the end of the sample. The observed tariff increase during the 2018–19 U.S.–China trade war (green line) is of a similar magnitude.[9]

The implications of these policy scenarios for support for globalization are nuanced. Higher tariffs reduce aggregate consumption but also mitigate inequality, generating offsetting effects on household outcomes. As shown in the bottom-right panel of Figure 8, the share of households benefiting from globalization declines relative to the baseline but remains fairly stable, consistently above 50%, indicating that a majority of households continue to gain from trade even under more protective policies.

We consider values of η equal to 0 and 0.3 to contrast cases in which the government does or does not value political contributions, capturing differences in 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 close to zero using U.S. non-tariff barriers in 1983, while rejecting pure welfare maximization ($\eta = 0$).

[8] To isolate the role of inequality, we abstract from the tariff-revenue term in equation (18). As shown in the Appendix, including this term does not affect our main results.

[9] According to the model, the social-welfare-maximizing policymaker in the reference case (C2) would have implemented more targeted protection, providing greater support to the most affected sectors while applying lower tariffs elsewhere. By contrast, the actual tariff increases during the 2018–19 U.S.–China trade war were concentrated around 15–20% across most sectors. This suggests that observed trade policy deviated from the socially optimal benchmark because of political distortions.

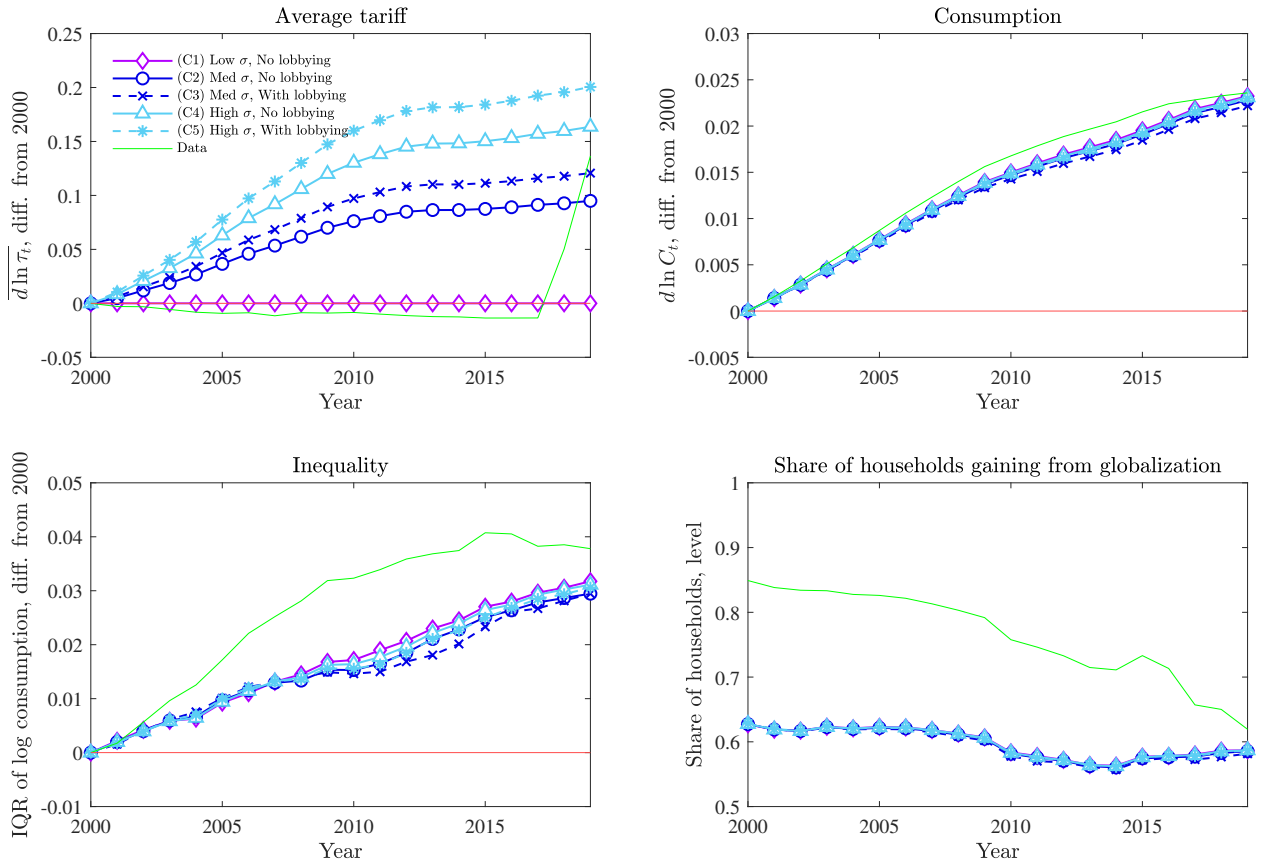


Figure 8: Implied tariffs, consumption, inequality, and globalization gains under alternative policy preferences

Notes: To isolate the role of inequality, we abstract from the tariff term in equation (18). For all panels, we set $\gamma = 1.5$. The average tariff is computed as $\overline{d \ln \tau_t} = \sum_{i=1}^{n_T} w_{IMi}\, d \ln \tau_{it}$, 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 parameters as follows: (C1) no inequality aversion, no lobbying: $\sigma = 0$, $\eta = 0$; (C2) moderate inequality aversion, no lobbying: $\sigma = 1.5$, $\eta = 0$; (C3) moderate inequality aversion, with lobbying: $\sigma = 1.5$, $\eta = 0.3$; (C4) strong inequality aversion, no lobbying: $\sigma = 3$, $\eta = 0$; (C5) strong inequality aversion, with lobbying: $\sigma = 3$, $\eta = 0.3$.

Irwin and Soderbery (2021) estimate η between 0.73 and 0.85 outside trade agreements, and Ma and McLaren (2018) find values around 0.3 when swing-state interests are involved. Although precise estimation of η is beyond the scope of this paper, values strictly above zero appear more realistic; otherwise, the scale of political spending in U.S. politics, emphasized by Bombardini and Trebbi (2025), would be difficult to rationalize. Finally, as lobbying influence increases (that is, as η rises), richer strategic interactions emerge, highlighting the central mechanism of the model.

Counterfactual tariff paths under alternative economic fundamentals. The analysis in the previous section suggests that protectionist pressures have intensified in recent years, driven by the distributional consequences of globalization. This pattern follows several

decades of global integration under free trade, during which other export-oriented economies, such as Japan and Korea, experienced rapid growth. Why, then, has the recent resurgence of protectionism been more pronounced than in earlier episodes?

To address this question through the lens of the model, we conduct a counterfactual simulation under the following alternative assumptions about the foreign and home economies:

(A1) Baseline
(A2) Smaller foreign size
(A3) Larger home tradables
(A4) Home growth
(A5) Higher home growth
(A6) Combination of (A2), (A3), and (A5)

Assumption (A1) defines the baseline scenario, with parameter values identical to those in case (C2) of Figure 7. Under (A2), foreign output S^f is reduced to one-quarter of its baseline level, reflecting the relative sizes of the Chinese and Japanese economies compared with the United States at the onset of their respective growth episodes (China in 1993 and Japan in 1950), as discussed above. Assumption (A3) raises output in domestic tradable sectors, S_T, by 50% relative to the baseline. This adjustment is motivated by the secular decline in the tradable sector's share of the U.S. economy since World War II: in 1950, this share was about 1.5 times its 1993 level (41.7 versus 27.0%). Assumptions (A4) and (A5) incorporate growth in the home economy, which alters the relative size of the foreign economy over time. In (A4), growth follows sectoral data from KLEMS, whereas in (A5) it is calibrated to the higher growth rates observed from 1950 onward. Notably, U.S. sectoral growth in earlier decades was both faster and more concentrated in tradable sectors. Finally, assumption (A6) combines these counterfactual scenarios.

Figure 9 plots the model-implied tariff trajectories under the alternative scenarios and highlights substantial heterogeneity across assumptions. Tariff increases are markedly more modest when the foreign economy is smaller (A2) or when the domestic tradable sector is larger (A3). In both cases, the lower relative importance of imports dampens the distributional pressures that fuel protectionism, resulting in muted tariff paths.

Under assumption (A4), which incorporates actual home-economy growth, tariff increases are slightly smaller than in the baseline (A1). Two forces are at work. Stronger home growth sustains the domestic economy's relative size, but when growth is concentrated in non-tradable sectors, rising inequality generates upward pressure on tariffs to compensate tradable sectors. These forces largely offset each other, resulting in a modest increase in tariffs. By contrast, assumption (A5), which features faster growth concentrated in tradable sectors,

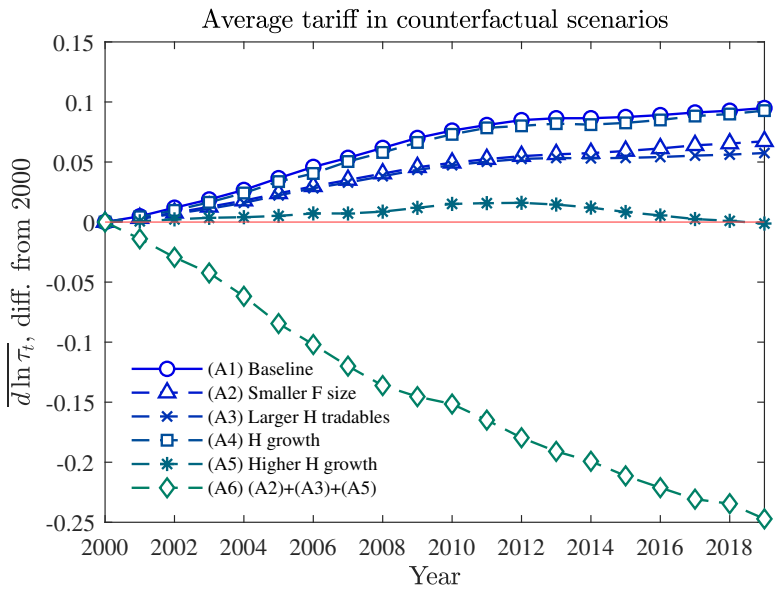


Figure 9: Implied tariffs under alternative fundamentals

Notes: Other than the parameter indicated in each line, model parameters are set to (C2) of Figure (7).

produces only a limited rise in tariffs. In this case, both channels reduce the protectionist pressure generated by foreign expansion, yielding tariffs close to zero.

