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INEQUALITY AVERSION, POPULISM, AND THE BACKLASH AGAINST GLOBALIZATION

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ABSTRACT

Motivated by the recent rise of populism in western democracies, we develop a tractable equilibrium model in which a populist backlash emerges endogenously in a strong economy. In the model, voters dislike inequality, especially the high consumption of "elites." Economic growth exacerbates inequality due to heterogeneity in preferences, which generates heterogeneity in returns on capital. In response to rising inequality, rich-country voters optimally elect a populist promising to end globalization. Equality is a luxury good. Countries with more inequality, higher financial development, and trade deficits are more vulnerable to populism, both in the model and in the data.

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"Let us not be naive. Today, globalization is going through a major crisis..."
Emmanuel Macron, World Economic Forum, Davos, January 2018.

"The gains from globalization are not evenly distributed." Milanović (2016, p.10).

1. Introduction

One of the defining trends of the late 2010s is the ongoing rise of populism in the West. This trend has gone hand in hand with a pushback against globalization, which is perhaps best exemplified by two momentous 2016 votes: the British vote to leave the European Union ("Brexit") and the election of a protectionist, Donald Trump, to the U.S. presidency. In both cases, rich-country electorates voted to effectively take a step back from the long-lasting process of global integration. Interestingly, they did it after years of economic growth. It would be easier to understand voters' frustration during an economic crisis, but at the time of these votes, both countries' unemployment rates were below 5%.

Why is this pushback against globalization happening? Why is it happening in rich countries, such as the U.S. and UK? And why is it happening when the countries' economies are strong? These are the questions we attempt to address. Some blame the pushback on reasons outside economics, such as a cultural backlash against the ascent of progressive values (e.g., Inglehart and Norris, 2016); others blame it on the naivité of voters. We cannot rule out those mechanisms, but we argue that many aspects of the populist backlash can also be understood in a simple economic model with rational voters.

We develop a tractable heterogeneous-agent equilibrium model in which a backlash against globalization emerges as the optimal response of voters to rising inequality. Income inequality within rich countries has grown substantially over the past four decades, especially at the top of the income distribution (e.g., Atkinson, Piketty, and Saez, 2011). In our model, inequality also grows over time, also especially at the top, fueled by economic growth. In other words, growth aggravates inequality, which eventually subdues globalization.

Populism is a political ideology pitching ordinary people, who are viewed as homogeneous and inherently good, against established "elites," who are deemed immoral and corrupt. Anti-elitism enters our model through agents' preferences. We assume that agents dislike inequality, which we measure by the variance of consumption shares across agents. Given our other assumptions, equilibrium consumption develops a right-skewed distribution across agents. As a result, inequality is driven by the high consumption of the rich rather than the low consumption of the poor. Therefore, aversion to inequality mostly reflects envy of the economic elites rather than compassion for those left behind.

Besides being anti-elite, populists tend to oppose globalization. They prioritize national interests over international cooperation, strong leadership over diplomacy, and protectionism over free trade. They often advocate anti-global policies such as tariffs and immigration controls. Prior studies link the rise of populism to exposure to globalization.[1] Accordingly, we define a populist as a politician promising to reverse global integration.[2]

In the model, there are two countries, the U.S. and the rest of the world ("RoW"). Both countries grow trees producing output, which trends upward. At the outset, the countries are economically integrated, with no barriers to trade. At a given time, both countries hold elections featuring two candidates. The "mainstream" candidate promises to preserve globalization whereas the "populist" candidate promises to end it. If either country elects a populist, a move to autarky takes place. After that, each country consumes the output of its own tree and there is no cross-border trade. Elections are decided by the median voter.

Agents trade risky stocks, which represent claims on the output-producing trees, and riskless bonds. They have constant-relative-risk-aversion (CRRA) preferences over consumption. The preference parameter γ, which represents both risk aversion and the inverse of the elasticity of intertemporal substitution (EIS), is heterogeneous across agents, both within and across countries. U.S. agents have lower γ's than RoW agents, on average.

We first solve for optimal consumption and portfolio choice under globalization. Higher-γ agents choose consumption plans that are smoother, both across states and over time. Across states, stocks are riskier than bonds; therefore, high-γ agents hold mostly bonds, whereas low-γ agents' portfolios are heavily invested in stocks. Over time, output trends upward; therefore, high-γ agents initially borrow to consume more in earlier periods, whereas low-γ agents initially lend to consume more later. Due to country-level differences in γ, the U.S. eventually runs a trade deficit with RoW. Due to individual-level differences in γ, inequality grows over time as lower-γ agents consume a growing share of total output.

When deciding whether to vote for the populist, U.S. agents face a tradeoff. If elected, the populist delivers lower consumption but also lower inequality to U.S. agents. Under autarky, U.S. agents can no longer borrow from RoW to finance their excess consumption. But their inequality drops, too, because the absence of cross-border trade makes their portfolio

[1]See, for example, Autor et al. (2017), Colantone and Stanig (2018a, 2018b), and Guiso et al. (2017, 2018). These studies emphasize worker displacement caused by international trade in goods, which is absent from our model. We do not invoke these studies to support our mechanism, but rather to illustrate the strong connection between populism and globalization, which motivates our definition of a populist politician.

[2]Our definition departs from other theories of populism. For example, Guiso et al. (2017) define as populist a party that champions short-term protection policies while disregarding their long-term costs. Acemoglu, Egorov, and Sonin (2013) define populist policies as those to the left of the median voter's preferences.

positions less disperse. As output grows, the marginal utility of consumption declines, and U.S. agents are increasingly willing to sacrifice consumption in exchange for more equality. In that sense, equality is a luxury good. When output grows large enough, the median voter prefers autarky and the populist wins the U.S. election. In a growing economy, the populist thus eventually gets elected. Within our stylized model of a democratic society that values equality, globalization does not survive in the long run.