Finally, assumption (A6), which combines these counterfactuals, generates a declining tariff path that reaches about -25% by the end of the sample. This outcome reflects how the model interprets the historical shift toward more open trade in earlier decades. Figure C.5 in the Appendix confirms that the pace and composition of foreign growth, as the mirror image of the home economy, play a central role in shaping endogenous tariff outcomes.

Across assumptions (A1)–(A6), the model produces a wide range of tariff paths, underscoring its ability to capture both rising and declining protectionist pressures depending on the underlying economic fundamentals.

6.3 Interactions of voting and lobbying

Our analysis so far has treated voting and lobbying as orthogonal components of the political process. In practice, however, these mechanisms may interact. We therefore consider an extension in which the politician's objective is influenced by voting behavior.

Specifically, we assume that the weight on lobbying contributions, η, depends on public support for trade protectionism: $\eta_t = \psi\left(V_{t-1} - \bar{V}\right)$, where V_{t-1} is the previous year's voting share favoring trade protectionism, as defined in equation (14), and $\bar{V}$ is a reference point set to the voting share in 2000. The politician compares the previous period's voting outcome with this benchmark, and the resulting deviation affects the subsequent weight placed on lobbying. The parameter $\psi > 0$ governs the sensitivity of η_t to voting behavior. As voting

shifts away from globalization, the policymaker assigns greater weight to sectoral interests, reflecting the distribution of gains from globalization across sectors.

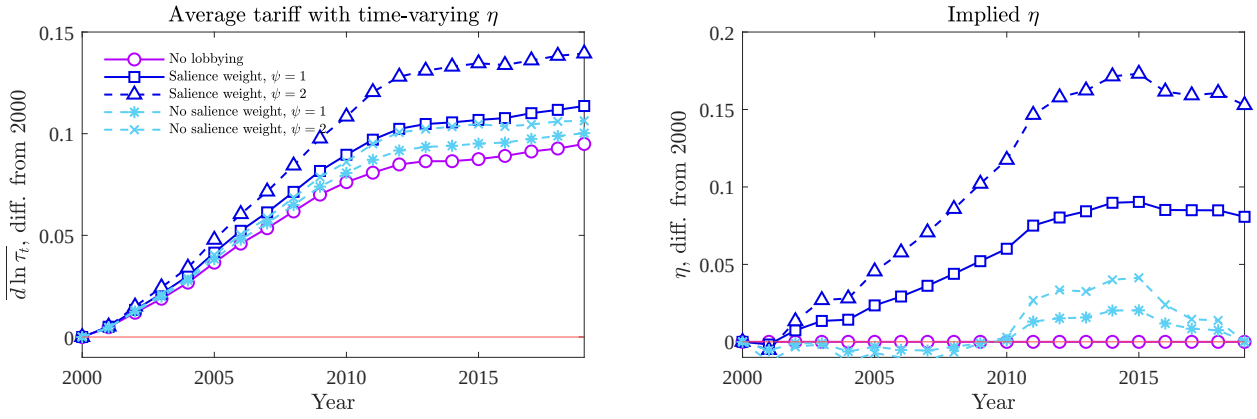


Figure 10: Implied tariffs under time-varying weight η on lobbying contribution

Notes: Lines with squares and triangles are with salience weights ($\alpha = 6$), whereas those with asterisks and crosses are without them ($\alpha = 0$). $\bar{V}$ is set to the voting share in 2000.

Figure 10 reports average tariff rates under time-varying η, together with the implied path of η. As the voting share moves toward trade protectionism, η increases, leading tariffs to follow a higher trajectory under endogenous lobbying weights. The tariff response is stronger when salience weights are present, as adversely affected households are more likely to vote for protectionism, and it is amplified for larger values of ψ.

7 Extensions

Finally, we extend the model along two dimensions: cross-lobbying and factor mobility. Each extension can meaningfully affect the political outcomes generated by the model, but the main results remain robust. We discuss these extensions in turn below.

7.1 Cross-sectoral lobbying

The idea of counter-lobbying, or lobbying for less protection, goes back at least to Bhagwati et al. (1992). While the baseline model allows only for own-sector lobbying, this restriction may be limiting in economies characterized by global value chains. As emphasized by Alfaro et al. (2019) and Antràs and Chor (2022), cross-border production linkages create incentives for firms that rely on imported intermediates or foreign affiliates to favor trade openness and to lobby against protection. Consistent with this view, Kim (2017) shows that export-oriented and import-using firms lobby for liberalization, and Choi (2025) documents similar behavior among globally integrated firms.

Motivated by these observations, we extend the model to allow for cross-sectoral partici-

pation in lobbying when determining sectoral tariffs. Unlike the baseline specification, which allows only the directly affected sector lobbies to influence policy, this extension permits multiple sectors to influence policy. Our framework differs from earlier multi-sector lobbying models, such as Gawande et al. (2012), by embedding lobbying behavior in a general-equilibrium production network, so that sectoral linkages endogenously shape trade policy outcomes.

Formally, we modify the politician's objective function in equation (15) to

$$U_t^p = (1-\eta) \underbrace{u_t}_{\text{Social welfare}} + \eta \underbrace{\sum_{i \in L} Q_t^i}_{\text{Lobbying contributions}}, \tag{22}$$

where L denotes the set of sectors engaged in lobbying. Nash bargaining between the government and the lobbying sectors implies:

$$U_t^p \propto U_t^j \propto (1-\eta) u_t + \eta \sum_{i \in L} u_t^i, \tag{23}$$

for all $j \in L$. The policymaker, therefore, acts as if maximizing a weighted average of aggregate welfare and the utilities of all lobbying sectors. As a result, the tariff applied to a given sector depends not only on that sector's own gains, but also on how the policy affects other lobbying sectors and overall social welfare.

This setup naturally generates both counter-lobbying and supportive lobbying. For example, when a tariff is imposed on a tradable sector (such as automobiles), downstream sectors (such as car dealers) may face higher input costs and lobby against the tariff. Conversely, upstream sectors (such as steel producers) may benefit and lobby in favor of protection. The net effect of cross-sectoral lobbying is therefore ambiguous, and it depends on the relative strength of these opposing forces.

To quantify these effects, we must specify the composition of the lobbying set L. Following Goldberg and Maggi (1999), we define lobbying sectors as those whose lobbying intensity exceeds a given threshold. Lobbying intensity is measured as lobbying expenditure on trade and tariff issues relative to sales, using the dataset described in Section 2. We set the threshold at 10% of the average lobbying intensity, yielding a restricted set of lobbying sectors that account for about 70% of total sales. For comparison, we also consider a universal case in which all sectors are allowed to lobby, providing a counterfactual benchmark with full participation.[10]

[10] Appendix Figure C.7 reports lobbying intensity by sector. It is highest in primary metals, wholesale and retail trade, and agriculture. Tradable sectors also tend to exhibit higher lobbying intensity than non-tradable sectors.

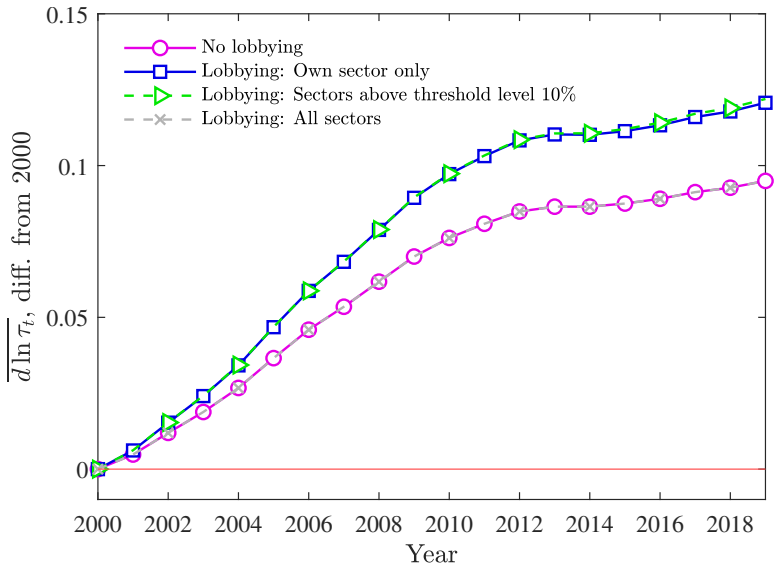


Figure 11: Implied tariffs under cross-sectoral lobbying

Notes: Model parameters are set to (C2) and (C3) of Figure (8), i.e., $\sigma = 1.5$ and $\eta = 0$ or 0.3. The solid lines with circles and squares are identical to (C2) and (C3) of Figure (8), respectively. The dashed lines with triangles and crosses represent cases in which lobbying is limited to sectors with intensity above 10% of the average, or in which all sectors are allowed to lobby, respectively.

Figure 11 reports the results. First, under the 10% threshold that restricts lobbying participation, outcomes are virtually identical to those obtained when only own-sector lobbying is permitted. This arises because counter-lobbying by sectors that benefit from trade, such as wholesale and retail trade, partly offsets protectionist pressures. In contrast, supportive lobbying by adversely affected tradable sectors, such as apparel, balances these effects. At the same time, the 10% threshold excludes many benefiting non-tradable sectors, including construction, education, healthcare, and hospitality, that would otherwise engage in counter-lobbying. With their exclusion, these opposing forces largely cancel out, leaving aggregate tariffs close to unchanged.

When lobbying participation becomes universal, these non-tradable sectors enter the process, and the resulting counter-lobbying dominates the supportive lobbying of adversely affected sectors. Tariffs therefore decline toward the no-lobbying benchmark, which lies strictly below the outcome obtained under own-sector lobbying alone. This pattern highlights the robustness of the baseline specification. Allowing for broader cross-sectoral lobbying does not overturn the main results and, in fact, reinforces the role of own-sector lobbying as a parsimonious benchmark.

7.2 Factor mobility

The empirical evidence shows that physical capital is not freely mobile across sectors in the short run (e.g., Neary, 1978). Similarly, Artuç et al. (2010) and Dix-Carneiro and Kovak (2017) document substantial labor mobility frictions, showing that workers adjust only slowly across sectors, causing trade shocks to have persistent effects on employment and wages. At the same time, evidence in Autor et al. (2014) and Foschi et al. (2025) indicates that workers eventually reallocate across sectors, mitigating the long-run persistence of globalization shocks. While our baseline assumption of no cross-sector factor mobility is a useful abstraction that captures medium-term persistence, we examine whether our results, particularly those for voting outcomes, depend on this assumption.

In the baseline model, factors are sector-specific and not transferable across sectors. We relax this assumption by allowing the mass of households in each sector, m_j, to vary exogenously over time, incorporating observed factor reallocation following trade shocks in a parsimonious way. In other words, we assume that the production factors captured by X_{it}, such as capital and sector-specific skills, remain fixed within each sector, while households can move across sectors and employ the factors available in their destination sector, which may differ from those associated with their initial endowment.