Globalization would survive under a social planner. The competitive market solution differs from the social planner solution due to the negative externality that the elites impose on others through their high consumption. Inspired by the social planner, we could tax the consumption of the elites and subsidize the consumption of those left behind. But simpler and more realistic wealth redistribution policies, which do not get agents to internalize the consumption externality, fail to save globalization. We analyze a broad class of redistributive policies that transfer wealth from low-γ agents, who benefit the most from globalization, to high-γ agents, who benefit the least. We show that these policies are equivalent to assigning higher initial endowments to high-γ agents. Starting from those modified endowments, the economy eventually reaches the point at which the populist gets elected. In that sense, simple wealth redistribution delays the populist's victory, but only temporarily.

Our model predicts that support for populism should be stronger in the country with higher inequality, more financial development, and a lower trade balance. We find evidence of such relations in the cross-section of developed countries. We measure the support for populism by the vote share of populist parties in recent elections, as well as by protectionist attitudes expressed in a survey of OECD households. The model also predicts that populist voters should have larger γ's and be more inequality-averse than mainstream voters, on average. Inequality-averse agents are "anti-elite"; they place a large weight on inequality in the consumption-inequality tradeoff. Higher-γ agents choose portfolios delivering smoother consumption plans; as a result, their consumption drops less after a move to autarky.

The model also makes asset pricing predictions. Upon a move to autarky, risk sharing becomes local, so the risk associated with U.S. output is borne by U.S. agents only. As these agents are less risk-averse than RoW agents, the U.S. market price of risk drops when autarky arrives. The opposite happens for RoW. As a result, the global market share of U.S. stocks rises in anticipation of the populist's victory. The model also implies that stock returns are predictable by the price-dividend ratio. In addition, U.S. bond yields should be low before the populist's victory. U.S. bonds are valuable under the threat of autarky because they deliver future consumption when its marginal utility is high.

Agents in our model dislike inequality. Inequality aversion has its roots in Thurow (1971), who advocates the inclusion of income distribution in the utility function. According to Thurow, individuals may like equality because it helps prevent crime and preserve social stability. Wilkinson and Pickett (2009, 2018) show that less equal societies suffer from social problems such as illiteracy, crime, and poor health. They argue that inequality causes status anxiety at all income levels, including the top. In Fehr and Schmidt's (1999) model, individuals willingly give up material payoffs to achieve more equality. Alesina and Angeletos (2005) employ preferences in which agents dislike unfair outcomes. Evidence also shows that individuals dislike inequality. Morawetz et al. (1977) compare two Israeli communities and find that individuals in the more egalitarian community report being happier. Alesina, Di Tella, and MacCulloch (2004) also find that people facing less inequality are happier. Dawes et al. (2007) find experimental evidence that subjects alter others' incomes, at a personal cost, to achieve more equality. Experimental results from dictator and ultimatum games also point to egalitarian preferences. Ferrer-i-Carbonell and Ramos (2014) review the evidence on happiness and inequality and conclude that inequality correlates negatively with happiness in Western societies. Clark and D'Ambrosio (2015) reach similar conclusions.

Prior literature has emphasized social tensions created by globalization. For example, Rodrik (1997) argues that globalization clashes with domestic norms and social arrangements. Rodrik (2000) argues that due to these tensions, we cannot have all three of democratic politics, the nation state, and global economic integration. We focus on one tension—inequality—and formalize the fragility of globalization in an equilibrium model.

Our modeling of globalization differs from its treatments in labor economics and international trade. Unlike labor economics, our model features no heterogeneity in skill, but its predictions are similar in that lower-γ agents benefit from globalization as if they were more skilled. Unlike international trade, we consider only one consumption good. We assume away important aspects of globalization to emphasize the role of financial factors, namely trade in financial assets and risk sharing, which have been unexplored in this context. Given our focus, explicit modeling of production or heterogeneous goods would be distracting.[3] Taking the finance perspective allows us to deliver novel insights into the relations between globalization, inequality, financial development, global imbalances, and asset prices.

Financial capital plays an important role in the recent rise of inequality. Piketty, Saez, and Zucman (2018) argue that top earners derive most of their income from capital rather

[3] Studies of income inequality that model production explicitly, along with heterogeneous entrepreneurial skill, include Pástor and Veronesi (2016) and Jones and Kim (2018), among others. Kogan, Papanikolaou, and Stoffman (2020) build a production-based model in which inequality is caused by technological innovation.

than labor, and that capital income is the key driver of the rise of the top 1% U.S. income share since 2000. Piketty (2014) contends that a high rate of return on capital causes inequality to grow. Some of this growth is due to heterogeneity in return on capital across households. Richer households tend to earn higher returns, in part because they have more aggressive risk exposures (see Bach, Calvet, and Sodini, 2019, and Fagereng et al., 2020). Consistent with this evidence, our model implies that richer agents take more risk and, as a result, earn higher expected returns. This micro-level evidence supports our premise that heterogeneity in preferences helps explain the recent rise in inequality.

Heterogeneity in preferences has piqued growing research interest.[4] We interpret country-level differences in γ as differences in financial development. Like Gourinchas, Rey, and Govillot (2017), we assume U.S. agents are less risk-averse than RoW agents, capturing the idea that the U.S. is more financially developed than RoW. In their model, as well as ours, U.S. agents effectively provide insurance to RoW agents.[5] Maggiori (2017) microfounds this asymmetry by relying on cross-country differences in financial development. In his model, the country whose financial intermediaries are less constrained behaves as if it were less risk-averse. It also runs a trade deficit, as it does in our model. Caballero, Farhi, and Gourinchas (2008) and Mendoza, Quadrini, and Ríos-Rull (2009) also link financial development to global imbalances. Pástor and Veronesi (2020) consider the political implications of time variation in γ, whereas we consider the political implications of its cross-sectional variation.

Our paper is also related to the literature on financial development. A key result in this large literature is that financial development facilitates economic growth (e.g., Rajan and Zingales, 1998). In contrast, our model emphasizes the dark side of financial development: it spurs the growth of inequality, which eventually leads to a populist backlash.

2. Which Countries Are Populist?

We first present cross-country evidence showing that the support for populism is stronger in countries with larger inequality, more financial development, and lower trade balance. We focus on a recent cross-section of rich countries because the rise of populism in the West is a 2010s phenomenon and the variables of interest are highly persistent year to year. This evidence motivates our theoretical analysis in Section 3.

[4]See, for example, Dumas (1989), Chan and Kogan (2002), Gomes and Michaelides (2008), Longstaff and Wang (2012), Chabakauri (2013), Bhamra and Uppal (2014), and Garleanu and Panageas (2015).

[5]Consistent with this mechanism, Gourinchas et al. provide empirical evidence of wealth transfers from the U.S. to RoW during recent financial crises. Unlike Gourinchas et al., we allow heterogeneous risk aversion not only across countries but also within countries, which allows us to analyze within-country inequality.

2.1. Data

We measure the support for populism by the vote share of populist parties in recent elections. Our set of countries includes the U.S. and all EU countries. For each EU country, we consider the most recent national parliamentary election as of January 1, 2017. The list of all elections is in Table 1. If the country's most recent election took place before the May 2014 European Parliament (EP) election, we replace the national election with the EP election in the same country to align the timing of elections as closely as possible across countries.

We obtain data on election outcomes from the ParlGov database (Döring and Manow, 2011), which contains party-by-party vote shares from parliamentary and EP elections for all EU member states and most OECD countries. To identify populist parties, we match the ParlGov data to the 2014 Chapel Hill Survey of Experts (Bakker et al., 2015), which estimates the positioning of political parties on various ideological and policy issues. The data cover the views of 337 experts evaluating 268 political parties from all EU countries. We focus on the three dimensions of populism evaluated in the survey that seem the most closely related to skepticism toward globalization: (1) position toward nationalism, (2) position on immigration policy, and (3) the salience of anti-elite rhetoric.[6] We thus classify as populist the parties that experts consider to be nationalist, anti-immigrant, or anti-elite.

For each of the three dimensions of populism, individual experts rate each party on the scale of 0 to 10, with larger values indicating a more populist stance.[7] We classify a party as nationalist, anti-immigrant, or anti-elite if its average score across experts is at least six. For each election and each dimension of populism, we compute the populist vote share by adding up the vote shares of all populist parties. For example, we compute the nationalist vote share in the 2016 Irish election by adding up the 2016 vote shares of all Irish parties classified as nationalist. We report all parties' average scores in the Appendix.

The intersection of ParlGov and the Chapel Hill Survey covers the 28 EU member states. We augment this sample by adding the United States. The 2016 U.S. presidential election pitted Donald Trump against Hillary Clinton. We classify Trump as populist on all three

[6] The remaining policy dimensions evaluated in the survey include the party's position toward ethnic minorities, environmental issues, corruption, deregulation, state intervention in the economy, wealth redistribution, improving public services vs reducing taxes, regional decentralization, urban vs rural interests, religion, liberal social lifestyle, civil liberties vs law and order, integration of asylum seekers, and peacekeeping. None of these are strongly related to globalization. Probably the closest is the position toward ethnic minorities because their members often arrive from abroad. We view the position toward ethnic minorities as a fourth dimension of populism and report the results in the Online Appendix, located on our websites. In the remainder of the paper, we refer to the Online Appendix simply as the "Appendix."

[7] See the Appendix for more detail on the scoring for each of the three dimensions. The number of experts scoring each party in the 2014 survey ranges from 3 to 22, averaging 11.6.

dimensions and Clinton on none. We thus assess the U.S. populist share as equal to Trump's share of the popular vote, 46.1%, in all three dimensions.[8]

We measure inequality by the Gini coefficient of disposable income after taxes and transfers, obtained from the OECD, and by the top 10% income share, from the World Bank. Data on financial development and trade balance also come from the World Bank. Financial development is the ratio of the country's stock market capitalization to GDP, in percent.[9] Trade balance is net trade in goods and services, scaled by GDP. We match the timing of each variable to the corresponding election, as described in the Appendix.

2.2. Election Evidence

Panels A and B of Figure 1 plot the cross-country relation between inequality and the vote share of nationalist parties, or "nationalism." The relation is positive, with the t-statistic of 2.82 for the Gini coefficient and 2.16 for the top 10% income share. A one-standard-deviation increase in the Gini (top 10% income share) is associated with a 5.8 (4.8) percentage point increase in the nationalist vote share. In the regression analysis throughout Section 2, we weight each country by its GDP.[10] But the relation is present also on an equal-weighted basis, especially among large countries. If we restrict the sample to the eight largest countries with the GDP of Poland or higher, there is a 43% (18%) simple correlation between nationalism and the Gini (top 10% income share). Across all countries, the correlations are 21% and 13%, respectively. More unequal countries exhibit more nationalism.

Panel C of Figure 1 shows a negative relation between nationalism and trade balance ($t = -2.81$). A one-standard-deviation increase in trade balance is associated with a 10.0 percentage point decrease in the nationalist vote share. Panel D shows that financial development is positively related to nationalism ($t = 2.94$). A one-standard-deviation increase in financial development is associated with a 5.2 percentage point increase in the nationalist vote share. If we equal-weight all countries, the correlations in both panels are close to zero. But after eliminating countries with GDP smaller than Poland's, the simple correlations are

[8] On the campaign trail, Trump promised to put "America first," pull the U.S. out of international agreements, build a wall on the border with Mexico, impose tariffs, restrict immigration, etc. For the purpose of this exercise, we thus interpret a vote for Trump as a vote to pull back from globalization.