Specifically, we feed observed sectoral employment shares from BLS data into m_j. To allow for the possibility that part of the observed variation reflects forces unrelated to trade, we introduce a tuning parameter $\varepsilon \in [0, 1]$ that governs the fraction of observed reallocation incorporated into the model:

$$m_{jt} = m_j^{obs} \left(\frac{m_{jt}^{obs}}{m_j^{obs}} \right)^{\varepsilon},$$

where m_{jt}^{obs} denotes observed sectoral employment shares and m_j^{obs} their steady-state values, corresponding to the initial year of the sample (1991).

Changes in m_{jt} affect factor incomes by altering factor supply in both origin and destination sectors. As a result, the consumption dynamics in equation (8) become

$$\underbrace{d \ln C_t^{hj}}_{\text{Individual consumption}} = \underbrace{\frac{\omega^{hj}}{1-\beta} d \ln R_t}_{\text{Financial income}} + \underbrace{\left(1 - \omega^{hj}\right)\left(d \ln S_{jt} - d \ln m_{jt}\right)}_{\text{Factor income}}, \tag{24}$$

reflecting that an increase in sectoral employment ($d \ln m_{jt} > 0$) lowers individual factor income by spreading total sectoral income across more households.

Figure 12 reports θ_0^*, the intercept of the voting function that yields an equal split of votes ($V = 0.5$) for trade protectionism when factor mobility is introduced. Panel (A) includes

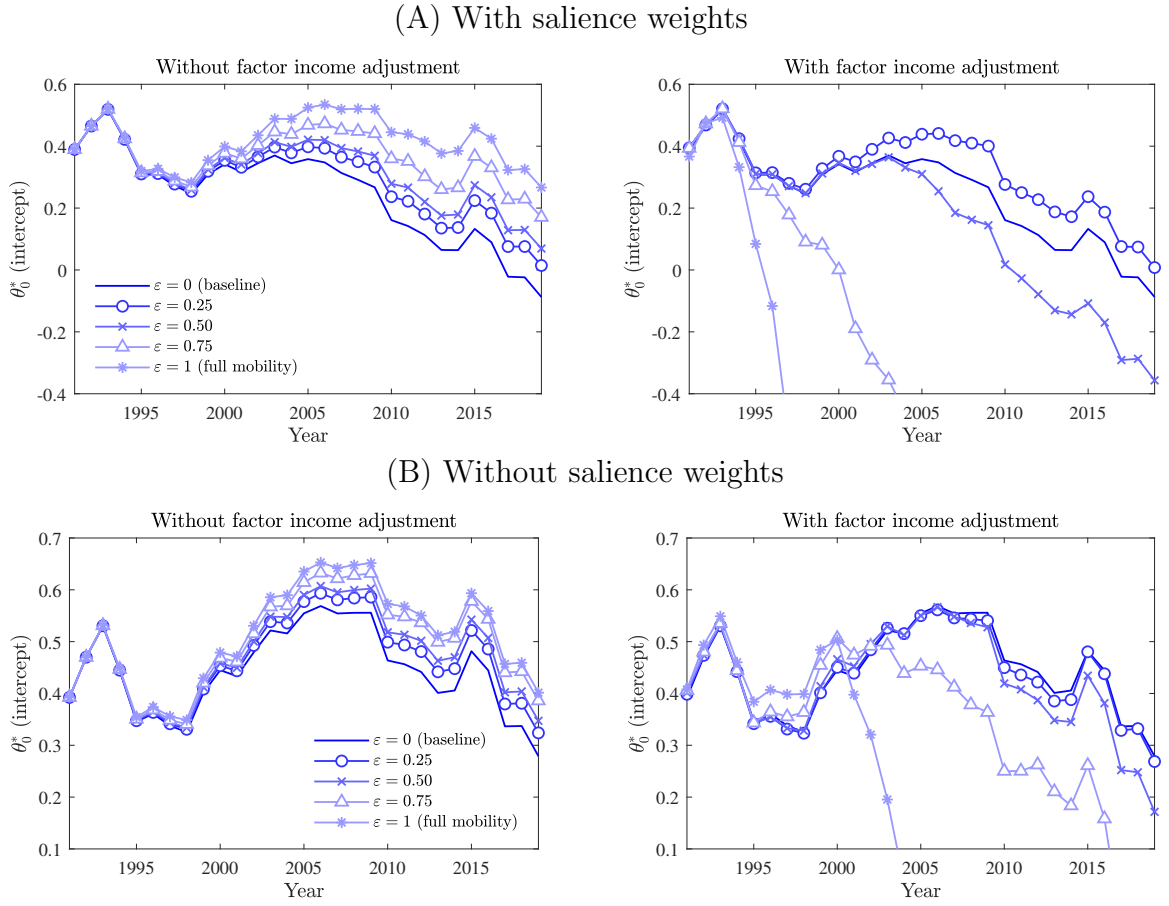


Figure 12: Evolution of θ_0^* in voting function: Mobility across sectors

Notes: The salience weight is set to $\alpha = 6$ in Panel (A) and to $\alpha = 0$ in Panel (B). In the right-hand charts, the cases with $\epsilon = 0.5$ and $\epsilon = 1.0$ (shown by lines with triangles and asterisks, respectively) lie outside the plotted range, corresponding to values of –0.20 and –1.99 in Panel (A) and –2.20 and –6.48 in Panel (B) at the end of the sample.

salience weights, while Panel (B) omits them; both exhibit similar qualitative patterns. In the left panels, we shut down the factor-income adjustment in equation (24), thereby removing the downward pressure on destination-sector factor income generated by factor inflows as households exit trade-exposed sectors. As a result, higher values of ε shift θ_0^* upward, since mobility attenuates the negative income effects of trade. Nevertheless, since the GFC, θ_0^* continues to decline, indicating persistent protectionist sentiment.

In the right panels, where factor income adjusts according to equation (24), mobility across sectors substantially lowers θ_0^*, especially for larger values of ε. For comparability, the y-axis limits are held fixed across left and right panels; consequently, the high-mobility cases ($\varepsilon = 0.5, 1.0$) lie outside the plotted range, reflecting their strong quantitative impact. In Panel (A), with salience weighting, a low degree of mobility ($\varepsilon = 0.125$) slightly raises θ_0^*, suggesting that modest reallocation can cushion shocks without amplifying inequality.

Overall, these results underscore the role of factor-income adjustments. However, observed mobility patterns do not imply that reallocation offsets the gains and losses from globalization. Even allowing for factor mobility, the model continues to predict rising support for trade protectionism.

8 Conclusion

This paper studies how protectionism can arise endogenously from the unequal distribution of the gains from globalization.

Our empirical analysis documents two complementary channels through which economic exposure generates political pressure. On the household side, individuals with greater exposure to import competition and lower financial wealth are significantly more likely to oppose globalization, while wealthier households remain more supportive. These voting patterns transform distributional shocks into sustained electoral pressure against openness. On the firm side, industries exposed to foreign competition respond by sharply increasing lobbying expenditures in favor of protection, reinforcing these electoral forces.

We interpret these findings through a quantitative Ricardian model with heterogeneous households, input–output linkages, and endogenous policy determination. A central feature of the model is dual-layer income heterogeneity: households differ in sector-specific factor income and in financial wealth within sectors. This structure generates asymmetric responses to globalization, even within sectors, widening consumption dispersion and shifting voting and lobbying incentives against openness despite positive aggregate gains. When calibrated to U.S.–China data, the model reproduces the observed decline in public support for globalization as trade exposure and wealth inequality rise.

Input–output linkages further amplify these dynamics. Because sectors are interconnected, protection in one sector alters costs, returns, and political incentives elsewhere, generating feedback effects that can sustain protectionist equilibria. Although tariffs may compress distributional disparities, they do so at the cost of lower aggregate consumption and efficiency.

Overall, the analysis highlights a fundamental tension between aggregate efficiency and political support for openness. Globalization delivers sizable aggregate gains, but when those gains are unevenly distributed, the resulting political equilibrium can shift toward protection. Accounting for this mechanism is essential for understanding the durability of open trade regimes.

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.

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

Aiyar, S., Chen, J., Ebeke, C., Ebeke, C. H., García-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.

Alfaro, L., Antràs, P., Chor, D., and Conconi, P. (2019). Internalizing global value chains: A firm-level analysis. *Journal of Political Economy*, 127(2):508–559.

Anderson, J. E. (2011). The specific factors continuum model, with implications for globalization and income risk. *Journal of International Economics*, 85:174–185.

Antràs, P. and Chor, D. (2022). Global value chains. In Gopinath, G., Helpman, E., and Rogoff, K., editors, *Handbook of International Economics*, volume 5, pages 297–376. Elsevier.

Antràs, P., de Gortari, A., and Itskhoki, O. (2017). Globalization, inequality and welfare. *Journal of International Economics*, 108:387–412.

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

Artuç, E., Chaudhuri, S., and McLaren, J. (2010). Trade shocks and labor adjustment: A structural empirical approach. *American Economic Review*, 100(3):1008–45.

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(5):1553–1597.

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.

Autor, D. H., Dorn, D., Hanson, G. H., and Song, J. (2014). Trade adjustment: Worker-level evidence. *Quarterly Journal of Economics*, 129(4):1799–1860.

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, Yale University.

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.

Bhagwati, J. N., Dinopoulos, E., and yu Wong, K. (1992). Quid pro quo foreign investment. *American Economic Review*, 82(2):186–190.

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.

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

Bordalo, P., Gennaioli, N., and Shleifer, A. (2022). Salience. *Annual Review of Economics*, 14:521–544.

Bordalo, P., Tabellini, M., and Yang, D. Y. (2020). Issue salience and political stereotypes. NBER Working Paper No. 27194.

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. Discussion Paper DP15648, CEPR.

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

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

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. (2025). Lobbying, trade, and misallocation. *Journal of International Economics*, 155:104086.

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 Gopinath, G., Helpman, E., and Rogoff, K., editors, *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 Gopinath, G., Helpman, E., and Rogoff, K., editors, *Handbook of International Economics*, volume 4, pages 197–261. Elsevier.

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

Dix-Carneiro, R. and Kovak, B. K. (2017). Trade liberalization and regional dynamics. *American Economic Review*, 107(10):2908–46.

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

Fernández-Villaverde, J., Ohanian, L. E., and Yao, W. (2023). The neoclassical growth of China. Working Paper 31351, 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.