[9] We also consider three other measures of financial development, all scaled by GDP: private credit, stock market trading volume, and the sum of stock and bond market capitalizations. The results based on these measures are similar to those reported here. For details, see the Appendix.

[10] Our sample includes countries such as Malta, Luxembourg, and Cyprus whose populations are smaller than one million. Luxembourg's trade balance is an outlier, exceeding 30% of GDP. We do not want our results to be driven by small economies. Our model features only two large countries whose interaction determines the global equilibrium. The model's predictions are thus better suited to large countries.

strong: −36% in Panel C and 48% in Panel D.

Figures 2 and 3 show similar results when we replace the vote shares of nationalist parties by those of anti-immigrant and anti-elite parties, respectively. All three measures of populism are thus negatively related to trade balance and positively related to both income inequality and financial development.

Recall that, for each country, we use either the national election or the May 2014 EP election, whichever is more recent as of January 1, 2017. For robustness, we also conduct the analysis in two other ways: by using only national elections, and by using only EP elections. In both cases, the results are very similar to those reported here (see the Appendix). In general, the advantage of using EP elections is that they take place at the same time in all EU countries. The disadvantage is that the voter turnout in EP elections is lower: 43.4%, compared to 66.1% for the national elections in our sample.

The presence of the U.S. in our sample significantly contributes to our conclusions. However, even when we exclude the U.S., the results are qualitatively similar: 11 of the 12 slopes in Figures 1 through 3 have the same signs and five remain statistically significant. See the Appendix. Overall, the electoral support for populist parties is stronger in countries with more inequality, more financial development, and larger trade deficits.

2.3. Survey Evidence

We complement our election analysis with survey evidence on attitudes toward globalization. We use data from the International Social Survey Programme (ISSP; `www.issp.org`). ISSP's cross-country surveys cover most OECD members as well as a few non-members; we use OECD countries in our analysis. We use the 2013 ISSP segment on national identity. The survey question that we find the most relevant given our focus is "Country should limit the import of foreign products." Individual responses are on the scale of 1 to 5, with higher values indicating stronger agreement. We average the individual responses within countries and interpret a higher country-level average score as stronger support for protectionism. We match these country-level protectionism scores to our 2013 data on inequality, financial development, and trade balance. See the Appendix for details.[11]

Panels A and B of Figure 4 relate inequality to the protectionism score. Cross-country regressions reveal positive relations between protectionism and both the Gini coefficient

[11] Mayda and Rodrik (2005) also use the ISSP data to analyze the determinants of attitudes toward trade, but they do not relate these attitudes to inequality, trade balance, or financial development.

($t = 2.65$) and the top 10% income share ($t = 3.57$). A one-standard-deviation increase in the Gini (top 10% income share) is associated with an increase of 0.18 (0.23) in the protectionism score. This result mirrors the election-based results in Section 2.2, but it is less driven by large countries. Even when the countries are equal-weighted, the correlation between inequality and protectionism is positive and high, 43% for the Gini and 45% for the top 10% income share. Citizens of more unequal countries show more support for protectionism.

Panel C of Figure 4 shows a negative relation between trade balance and the protectionism score ($t = -2.50$). A one-standard-deviation increase in trade balance is associated with a 0.21 decrease in protectionism. This result echoes the election-based results, but it is again less driven by large economies: even the equal-weighted correlation is −45%. Panel D shows a positive but insignificant relation between financial development and protectionism ($t = 1.50$). A one-standard-deviation increase in financial development is associated with a 0.12 increase in protectionism. The equal-weighted correlation is close to zero when calculated across all countries, but it is 42% when calculated across the six largest countries only.

To summarize, protectionist attitudes are stronger in countries with more inequality, larger trade deficits, and more financial development. The results from Sections 2.2 and 2.3 motivate our two-country model, which predicts that the support for populism is stronger in the country (U.S.) with more inequality, more financial development, and a trade deficit. In reality, the U.S. is indeed more unequal and more financially developed than the rest of the world, and it has run a trade deficit since the 1980s. While the correlations presented here are consistent with our model, they are also consistent with other mechanisms. For example, the association between trade balance and populism could also emerge from models with international trade and comparative advantage, through worker displacement.

3. Model

There is a continuum of agents with unit mass spread across two countries, the U.S. and the rest of the world ("RoW"). Agents have preferences over their own consumption as well as the inequality in their own country. Agent i from country $k \in \{US, RoW\}$ has a time-separable utility function with instantaneous utility at time t given by

$$U_i\left(C_{it}, V_t^k, t\right) = e^{-\phi t}\left(\frac{C_{it}^{1-\gamma_i}}{1-\gamma_i} - \eta_i V_t^k\right) \qquad \forall i \in \mathcal{I}^k \ , \tag{1}$$

where C_{it} is the agent's consumption, $\gamma_i > 1$ is his risk aversion as well as the inverse of his EIS, $\eta_i \geq 0$ is his inequality aversion, $\mathcal{I}^k$ is the set of agents in country k, and V_t^k is inequality in country k, which we measure by the variance of consumption shares across agents:

$$V_t^k = \mathrm{Var}\left(\frac{C_{it}}{\overline{C}_t^k}\,|\, i \in \mathcal{I}^k\right) \;, \tag{2}$$

where $\overline{C}_t^k = \mathrm{E}^{\mathcal{I}}\left[C_{it}\,|\, i \in \mathcal{I}^k\right]$ denotes the average value of C_{it} across all agents in country k.[12] The scaling of C_{it} by $\overline{C}_t^k$ in equation (2) ensures that V_t^k is invariant to changes in average consumption so that it measures relative, not absolute, inequality.

The utility function in equation (1) increases in consumption but decreases in inequality. The idea that individuals dislike inequality is well established, but the way we model it is novel. In equilibrium, consumption shares develop a right-skewed distribution across agents. Therefore, V_t^k is driven by the right tail of the distribution, and inequality aversion can largely be thought of as anti-elitism: agents dislike being left behind the economic elites.[13] Agents effectively derive more disutility from envying the rich than from pitying the poor, similar to Fehr and Schmidt (1999).[14] Importantly, inequality aversion induces an externality: through their high consumption, elites impose a negative externality on other agents.

We assume that U.S. agents have lower risk aversion (and higher EIS) than RoW agents. The technical condition that we need is for the distribution of γ_i across agents to satisfy

$$\lim_{x\to\infty} \frac{\mathrm{E}^{\mathcal{I}}[e^{x/\gamma_j}\,|\, j \in \mathcal{I}^{RoW}]}{\mathrm{E}^{\mathcal{I}}[e^{x/\gamma_i}\,|\, i \in \mathcal{I}^{US}]} \;=\; 0 \;. \tag{3}$$

The simplest example of an assumption that satisfies this condition is

$$\gamma_i < \gamma_j \qquad \forall i,j : \left\{i \in \mathcal{I}^{US},\; j \in \mathcal{I}^{RoW}\right\} \;, \tag{4}$$

so that U.S. agents are uniformly less risk-averse than RoW agents. But the distributions of γ_i for the U.S. and RoW can also overlap. For example, condition (3) is satisfied when risk tolerances $\rho_i = 1/\gamma_i$ are uniformly distributed with the same lower bound for both countries but a higher upper bound for the U.S. Condition (3) also holds if ρ_i in both countries is truncated normal, with the same truncation points and same dispersion for both countries but a higher U.S. mean—that is the example we use in our numerical illustrations. Our propositions do not assume (4); they rely only on the weaker assumption in equation (3).

[12]Throughout the paper, $\mathrm{E}^{\mathcal{I}}\,[.|\, i \in S]$ denotes an expected value computed across agents i in the set S.

[13]We interpret "elites" narrowly as economic elites, or the wealthy. Political scientists often think of elites more broadly as including also members of the political establishment, academia, military, etc.

[14]In Fehr and Schmidt's model, agents dislike inequality whether they are better or worse off than others, but they dislike it more if they are worse off. In our model, the agent's relative position in the income distribution does not appear in the utility function, but given the right skewness of consumption, the vast majority of agents are far behind the ultra-rich but only a bit ahead of the ultra-poor.

The assumption that U.S. agents are less risk-averse than RoW agents—the defining difference between the two countries—is motivated by the literature that explores risk-sharing motives to analyze global trading imbalances, especially Gourinchas, Rey, and Govillot (2017) and Maggiori (2017). Following this literature, we view the lower risk aversion of U.S. agents as a proxy for higher financial development in the U.S. In that sense, we could replace US-RoW with UK-EU (United Kingdom–European Union), as the financial system is generally considered to be more developed in the UK than in continental Europe.

The two countries grow trees which produce continuous streams of perishable output denoted by D_t^{US} and D_t^{RoW} at time $t \in [0, T]$. Aggregate global output, D_t, is given by

$$D_t = D_t^{US} + D_t^{RoW} \ . \tag{5}$$

We assume that $\delta_t \equiv \log(D_t)$ evolves over time by following a simple stochastic process:

$$d\delta_t = \mu_\delta \, dt + \sigma_\delta \, dZ_t \ , \tag{6}$$

where $\mu_\delta > 0$ and Z_t is a Brownian motion. We also assume, for simplicity, that each country's share of global output is constant and equal to the country's population share:

$$\frac{D_t^{US}}{D_t} = m \ , \tag{7}$$

where m is the fraction of agents living in the U.S. (In Section 5.4, we relax this assumption by allowing output shares to be stochastic.) Since the two countries' outputs are perfectly correlated, δ_t is the only state variable in this endowment economy.

Agents trade two types of financial assets: stocks and bonds. Stocks are in positive net supply. U.S. stocks are claims to U.S. output; RoW stocks are claims to RoW output. Since the two output streams are perfectly correlated, so are the two stock prices. Bonds, which are in zero net supply, allow agents to lend to each other in a risk-free manner.

There are two political regimes: "globalization" and "autarky." Under globalization, there are no cross-border barriers, so agents can trade freely across countries. Under autarky, cross-border trading is not allowed—each country consumes the output of its own tree, U.S. agents trade only with other U.S. agents, and RoW agents trade only with RoW agents.

From time 0 until time $\tau \in [0, T]$, the countries coexist under globalization. At the given time τ, both countries hold elections featuring two candidates. The "mainstream" candidate promises to maintain globalization through time T. The "populist" candidate promises to end it and move the country to autarky until time T. Each country's election is decided by that country's median voter.[15] When elected, both candidates deliver on their promises. If either country elects a populist, the move to autarky occurs immediately—U.S. agents reclaim the possession of the U.S. tree (producing D_t^{US}), RoW agents reclaim the RoW tree (producing D_t^{RoW}), cross-border debts are settled, and cross-border trade stops.

A country can move to autarky only if it can afford to settle its cross-border liabilities. It cannot move to autarky if doing so would reduce the other country's consumption. We thus rule out expropriation of wealth. This assumption seems plausible given our focus on the rise of populism in developed countries, in which expropriation is rare.

The same no-default assumption would rule out autarky in models with standard utility over consumption. In such models, a country would move to autarky only to increase its own consumption, which would necessitate a consumption loss for the other country. That is not true in our model, given the presence of inequality in the utility function. In our model, a move to autarky by one country increases the consumption in the other country.