Foschi, A., House, C., Proebsting, C., and Tesar, L. (2025). Should I stay or should I go? The response of labor migration to economic shocks. *Brookings Papers on Economic Activity*, forthcoming.

Gabaix, X. (2019). Behavioral inattention. In Bernheim, B. D., DellaVigna, S., and Laibson, D., editors, *Handbook of Behavioral Economics*, volume 2, pages 261–343. North-Holland.

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

Gawande, B. K., Krishna, P., and Olarreaga, M. (2012). Lobbying competition over trade policy. *International Economic Review*, 53(1):115–132.

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.

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. *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.

Heblich, S., Redding, S. J., and Zylberberg, Y. (2024). The distributional consequences of trade: Evidence from the grain invasion. Working Paper 32958, National Bureau of Economic Research.

Irwin, D. A. and Soderbery, A. (2021). Optimal tariffs and trade policy formation: U.S. evidence from the Smoot-Hawley era. Working Paper 29115, National Bureau of Economic Research.

Itskhoki, O. and Mukhin, D. (2025). The optimal macro tariff. Working Paper 33839, National Bureau of Economic Research.

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.

Kahneman, D. and Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2):263–291.

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

Kim, I. S. (2017). Political cleavages within industry: Firm-level lobbying for trade liberalization. *American Political Science Review*, 111(1):1–20.

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

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. Working Paper 24425, National Bureau of Economic Research.

Mayer, W. (1984). Endogenous tariff formation. *American Economic Review*, 75(5):970–985.

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. Working Paper 11564, CESifo.

Méndez, E. and Van Patten, D. (2025). Voting on a trade agreement: Firm networks and attitudes towards openness. *Review of Economic Studies*, 92(6):4059–4083.

Neary, J. P. (1978). Short-run capital specificity and the pure theory of international trade. *Economic Journal*, 88:488–510.

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

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

Pflueger, C. and Yared, P. (2024). Global hegemony and exorbitant privilege. Working Paper 32775, 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.

Piketty, T. and Saez, E. (2003). Income inequality in the United States, 1913-1998. *Quarterly Journal of Economics*, 118(1):1–41.

Piketty, T., Saez, E., and Zucman, G. (2017). Distributional national accounts: Methods and estimates for the United States. *Quarterly Journal of Economics*, 133(2):553–609.

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.

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

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).

Zhang, H. (2025). Commerce, coalitions, and global value chains: Coordinated and collective lobbying on trade. *American Journal of Political Science*, pages 1–19.

Supplemental Appendices to

"How Globalization Unravels:

A Ricardian Model of Endogenous Trade Policy"

Jesús Fernández-Villaverde[†], *Tomohide Mineyama*[‡], *Dongho Song*[§]

A Model Solution

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

$$
\begin{aligned}
C_{it}^{Hhj} &= \left(\frac{P_{it}}{P_{it}\xi_i}\right)^{-\theta_i} C_{it}^{hj}, \\
C_{it}^{Fhj} &= \left(\frac{\tau_{it}P_{it}^{f}}{P_{it}(1-\xi_i)}\right)^{-\theta_i} C_{it}^{hj}, \\
C_{it}^{hj} &= v_i \left(\frac{P_{it}}{P_t}\right)^{-1} C_t^{hj}, \\
P_t &= \prod_{i=1}^{n} \left(P_{it}\right)^{v_i}, \\
P_{it} &= \left(\xi_i^{\theta_i} P_{it}^{1-\theta_i} + (1-\xi_i)^{\theta_i} (\tau_{it}P_{it}^{f})^{1-\theta_i}\right)^{\frac{1}{1-\theta_i}},
\end{aligned}
\tag{A.1}
$$

where τ_i is the tariff and P_{it} is a domestic price, which is a composite of home- and foreign-produced goods prices.

The first-order condition for the intertemporal decision (3)–(4) in the main text leads to the consumption Euler equation:

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

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

† University of Pennsylvania, ‡ International Monetary Fund, § Johns Hopkins University.

Firms. Profit maximization by firms leads to:

$$
\begin{aligned}
Y_{ijt}^{H} &= \left(\frac{P_{jt}}{P_{jt}\xi_j}\right)^{-\theta_j} Y_{ijt}, \\
Y_{ijt}^{F} &= \left(\frac{\tau_{jt}P_{jt}^{f}}{P_{jt}(1-\xi_j)}\right)^{-\theta_j} Y_{ijt}, \\
E_{it}X_{it} &= \alpha_i P_{it}Y_{it}, \\
P_{jt}Y_{ijt} &= (1-\alpha_i)w_{ij}P_{it}Y_{it},
\end{aligned}
\tag{A.2}
$$

Equation (A.2) 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 first-order conditions are given by:

$$
\begin{aligned}
C_{it}^{fFjh} &= \left(\frac{P_{it}^{f}}{P_{it}^{f}\xi_i^{f}}\right)^{-\theta_i} C_{it}^{Fhj}, \\
C_{it}^{fHjh} &= \left(\frac{\tau_{it}^{f}P_{it}}{P_{it}^{f}(1-\xi_i^{f})}\right)^{-\theta_i} C_{it}^{Fhj}, \\
C_{it}^{Fhj} &= v_i^{f}\left(\frac{P_{it}^{f}}{P_{t}^{f}}\right)^{-1} C_{t}^{Fhj}, \\
P_{t}^{f} &= \prod_{i=1}^{n}\left(P_{it}^{f}\right)^{v_i^{f}}, \\
P_{it}^{f} &= \left((\xi_i^{f})^{\theta_i}(P_{it}^{f})^{1-\theta_i} + (1-\xi_i^{f})^{\theta_i}(\tau_{it}^{f}P_{it})^{1-\theta_i}\right)^{\frac{1}{1-\theta_i}}, \\
1 &= \mathbb{E}_t\left[\beta\left(\frac{C_{t+1}^{Fhj}}{C_{t}^{Fhj}}\right)^{-\gamma}\tilde{R}_{t+1}^{f}\right], \\
Y_{ijt}^{fF} &= \left(\frac{P_{jt}^{f}}{P_{jt}^{f}\xi_j^{f}}\right)^{-\theta_j} Y_{ijt}^{f}, \\
Y_{ijt}^{fH} &= \left(\frac{\tau_{jt}^{f}P_{jt}}{P_{jt}^{f}(1-\xi_j^{f})}\right)^{-\theta_j} Y_{ijt}^{f}, \\
E_{it}^{f}X_{it}^{f} &= \alpha_i^{f}P_{it}^{f}Y_{it}^{f}, \\
P_{jt}^{f}Y_{ijt}^{f} &= (1-\alpha_i^{f})w_{ij}^{f}P_{it}^{f}Y_{it}^{f},,
\end{aligned}
\tag{A.3}
$$

Market clearing. Substituting the first-order conditions into the market-clearing conditions yields:

$$\xi_i^{\theta_i}\left(\frac{P_{it}}{P_{it}}\right)^{-\theta_i+1} D_{it} + (1-\xi_i^f)^{\theta_i}(\tau_{it}^f)^{-\theta_i}\left(\frac{P_{it}}{P_{it}^f}\right)^{-\theta_i+1} D_{it}^f = S_{it}, \tag{A.4}$$

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

$$\text{where} \quad D_{it} = v_i P_t C_t + \sum_{j=1}^{n}(1-\alpha_j) w_{ji} S_{jt}, \tag{A.6}$$

$$D_{it}^f = v_i^f P_t^f C_t^f + \sum_{j=1}^{n}(1-\alpha_j^f) w_{ji}^f S_{jt}^f. \tag{A.7}$$

Here $S_{it} = P_{it}Y_{it}$ 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 the t subscript denote steady-state values.

Equations (A.4)–(A.7) lead to:

$$\begin{aligned}
&-\left\{\tilde{\xi}_i(1-\tilde{\xi}_i)D_i + \tilde{\xi}_i^f(1-\tilde{\xi}_i^f)(\tau_i^f)^{-1}D_i^f\right\}(\theta_i-1)(d\ln P_{it} - d\ln P_{it}^f) + \tilde{\xi}_i D_i d\ln D_{it} \\
&\quad +(1-\tilde{\xi}_i^f)(\tau_i^f)^{-1}D_i^f d\ln D_{it}^f + \tilde{\xi}_i(1-\tilde{\xi}_i)D_i(\theta_i-1)d\ln\tau_{it} \\
&\quad -\left\{-(1-\tilde{\xi}_i^f)(\theta_i-1)+\theta_i\right\}(1-\tilde{\xi}_i^f)(\tau_i^f)^{-1}D_i^f d\ln\tau_{it}^f = S_i d\ln S_{it}, \\
&\left\{\tilde{\xi}_i(1-\tilde{\xi}_i)\tau_i^{-1}D_i + \tilde{\xi}_i^f(1-\tilde{\xi}_i^f)D_i^f\right\}(\theta_i-1)(d\ln P_{it} - d\ln P_{it}^f) + (1-\tilde{\xi}_i)\tau_i^{-1}D_i d\ln D_{it} \\
&\quad +\tilde{\xi}_i^f D_i^f d\ln D_{it}^f + \tilde{\xi}_i^f(1-\tilde{\xi}_i^f)D_i^f(\theta_i-1)d\ln\tau_{it}^f \\
&\quad -\left\{-(1-\tilde{\xi}_i)(\theta_i-1)+\theta_i\right\}(1-\tilde{\xi}_i)\tau_i^{-1}D_i d\ln\tau_{it} = S_i^f d\ln S_{it}^f, \\
&\text{where} \quad D_i d\ln D_{it} = v_i d\ln(P_tC_t) + \sum_{j=1}^{n}(1-\alpha_j)w_{ji}S_j d\ln S_{jt}, \\
&D_i^f d\ln D_{it}^f = v_i^f P^f C^f d\ln(P_t^f C_t^f) + \sum_{j=1}^{n}(1-\alpha_j^f)w_{ji}^f S_j^f d\ln S_{jt}^f.
\end{aligned}$$

Here, $\tilde{\xi}_i = \xi_i^{\theta_i}/(\xi_i^{\theta_i} + (1-\xi_i)^{\theta_i}\tau_i^{1-\theta_i})$ 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

equations (A.1) and (A.3) are:

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

We also assume $\tau_i = \tau_i^f = 1$ in the baseline case.

In a matrix form:

$$\begin{aligned}
&-\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, \qquad \text{(A.8)}\\
&\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, \qquad \text{(A.9)}\\
&\text{where} \quad \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, \\
&\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\prime}\boldsymbol{S}^f d\ln \boldsymbol{S}_t^f.
\end{aligned}$$

Combining equations (A.8) and (A.9), we get:

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

or:

$$\begin{aligned}
&\boldsymbol{v}PCd\ln(P_tC_t) + \boldsymbol{v}^f P^f C^f d\ln(P_t^f C_t^f) - (\boldsymbol{I}-\tilde{\boldsymbol{\xi}})\boldsymbol{D}d\ln \boldsymbol{\tau}_t - (\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)\boldsymbol{D}^f d\ln \boldsymbol{\tau}_t^f \\
&\qquad = \boldsymbol{V}'^{-1}\boldsymbol{S}d\ln \boldsymbol{S}_t + \boldsymbol{V}^{f\prime-1}\boldsymbol{S}^f d\ln \boldsymbol{S}_t^f, \qquad \text{(A.10)}
\end{aligned}$$

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

Substituting equation (A.10) back to condition (A.8) yields:

$$\begin{aligned}
\underbrace{\boldsymbol{S}d\ln \boldsymbol{S}_t}_{\text{Output}} = \underbrace{\tilde{\boldsymbol{V}}'}_{\text{Network}} \Bigg\{ &\underbrace{-\tilde{\boldsymbol{\theta}}}_{\text{Elasticity}} \underbrace{(d\ln \boldsymbol{P}_t - d\ln \boldsymbol{P}_t^f)}_{\text{Relative price}} \underbrace{+\tilde{\boldsymbol{v}}PCd\ln(P_tC_t)}_{\text{Home aggregate demand}} \underbrace{+\tilde{\boldsymbol{v}}^f P^f C^f d\ln(P_t^f C_t^f)}_{\text{Foreign aggregate demand}} \\
&\underbrace{+\boldsymbol{\eta}d\ln \boldsymbol{\tau}_t - \boldsymbol{\eta}^f d\ln \boldsymbol{\tau}_t^f}_{\text{Tariff}} \Bigg\}, \qquad \text{(A.11)}
\end{aligned}$$

where:

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

and

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

are the Leontief inverse and demand elasticity, respectively, adjusted with trade.

The Leontief inverse $\tilde{\boldsymbol{V}}$ captures propagation through the domestic production network $\boldsymbol{V}$, but this propagation is attenuated because the imported goods component, $(\boldsymbol{I} - \tilde{\boldsymbol{\xi}})$, drops out of domestic linkages. The demand elasticity $\tilde{\boldsymbol{\theta}}$ is adjusted to account for imports and exports, $(\boldsymbol{I} - \tilde{\boldsymbol{\xi}})\boldsymbol{D}$ and $(\boldsymbol{I} - \tilde{\boldsymbol{\xi}}^f)\boldsymbol{D}^f$, and is rescaled by the home and foreign price differentials, $\tilde{\boldsymbol{\xi}}$ and $\tilde{\boldsymbol{\xi}}^f$.

The expressions $\tilde{\boldsymbol{v}} = \left\{\tilde{\boldsymbol{\xi}} + (\boldsymbol{I} - \tilde{\boldsymbol{\xi}}^f)(\boldsymbol{V}^{f\prime} - \boldsymbol{I})\right\}\boldsymbol{v}$ and $\tilde{\boldsymbol{v}}^f = (\boldsymbol{I} - \tilde{\boldsymbol{\xi}}^f)\boldsymbol{V}^{f\prime}\boldsymbol{v}^f$ represent sectoral elasticity with respect to aggregate demand. Similarly, define:

$$\boldsymbol{\eta} = \left\{\tilde{\boldsymbol{\xi}}(\boldsymbol{\theta} - \boldsymbol{I}) - (\boldsymbol{I} - \tilde{\boldsymbol{\xi}})(\boldsymbol{V}^{f\prime} - \boldsymbol{I})\right\}(\boldsymbol{I} - \tilde{\boldsymbol{\xi}})\boldsymbol{D}$$

and

$$\boldsymbol{\eta}^f = \left\{\tilde{\boldsymbol{\xi}}^f(\boldsymbol{\theta} - \boldsymbol{I}) + (\boldsymbol{I} - \tilde{\boldsymbol{\xi}})(\boldsymbol{V}^{f\prime} - \boldsymbol{I}) + \boldsymbol{\theta}\right\}(\boldsymbol{I} - \tilde{\boldsymbol{\xi}}^f)\boldsymbol{D}^f.$$

Equation (A.11) shows that sectoral outputs fall when the relative price of home goods increases and rise with home and foreign aggregate demand, with these effects amplified by the production network. The sign of $\boldsymbol{\eta}$ is ambiguous because higher tariffs reduce imports on one hand, but also depress domestic demand on the other. When trade is absent, that is, $\tilde{\boldsymbol{\xi}} = \boldsymbol{I}$, equation (A.11) simplifies to

$$\boldsymbol{S} d\ln \boldsymbol{S}_t = \boldsymbol{V}'\boldsymbol{v}\, PC\, d\ln(P_t C_t).$$

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 $\boldsymbol{D}^f = \boldsymbol{v}^f P^f C^f$, implying that $\tilde{\boldsymbol{V}}$, $\boldsymbol{\eta}$, $\boldsymbol{\eta}^f$ are diagonal and, thus, there is no sectoral propagation.

National accounting. Recall that the home country's nominal GDP is given by:

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

Therefore, up to first-order, we have the approximation:

$$\begin{aligned} dGDP_t &= d(P_t C_t) + \sum_{i=1}^{n} (1-\tilde{\xi}_i^f) \left\{ -\theta_i D_i^f d\ln \tau_{it}^f - (\theta_i - 1) D_i^f (d\ln P_{it} - d\ln P_{it}^f) + dD_{it}^f \right\} \\ &\quad - \sum_{i=1}^{n} (1-\tilde{\xi}_i) \left\{ -\theta_i D_i d\ln \tau_{it} - (\theta_i - 1) D_i (d\ln P_{it}^f - d\ln P_{it}) + dD_{it} \right\} \\ &= d(P_t C_t) + \mathbf{1}'(\boldsymbol{I} - \tilde{\boldsymbol{\xi}}^f) d\boldsymbol{D}_t^f - \mathbf{1}'(\boldsymbol{I} - \tilde{\boldsymbol{\xi}}) d\boldsymbol{D}_t - \mathbf{1}'\tilde{\boldsymbol{\theta}}(d\ln \boldsymbol{P}_t - d\ln \boldsymbol{P}_t^f) \\ &\quad + \mathbf{1}'(\boldsymbol{I} + (\boldsymbol{\theta} - \boldsymbol{I})\tilde{\boldsymbol{\xi}})(\boldsymbol{I} - \tilde{\boldsymbol{\xi}}) \boldsymbol{D} d\ln \boldsymbol{\tau}_t - \mathbf{1}'(\boldsymbol{I} + (\boldsymbol{\theta} - \boldsymbol{I})\tilde{\boldsymbol{\xi}}^f)(\boldsymbol{I} - \tilde{\boldsymbol{\xi}}^f) \boldsymbol{D}^f d\ln \boldsymbol{\tau}_t^f. \end{aligned} \tag{A.12}$$

The production approach yields $GDP_t = \sum_{i=1}^{n} \alpha_i S_{it}$, and

$$dGDP_t = \mathbf{1}'\boldsymbol{\alpha} d\boldsymbol{S}_t. \tag{A.13}$$

Using the symmetry of home and foreign economies, equations (A.12) and (A.13) imply:

$$\mathbf{1}'\boldsymbol{\alpha} d\boldsymbol{S}_t + \mathbf{1}'\boldsymbol{\alpha}^f d\boldsymbol{S}_t^f = d(P_t C_t) + d(P_t^f C_t^f). \tag{A.14}$$

Production function. The production function, together with first-order conditions, determines the relation of sales with prices and factor inputs:

$$\begin{aligned} \boldsymbol{\alpha} d\ln \boldsymbol{S}_t &= d\ln \boldsymbol{A}_t + \boldsymbol{\alpha} d\ln \boldsymbol{X}_t + \boldsymbol{V}^{-1} d\ln \boldsymbol{P}_t \\ &\quad + (\boldsymbol{I} - \boldsymbol{\alpha}) \boldsymbol{W} (\boldsymbol{I} - \tilde{\boldsymbol{\xi}})(d\ln \boldsymbol{P}_t - d\ln \boldsymbol{P}_t^f - d\ln \boldsymbol{\tau}_t), \end{aligned} \tag{A.15}$$

$$\begin{aligned} \boldsymbol{\alpha}^f d\ln \boldsymbol{S}_t^f &= d\ln \boldsymbol{A}_t^f + \boldsymbol{\alpha}^f d\ln \boldsymbol{X}_t^f + \boldsymbol{V}^{f-1} d\ln \boldsymbol{P}_t^f \\ &\quad - (\boldsymbol{I} - \boldsymbol{\alpha}^f) \boldsymbol{W}^f (\boldsymbol{I} - \tilde{\boldsymbol{\xi}}^f)(d\ln \boldsymbol{P}_t + d\ln \boldsymbol{\tau}_t^f - d\ln \boldsymbol{P}_t^f). \end{aligned} \tag{A.16}$$

Combining equations (A.15) and (A.16), we obtain

$$\begin{aligned} d\ln \boldsymbol{P}_t - d\ln \boldsymbol{P}_t^f &= \left\{ \boldsymbol{I} + (\boldsymbol{V} - \boldsymbol{I})(\boldsymbol{I} - \tilde{\boldsymbol{\xi}}) + (\boldsymbol{V}^f - \boldsymbol{I})(\boldsymbol{I} - \tilde{\boldsymbol{\xi}}^f) \right\}^{-1} \\ &\quad \left\{ \boldsymbol{V}(\boldsymbol{\alpha} d\ln \boldsymbol{S}_t - d\ln \boldsymbol{A}_t - \boldsymbol{\alpha} d\ln \boldsymbol{X}_t) - \boldsymbol{V}^f(\boldsymbol{\alpha}^f d\ln \boldsymbol{S}_t^f - d\ln \boldsymbol{A}_t^f - \boldsymbol{\alpha}^f d\ln \boldsymbol{X}_t^f) \right. \\ &\quad \left. + (\boldsymbol{V} - \boldsymbol{I})(\boldsymbol{I} - \tilde{\boldsymbol{\xi}}) d\ln \boldsymbol{\tau}_t - (\boldsymbol{V}^f - \boldsymbol{I})(\boldsymbol{I} - \tilde{\boldsymbol{\xi}}^f) d\ln \boldsymbol{\tau}_t^f \right\}. \end{aligned} \tag{A.17}$$