3.1. Optimal Consumption

Our assumptions imply that markets are complete because τ is known and the risk associated with the single shock (dZ_t) can be hedged by either of the two stocks (US or RoW). Due to market completeness, we can write the optimization problem of each agent $i \in \mathcal{I}^k$ as

$$\max_{\{C_{it}\}} \mathrm{E}_0 \left[\int_0^T U_i \left(C_{it}, V_t^k, t \right) \, dt \right] \tag{8}$$

for $k \in \{US, RoW\}$, subject to the static budget constraint

$$\mathrm{E}_0 \left[\int_0^T \pi_t^k \, C_{it} \, dt \right] = w_i \ , \tag{9}$$

where w_i is agent i's initial endowment, $\mathrm{E}_0[.]$ is an expectation as of time 0, and π_t^k is the state price density for country k, which is determined in equilibrium. We normalize $\pi_0^k = 1$ and $\delta_0 = 0$ without loss of generality. Under globalization, the two countries' markets are fully integrated, so that $\pi_t^{US} = \pi_t^{RoW}$. Under autarky, the markets are segmented, so that $\pi_t^{US} \neq \pi_t^{RoW}$. The Lagrangean for the constrained optimization problem is

$$L_i = \mathrm{E}_0 \left[\int_0^T U_i \left(C_{it}, V_t^k, t \right) \, dt \right] - \xi_i \left(\mathrm{E}_0 \left[\int_0^T \pi_t^k \, C_{it} \, dt \right] - w_i \right) \ , \tag{10}$$

[15]We assume a traditional one-agent-one-vote democracy. We thus abstract from the possibility that some agents might possess more political power than others, which could potentially deepen inequality. For a review of studies relating inequality to imperfections of democracy, see Acemoglu et al. (2015).

where ξ_i is the Langrange multiplier. The maximization is performed state by state, period by period. The first-order conditions yield agent i's optimal consumption:

$$C_{it} = e^{\frac{g_t^k - \log(\xi_i)}{\gamma_i}} , \tag{11}$$

where g_t^k is a simple transformation of the state price density:

$$g_t^k = -\phi t - \log\left(\pi_t^k\right) . \tag{12}$$

Equation (11) shows that agents with higher γ_i's choose smoother consumption paths, both across states and over time. A high γ_i dampens the dependence of C_{it} on g_t^k, which is both risky and generally increasing over time, as we explain at the beginning of Section 4.

3.2. Distribution of Initial Endowments

Substituting optimal consumption from equation (11) into the budget constraint in equation (9), we can express agents' initial endowments as

$$w_i \;=\; e^{-\frac{\log(\xi_i)}{\gamma_i}} \, \mathrm{E}_0\left[\int_0^T e^{-\phi t + \left(\frac{1}{\gamma_i}-1\right) g_t^k}\, dt\right] . \tag{13}$$

To solve the model analytically, we make technical assumptions about the distribution of w_i across agents. For any given value of y, we define $\log(\widetilde{\xi}_i) = \log(\xi_i) - y$. We then define

$$\psi_i = -\frac{1}{\gamma_i}\log\left(\widetilde{\xi}_i\right) \tag{14}$$

and assume that it is independent of γ_i.[16] Once we draw the values of ψ_i and γ_i from their assumed distributions, we combine them with the chosen value of y to construct ξ_i, which then determines the initial endowments w_i in equation (13). In Section 5.3, we vary y to examine how the distribution of initial endowments affects the equilibrium outcomes.

Heterogeneous-agent models are often amenable only to numerical solutions. We derive analytical solutions, and many propositions, under three-dimensional heterogeneity (γ_i, η_i, and ψ_i) and no assumptions about the functional forms of the distributions of the three parameters across agents. We only assume that the distribution of γ_i is bounded, $\gamma_i \in [\gamma_L, \gamma_H]$ with $\gamma_L > 1$, continuously differentiable, and that it has positive dispersion. The distributions of both ψ_i and $1/\gamma_i$ must have well-defined moment-generating functions.

[16]The independence between ψ_i and γ_i is ensured by choosing $\tilde{\xi}_i$ implied by the values of ψ_i and γ_i. Given two independent distributions of ψ_i and γ_i, the distribution of $\tilde{\xi}_i$ follows from $\log(\tilde{\xi}_i) = -\psi_i\gamma_i$.

Our solution technique is similar to that of Chan and Kogan (2002), who analyze a model with heterogeneous risk aversion and habit preferences. While Chan and Kogan exploit Pareto optimality to solve for the competitive equilibrium, we obtain the equilibrium from agents' first-order conditions. In our setting, the competitive allocation is not Pareto optimal due to a consumption externality in agents' preferences.

3.3. Parameter Values

To plot the model's implications in subsequent figures, we calibrate the distribution of risk aversion across agents to the empirical distribution estimated by Calvet et al. (2019) for Swedish households. For both countries, we choose a truncated normal distribution of risk tolerance, $\rho_i = 1/\gamma_i$, with the same truncation points that restrict γ_i to the interval of $(2, 10)$. We also choose the same standard deviation of ρ_i, 0.06, for both countries. However, we choose different means of ρ_i: 1/5 for the U.S. and 1/6 for RoW, to make RoW agents more risk-averse, on average, than U.S. agents (condition (3) is satisfied). Table 2 shows that both distributions of γ_i match the empirical distribution fairly well. We follow Calvet et al. (2019) also in using their estimate of the time discount parameter, $\phi = 0.0157$.

We choose a truncated normal distribution for η_i with the mean of 5×10^{-5}, standard deviation of 1.5×10^{-5}, and the truncation at zero. The distribution of ψ_i is normal with standard deviation of 0.2 and the mean such that $\mathrm{E}^{\mathcal{I}}\left[e^{\psi_i} | i \in \mathcal{I}\right] = 1$. We set $y = 1$, which results in a near-uniform distribution of initial endowments in equation (13) across agents with different risk aversions.[17] We set the growth rate of output to $\mu_\delta = 2\%$ to approximately match the 1.94% average real growth rate of U.S. GDP per capita between 1947 and 2019. We also set $\sigma_\delta = 4\%$, $m = 0.2$, $\tau = 2$ years, and $T = \tau + 100$ years. None of our propositions rely on any of these parameter values; only Figures 5 through 12 do.

Global output, δ_t, follows the process in equation (6). Its drift is positive ($\mu_\delta > 0$), reflecting the tendency of output to grow over time. It is thus just a matter of time before δ_t exceeds any given value with probability close to one. In some of our subsequent results, we assume "when output is large enough," by which we mean $\delta_t > \underline{\delta}$, where $\underline{\delta}$ is a result-specific threshold. This is an innocuous assumption—we simply restrict our attention to time periods t for which enough time has passed so that $\delta_t > \underline{\delta}$.

[17] We plot this distribution of initial endowments in the Appendix. In addition, Panel A of Figure 11 shows that the correlation between initial endowment and risk aversion is very close to zero when $y = 1$.

4. Globalization

We now solve for the equilibrium under globalization. Since $\pi_t^{US} = \pi_t^{RoW}$, from equation (12), we have $g_t^{US} = g_t^{RoW}$. We denote the common value of g_t^{US} and g_t^{RoW} by g_t. Since output is perishable, aggregate output equals aggregate consumption in each period:

$$D_t = \int_{i \in \mathcal{I}} C_{it} \, di \ , \tag{15}$$

where $\mathcal{I}$ is the set of all agents. Substituting for consumption from equation (11), we obtain

$$\delta_t = \log \left(\frac{\mathrm{E}^{\mathcal{I}} \left[e^{(g_t - y)/\gamma_i} \mid i \in \mathcal{I} \right]}{\mathrm{E}^{\mathcal{I}} \left[e^{-y/\gamma_i} \mid i \in \mathcal{I} \right]} \right) \ . \tag{16}$$

The equilibrium value of g_t is the unique solution to this equation. We denote this solution by $g(\delta_t)$. The basic properties of this function are derived by Veronesi (2018). He shows that $g'(\delta_t)$ is the inverse of the consumption-weighted average of agents' risk tolerance, ρ_i. Since this value is positive, $g(\delta_t)$ is increasing in δ_t. In addition, $g'(\delta_t)$ decreases as δ_t increases because in a stronger economy, agents with higher ρ_i consume relatively more so that their higher ρ_i receives a larger weight in the average. Finally, $g(\delta_t) \to \infty$ as $\delta_t \to \infty$ because the marginal utility of consumption shrinks to zero when consumption is infinite.

These properties of $g(\delta_t)$ shed more light on optimal consumption from equation (11). That g_t depends on δ_t makes g_t risky, which then makes C_{it} risky, but less so for agents with higher γ_i's. That $g(\delta_t)$ is increasing in δ_t makes C_{it} increasing in δ_t, but again less so for agents with higher γ_i's. Since δ_t tends to grow over time (equation (6)), high-γ_i agents consume more than low-γ_i agents in early periods, but the opposite is true later on.

4.1. Inequality

From equations (2) and (11), we derive the following proposition. Its proof, along with the proofs of all of our other formal results, is in the Appendix.

Proposition 1. *When output is large enough, inequality V_t^k is uniformly increasing in output δ_t, with $\lim_{\delta_t \to \infty} V_t^k = \infty$, for both countries $k \in \{US, RoW\}$. Also, V_t^k is given by*

$$V_t^k = \frac{\mathrm{E}^{\mathcal{I}} \left[e^{2\psi_i} \mid i \in \mathcal{I}^k \right]}{\mathrm{E}^{\mathcal{I}} \left[e^{\psi_i} \mid i \in \mathcal{I}^k \right]^2} \frac{\mathrm{E}^{\mathcal{I}} \left[e^{2(g(\delta_t) - y)/\gamma_i} \mid i \in \mathcal{I}^k \right]}{\mathrm{E}^{\mathcal{I}} \left[e^{(g(\delta_t) - y)/\gamma_i} \mid i \in \mathcal{I}^k \right]^2} - 1 \ . \tag{17}$$

Economic growth thus generates rising inequality. This result would be unsurprising if we were to measure inequality in *absolute* terms, as the cross-sectional variance of consumption levels, because those levels, and differences between them, grow with output. However, we measure inequality in *relative* terms, as the cross-sectional variance of consumption shares (equation (2)). The rising relative inequality is an outcome of optimal trading among agents with heterogeneous preferences. As the economy strengthens, low-γ_i agents consume a growing fraction of total output. This can be seen directly from equation (11) because $g'(\delta_t) > 0$.

The intuition behind Proposition 1 can be conveyed in two ways because, given the CRRA specification of preferences in equation (1), γ_i represents both risk aversion and the inverse of the EIS.[18] High-γ_i agents are unwilling to substitute consumption both across states and over time. First, as higher-γ_i agents are more risk-averse, they choose safer portfolios. The portfolios of higher-γ_i agents tilt toward bonds, whereas those of lower-γ_i agents overweight stocks. Stocks earn a risk premium over bonds, delivering higher expected returns to lower-γ_i agents. Those agents thus consume a growing fraction of output.

Second, look at γ_i through the lens of intertemporal substitution. Facing a stream of output that is expected to grow, high-γ_i agents have a strong preference to bring some of the high future consumption to the present. Therefore, high-γ_i agents borrow initially to consume more in earlier periods and, consequently, less in later periods when they repay their debts. In contrast, low-γ_i agents initially lend to defer their consumption. Over time, the consumption shares of low-γ_i agents rise while those of high-γ_i agents fall. Under both interpretations, growth spurs inequality by delivering larger benefits to lower-γ_i agents.