Closed-form solution. We can use equations (A.8), (A.10), (A.12), (A.13), (A.14), (A.17) to 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 equation (A.10) into equation (A.17) eliminates $d\ln \boldsymbol{S}_t^f$:

$$\begin{aligned} d\ln \boldsymbol{P}_t - d\ln \boldsymbol{P}_t^f = \boldsymbol{c}_1^{-1}\Big\{&\boldsymbol{c}_2\boldsymbol{S}d\ln \boldsymbol{S}_t - \boldsymbol{c}_3(\boldsymbol{v}PCd\ln P_tC_t + \boldsymbol{v}^fP^fC^fd\ln P_t^fC_t^f) \\ &-\boldsymbol{V}(d\ln \boldsymbol{A}_t + \boldsymbol{\alpha}d\ln \boldsymbol{X}_t) + \boldsymbol{V}^f(d\ln \boldsymbol{A}_t^f + \boldsymbol{\alpha}^f d\ln \boldsymbol{X}_t^f) \\ &+\boldsymbol{c}_4 d\ln \boldsymbol{\tau}_t - \boldsymbol{c}_5 d\ln \boldsymbol{\tau}_t^f\Big\}, \end{aligned} \tag{A.18}$$

where $\boldsymbol{c}_1 = \boldsymbol{I} + (\boldsymbol{V}-\boldsymbol{I})(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}) + (\boldsymbol{V}^f-\boldsymbol{I})(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)$, $\boldsymbol{c}_2 = \boldsymbol{V}\boldsymbol{\alpha}\boldsymbol{S}^{-1} + \boldsymbol{V}^f\boldsymbol{\alpha}^f\boldsymbol{S}^{f-1}\boldsymbol{V}^{f'}\boldsymbol{V}'^{-1}$, $\boldsymbol{c}_3 = \boldsymbol{V}^f\boldsymbol{\alpha}^f\boldsymbol{S}^{f-1}\boldsymbol{V}^{f'}$, $\boldsymbol{c}_4 = \{\boldsymbol{V}^f\boldsymbol{\alpha}^f\boldsymbol{S}^{f-1}\boldsymbol{V}^{f'}\boldsymbol{D} + (\boldsymbol{V}-\boldsymbol{I})\}(\boldsymbol{I}-\tilde{\boldsymbol{\xi}})$, and $\boldsymbol{c}_5 = \{\boldsymbol{V}^f\boldsymbol{\alpha}^f\boldsymbol{S}^{f-1}\boldsymbol{V}^{f'}\boldsymbol{D}^f + (\boldsymbol{V}^f-\boldsymbol{I})\}(\boldsymbol{I}-\tilde{\boldsymbol{\xi}}^f)$.

Combining equations (A.11) and (A.18) determines the relation between $\boldsymbol{S}_t$ and exogenous variables as well as aggregate demand, eliminating the relative price:

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

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 $\check{\boldsymbol{v}} = \tilde{\boldsymbol{v}} + \tilde{\boldsymbol{\theta}}\boldsymbol{c}_1^{-1}\boldsymbol{c}_3\boldsymbol{v}$, $\check{\boldsymbol{v}}^f = \tilde{\boldsymbol{v}}^f + \tilde{\boldsymbol{\theta}}\boldsymbol{c}_1^{-1}\boldsymbol{c}_3\boldsymbol{v}^f$, $\check{\boldsymbol{\theta}} = \tilde{\boldsymbol{\theta}}\boldsymbol{c}_1^{-1}$, $\check{\boldsymbol{\eta}} = \boldsymbol{\eta} - \tilde{\boldsymbol{\theta}}\boldsymbol{c}_1^{-1}\boldsymbol{c}_4$, $\check{\boldsymbol{\eta}}^f = \boldsymbol{\eta}^f + \tilde{\boldsymbol{\theta}}\boldsymbol{c}_1^{-1}\boldsymbol{c}_5$.

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 equation (A.18), thereby reducing demand.

A.1 Equilibrium computation

Conditions (A.8), (A.9), (A.12), (A.13), (A.14), (A.15), and (A.16) identify:

$$\begin{aligned} d\ln \boldsymbol{S}_t &= d\ln \boldsymbol{P}_t + d\ln \boldsymbol{Y}_t, \\ d\ln \boldsymbol{S}_t^f &= d\ln \boldsymbol{P}_t^f + d\ln \boldsymbol{Y}_t^f, \end{aligned}$$

which, given exogenous vectors $\{\boldsymbol{A}_t, \boldsymbol{A}_t^f, \boldsymbol{X}_t, \boldsymbol{X}_t^f, \boldsymbol{\tau}_t, \boldsymbol{\tau}_t^f\}$, provide us with eight sets of linear equations to solve for eight endogenous vectors $\{\boldsymbol{S}_t, \boldsymbol{S}_t^f, \boldsymbol{P}_t, \boldsymbol{P}_t^f, \boldsymbol{Y}_t, \boldsymbol{Y}_t^f, P_tC_t, P_t^fC_t^f\}$. Other variables are calculated accordingly using respective conditions.

A.2 Examples

We now develop the details of our examples in Subsection 3.3.

Example 1. We need $\check{\boldsymbol{V}}$ and $\check{\boldsymbol{\theta}}$ to derive:

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

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

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

Example 2. Since sector 1 is non-tradable, $\tilde{\xi}_1 = 1$ and $\tilde{\theta}_1 = 0$. Then,

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

It follows that:

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

and we obtain:

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

Example 3. In this case, $\tilde{\xi}_2 = 1$ and $\tilde{\theta}_2 = 0$. Also,

$$\boldsymbol{V} = \left[\begin{array}{cc} 1 & 0 \\ 1 & 1 \end{array}\right],\ \tilde{\boldsymbol{V}} = \left[\begin{array}{cc} 1+2(1-\tilde{\xi}_1) & 2(1-\tilde{\xi}_1) \\ 1 & 1 \end{array}\right],$$
$$c_1 = \left[\begin{array}{cc} 1 & 0 \\ 2(1-\tilde{\xi}_1) & 1 \end{array}\right],\ c_2 = \left[\begin{array}{cc} S^{-1}+S^{f-1} & 0 \\ S^{-1}+S^{f-1} & 0 \end{array}\right],$$

which leads to:

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

$$\check{\boldsymbol{\theta}} = \begin{bmatrix} \tilde{\theta}_1 & 0 \\ 0 & 0 \end{bmatrix}.$$

Then:

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

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.3 Endogenous tariffs

The optimality condition for τ_{jt} is obtained from the first-order condition of equation (17) in the main text:

$$\underbrace{\tilde{\boldsymbol{S}}^{j\prime}\underbrace{\frac{\partial \ln \boldsymbol{S}_t}{\partial \ln \tau_{jt}}}_{\equiv \boldsymbol{C}_{S\tau j}}}_{\text{Average loss/gain}} + \eta \underbrace{\left\{ \frac{IM_j}{S}(1+d\ln IM_{jt}) + \underbrace{\left(\frac{\partial \ln \boldsymbol{IM}_t}{\partial \ln \tau_{jt}}\right)'}_{\equiv \boldsymbol{C}'_{IM\tau j}} \operatorname{diag}\left(\frac{\boldsymbol{IM}}{S}\right) d\ln \boldsymbol{\tau}_t \right\}}_{\text{Tariff revenue increase/decrease}}$$

$$= \underbrace{\sigma}_{\text{Inequality aversion}} \underbrace{\underbrace{\left(\frac{\partial \ln \boldsymbol{S}_t}{\partial \ln \tau_{jt}}\right)'}_{\equiv \boldsymbol{C}'_{S\tau j}} (\boldsymbol{I}-\boldsymbol{1}\boldsymbol{S}')' \operatorname{diag}(\tilde{\boldsymbol{S}}^j)\,(\boldsymbol{I}-\boldsymbol{1}\boldsymbol{S}')\, d\ln \boldsymbol{S}_t}_{\text{Equality gain/loss}},$$

where $\tilde{\boldsymbol{h}}^j$ is a n-by-1 column vector with the i-th element being $(1-\eta)S_i/S$ for $i \neq j$ and S_i/S for $i = j$. The coefficients $\boldsymbol{C}$ satisfy a linear solution:

$$\begin{aligned} d\ln \boldsymbol{S}_t &= \boldsymbol{C}_{SA^f} d\ln \boldsymbol{A}_t^f + \boldsymbol{C}_{SX^f} d\ln \boldsymbol{X}_t^f + \boldsymbol{C}_{SA} d\ln \boldsymbol{A}_t \\ &+ \boldsymbol{C}_{SX} d\ln \boldsymbol{X}_t + \boldsymbol{C}_{S\tau} d\ln \boldsymbol{\tau}_t + \boldsymbol{C}_{S\tau^f} d\ln \boldsymbol{\tau}_t^f, \\ d\ln \boldsymbol{IM}_t &= \boldsymbol{C}_{IMA^f} d\ln \boldsymbol{A}_t^f + \boldsymbol{C}_{IMX^f} d\ln \boldsymbol{X}_t^f + \boldsymbol{C}_{IMA} d\ln \boldsymbol{A}_t \\ &+ \boldsymbol{C}_{IMX} d\ln \boldsymbol{X}_t + \boldsymbol{C}_{IM\tau} d\ln \boldsymbol{\tau}_t + \boldsymbol{C}_{IM\tau^f} d\ln \boldsymbol{\tau}_t^f, \end{aligned}$$

and the subscript j indicates the j-th column vector.

Stacking the first-order condition for tradable sectors, we obtain:

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

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

Then:

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

where $\boldsymbol{C}^T_{\cdot}$ collects $j \in T$-th row of $\boldsymbol{C}_{\cdot}$.

We can also show that:

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

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

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

B Supplementary Tables

Table B.1: Calibrated trade elasticities

	Harmonized sector	$\theta_i - 1$
1	Agriculture, forestry, & fishing	8.11
2	Oil & gas	15.72
3	Mining	15.72
4	Utility	5
5	Construction	5
6	Wood products & furniture	10.83
7	Nonmetallic mineral products	2.76
8	Primary metals	7.99
9	Fabricated metal products	7.99
10	Machinery	1.52
11	Electronic products	10.6
12	Electrical equipment	10.6
13	Transportation equipment	1.01
14	Miscellaneous manufacturing	5
15	Food, beverage & tobacco products	2.55
16	Textile	5.56
17	Apparel	5.56
18	Paper products, printing & publishing	9.07
19	Petroleum & coal products	51.08
20	Chemical products	4.75
21	Plastics & rubber products	4.75
22	Wholesale & retail trades	5
23	Transport, storage & post services	5
24	Information & computer services	5
25	Financial Intermediation	5
26	Real estate	5
27	Professional & technical services	5
28	Education	5
29	Healthcare & social security services	5
30	Cultural, entertainment, & other services	5
31	Hotels & restaurants	5

Notes: These values are taken from Caliendo and Parro (2015) and Baqaee and Farhi (2024). Their notation of trade elasticity corresponds to $\theta_i - 1$ in our model.

Table B.2: 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 B.2: Harmonized sectors (continued)

	Harmonized sector	US KLEMS	Chinese KLEMS
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 Intermediation	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 Intermediation
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 B.3: Sectoral data

	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.

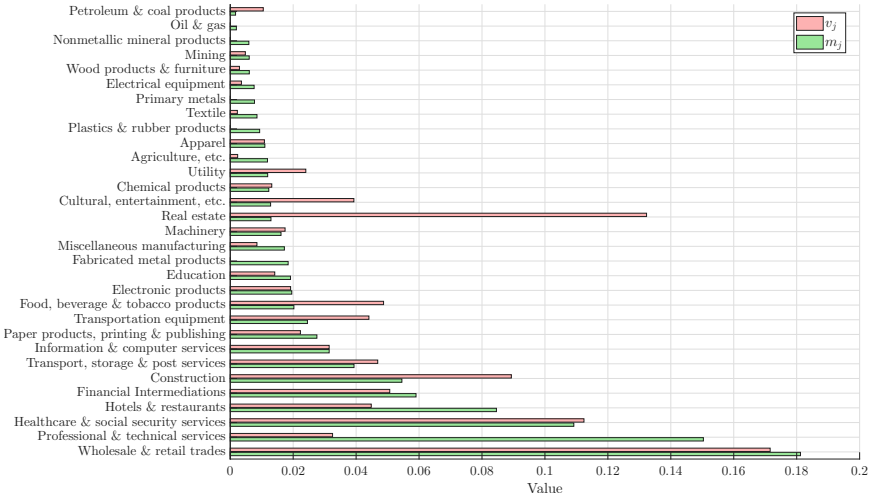
Table B.3: Sectoral data (continued)

	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 Intermediation	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

(A) Final good share v_j and mass of households m_j



(B) Sales relative to mass of households S_j/m_j

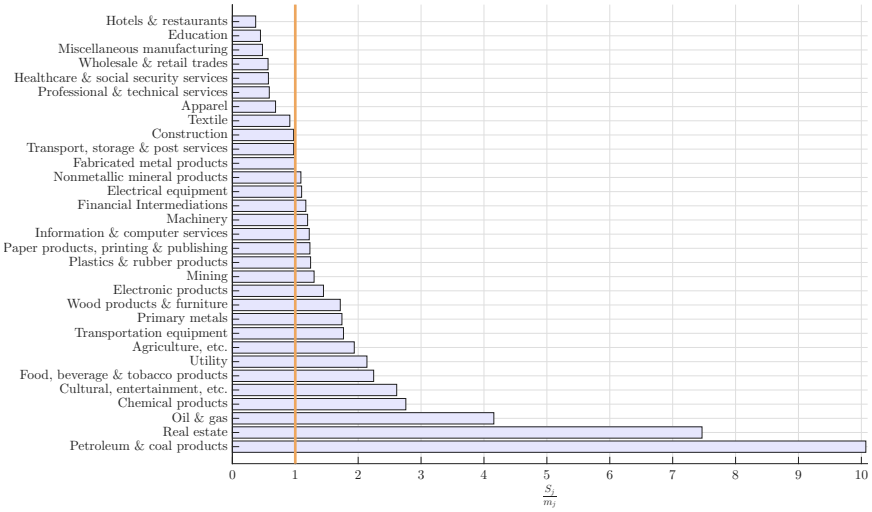


Figure C.1: Calibration of sectoral parameters

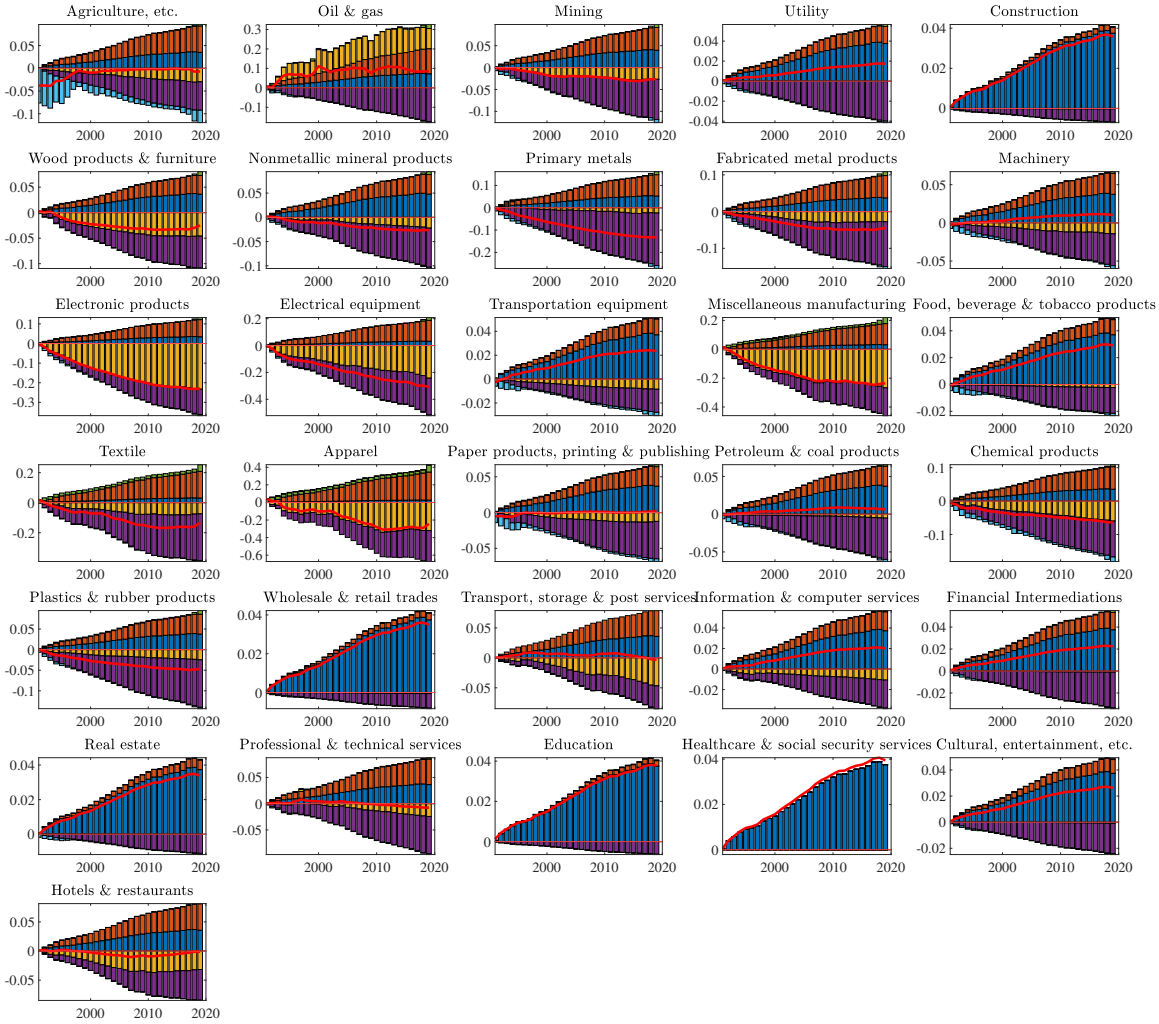


Figure C.2: Sectoral impact of globalization implied by the model

Notes: Red lines show the total impact $d \ln S_{jt}$. Bars display contributions from dC (blue), $dP^f C^f$ (orange), dA^f_j, dX^f_j (yellow), $dA^f_{j' \neq j}, dX^f_{j' \neq j}$ (purple), $d\tau$ (green), and $d\tau^f$ (light blue).

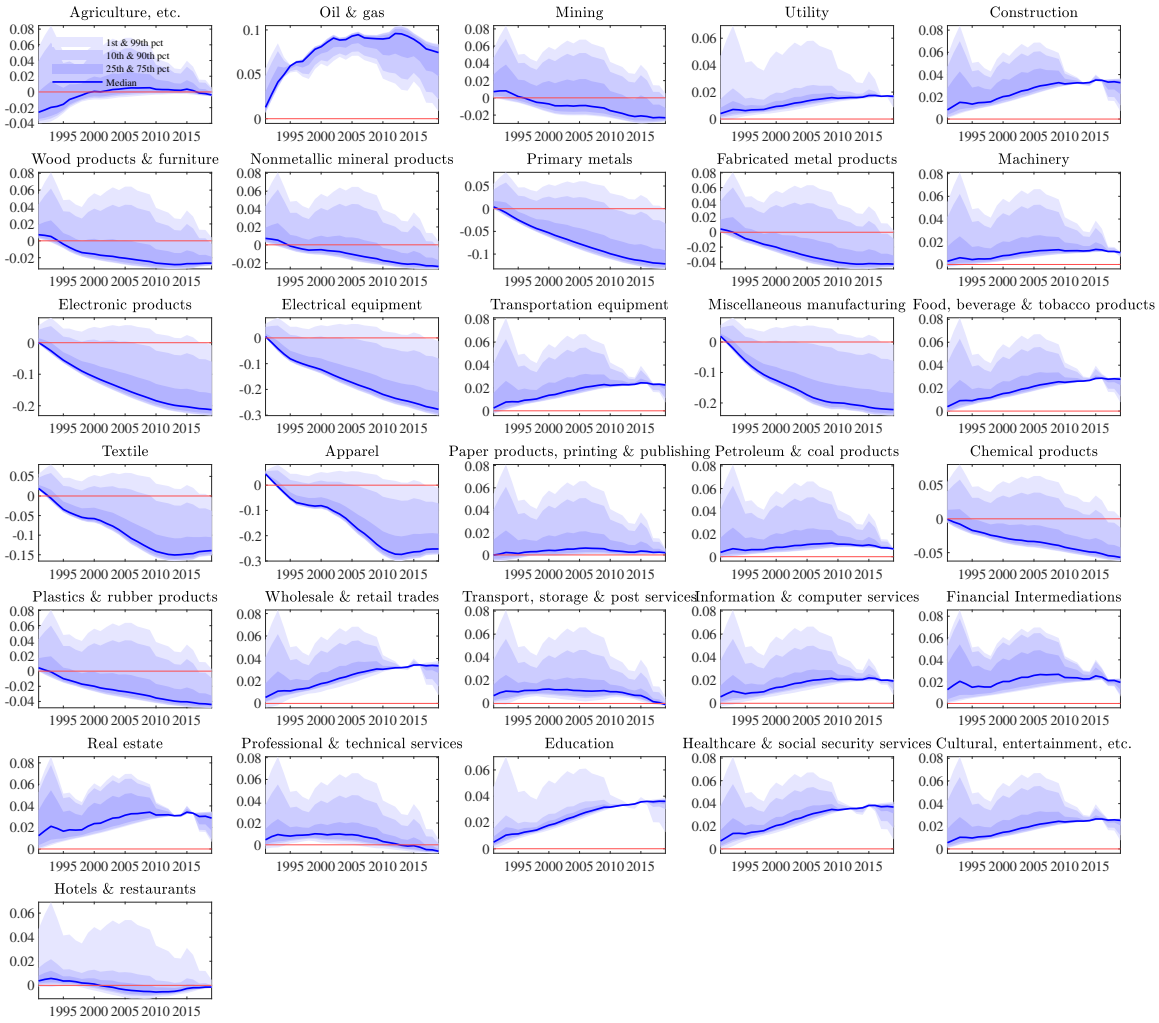


Figure C.3: Consumption impact of globalization by sector implied by the model

Notes: $d \ln C_t^{hj}$ among households in each sector is depicted. Blue lines display the median in each sector, while the shaded areas indicate the 1st-99th, 10th-90th, and 25th-75th percentiles, respectively.

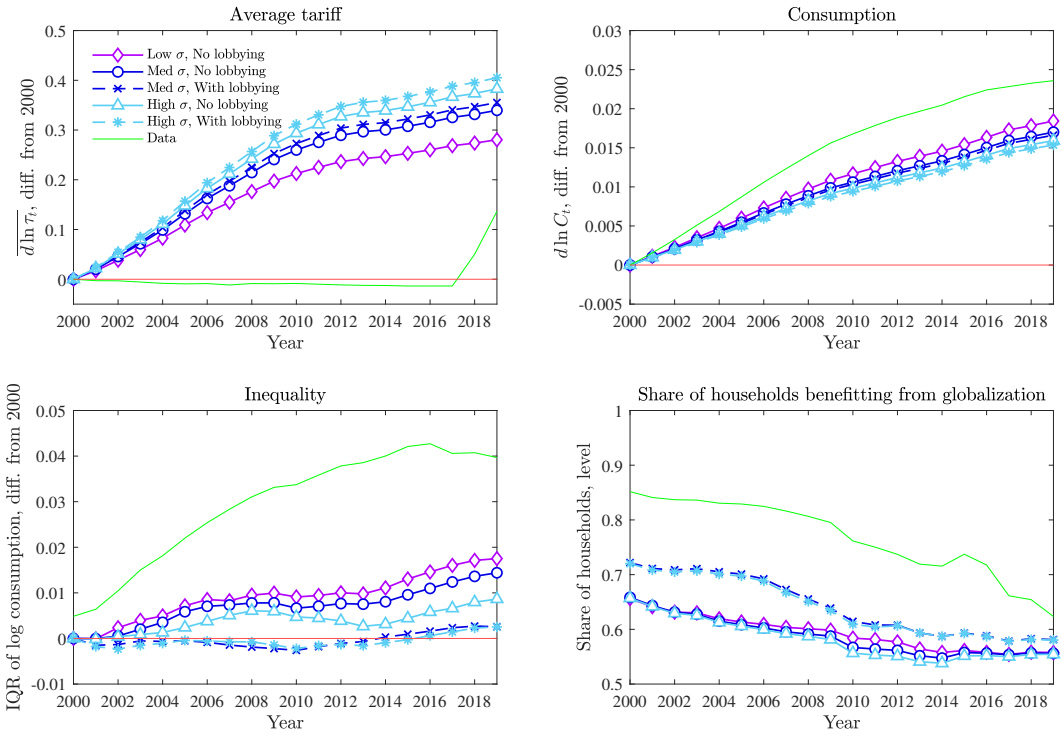


Figure C.4: Endogenous tariff determination: with tariff revenues

Notes: The average tariff is computed as $\overline{d\ln\tau_t} = \sum_{i=1}^{n_T} w_{IMi} d\ln\tau_{it}$ 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: $\sigma = 0$, $\eta = 0$; (C2) Moderate inequality aversion, no lobbying: $\sigma = 1.5$, $\eta = 0$; (C3) Moderate inequality aversion, with lobbying: $\sigma = 1.5$, $\eta = 0.3$; (C4) Strong inequality aversion, no lobbying: $\sigma = 3$, $\eta = 0$; (C5) Strong inequality aversion, with lobbying: $\sigma = 3$, $\eta = 0.3$.

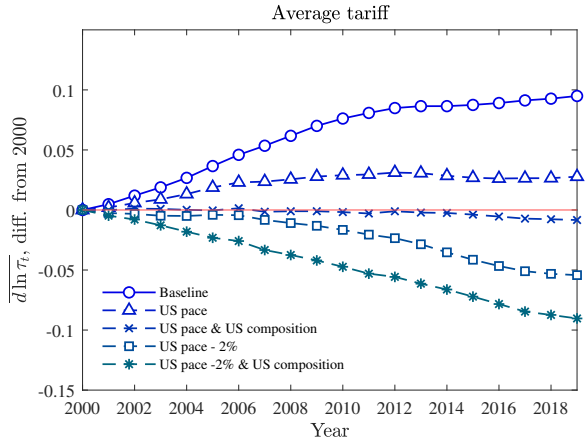


Figure C.5: Counterfactual analysis of tariff determination: Foreign growth

Notes: In the "US pace" scenario, the average growth rate in the foreign economy is reduced to that of the U.S. in the data. In the "US pace & US composition" scenario, sectoral composition is also adjusted to the U.S. one. In the last two scenarios, the average growth rate is further reduced by 2% per year, bringing the overall growth close to zero. Other than the parameter indicated in each line, model parameters are set to (C2) of Figure 8.

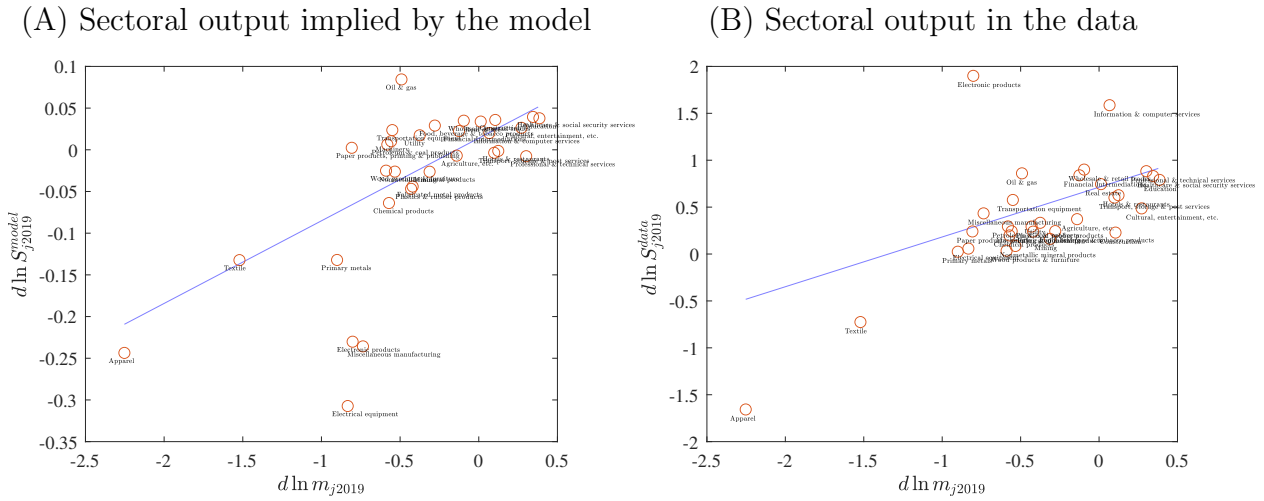


Figure C.6: Relation of factor mobility and sectoral output

Notes: The x-axis is the changes in the mass of households in each sector from 1991 to 2019, $d \ln m_{j2019}$. The y-axis is the changes in sectoral output implied in the model, $d \ln S^{model}_{j2019}$, and those in the data, $d \ln S^{data}_{j2019}$, respectively.

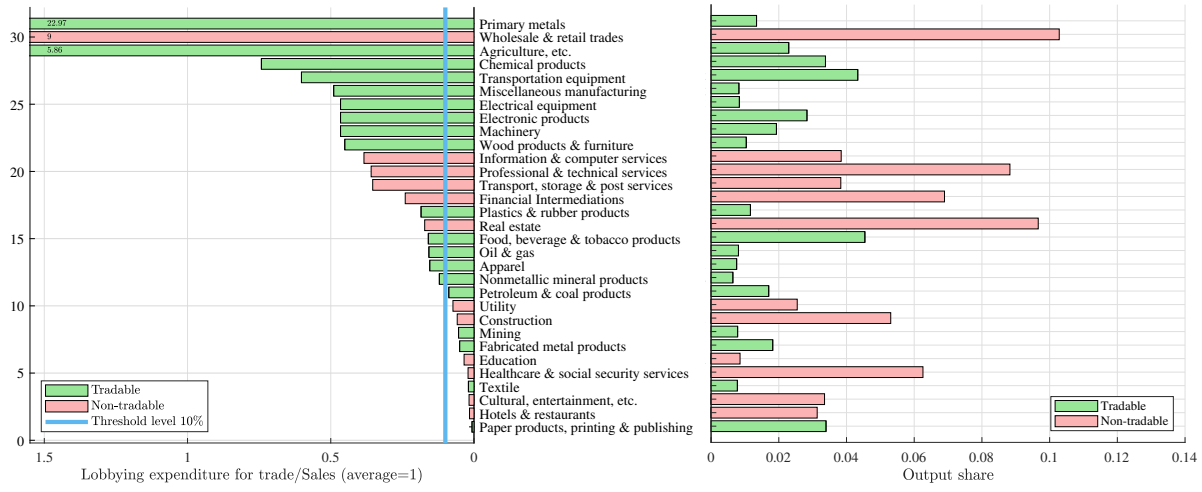


Figure C.7: Lobbying intensity and output share

Notes: Lobbying intensity is defined as lobbying expenditure as a share of sales. Thresholds are set to 10% of the average intensity.