Inequality is eventually driven by the right tail of the consumption distribution. Let $S_t^k = \text{Skewness}\left(\frac{C_{it}}{C_t^k} \mid i \in \mathcal{I}^k\right)$ denote the skewness of consumption shares across agents.

Corollary 1. *When output is large enough, we have $S_t^k > 0$, S_t^k uniformly increasing in δ_t, and $\lim_{\delta_t \to \infty} S_t^k = \infty$, for both countries $k \in \{US, RoW\}$.*

Both Proposition 1 and Corollary 1 hold after output grows large enough so that the inequality (skeweness) induced by heterogeneous wealth cumulation overcomes the arbitrary inequality (skeweness) of initial endowments. Until then, the relation between growth and inequality (skeweness) is non-monotonic. For example, if higher-γ_i agents have higher initial endowments, inequality initially declines with growth while lower-γ_i agents catch up. Over time, lower-γ_i agents gradually displace higher-γ_i agents from top consumption shares. (For evidence on displacement in top wealth shares, see Gomez, 2019.) Eventually, growth boosts inequality as low-γ_i agents consume a growing share of output.

[18] A natural way of disentangling the effects of risk aversion and intertemporal substitution is to replace CRRA by Epstein-Zin preferences in equation (1). Alas, the equilibrium then becomes intractable.

In our model, globalization per se does not increase inequality; economic growth does. But globalization contributes to inequality because cross-border risk sharing widens the dispersion in agents' exposures to global growth, thereby amplifying the distributional effects of growth. After output grows large enough, inequality is driven by the high consumption of the rich (i.e., the low-γ_i agents), not the low consumption of the poor. Inequality aversion is thus related more to agents' dislike of the rich than to their concern for the poor. Figure 5 plots the substance of Proposition 1 and Corollary 1 for our calibration.

Corollary 2. *For output large enough, agent i's consumption share, $C_{it}/\overline{C}_t^k$, is increasing in δ_t if and only if $\gamma_i < \overline{\gamma}^k(\delta_t)$. Moreover, $\overline{\gamma}^k(\delta_t)$ is decreasing in δ_t, for $k \in \{US, RoW\}$.*

Corollary 2 shows that the benefits of growth accrue disproportionately to low-γ_i agents, and that the set of disproportionate beneficiaries shrinks as output grows over time.

That a shrinking fraction of the population benefits disproportionately from growth is not only a prediction of our model but also a feature of the data. Panel A of Figure 6 shows that the top 1% income share in the U.S. has risen sharply since the 1970s. Panel B shows that the ratios of income shares, top 1% to top 10% as well as top 0.1% to top 1%, have also risen, in a very similar fashion. The two lines plotted in Panel B track each other fairly closely, revealing the "fractal" nature of top inequality (Gabaix et al., 2016).

Panels C and D of Figure 6 are the counterparts of Panels A and B for equilibrium consumption shares generated from our model under the expected output path. The patterns in Panels C and D are strikingly similar, both to each other and to the patterns in Panels A and B. Interestingly, our model generates fractal-like dynamics of top inequality similar to those observed in the data. In contrast, many other models in the inequality literature fail to generate such dynamics, as explained by Gabaix et al. (2016).

The levels of empirical quantities in Panels A and B exceed those of model-predicted variables in Panels C and D. That is not surprising because the former measure income inequality while the latter measure consumption inequality. In Panels A and B, we plot income inequality because it is measured more precisely, and is available more easily, than consumption inequality. In Panels C and D, we plot consumption inequality because that is what our model makes predictions about. In the data, consumption inequality is lower than income inequality, but their dynamics are similar (e.g., Aguiar and Bils, 2015). It is interesting that our economic mechanism, driven by heterogeneous preferences, produces dynamics of top inequality similar to those in the data.

4.2. Trade Balance

Preference heterogeneity generates an imbalance between the two countries.

Proposition 2. *Under globalization, when output is large enough, the U.S. runs a trade deficit whereas RoW runs a trade surplus. That is, U.S. agents consume more than their tree's output whereas RoW agents consume less:*

$$\int_{i\in\mathcal{I}^{US}} C_{it}\,di \quad > \quad D_t^{US} \tag{18}$$

$$\int_{i\in\mathcal{I}^{RoW}} C_{it}\,di \quad < \quad D_t^{RoW} \;. \tag{19}$$

To understand this result, first consider the intertemporal smoothing motive. RoW agents have lower EIS than U.S. agents. Facing upward-trending output, RoW agents initially sell assets to increase their early consumption, at the cost of lower consumption later on. They sell assets to U.S. agents, who are more willing to defer their consumption. As U.S. agents accumulate assets, they earn asset income that raises their future consumption. After enough time passes, U.S. agents consume more than their tree's output (equation (18)), whereas the opposite is true for RoW agents (equation (19)).

Risk sharing also contributes to Proposition 2. As U.S. agents are less risk-averse, they insure RoW agents by issuing bonds to them and use the proceeds to establish levered positions in stocks. The returns earned on those stock positions boost U.S. agents' consumption. The opposite is true for RoW agents—their desire for smooth consumption leads them to adopt conservative portfolios, from which they consume less. Figure 7 plots both countries' trade deficits. In Section 7.3, we discuss their current account balances.

5. Backlash Against Globalization

At time τ, both countries hold elections that may result in a move from globalization to autarky. Before analyzing how agents vote, we describe the equilibrium under autarky.

5.1. Autarky

Under autarky, each country consumes its own output, so that for both $k \in \{US, RoW\}$,

$$D_t^k = \int_{i\in\mathcal{I}^k} C_{it}\,di \;. \tag{20}$$

Substituting for consumption from equation (11) and rearranging, we obtain an equation identical to equation (16) but specific to country k. We denote its solution, the equilibrium value of g_t^k, by $g^k(\delta_t)$. Similar to $g(\delta_t)$, the function $g^k(\delta_t)$ is increasing and concave in δ_t, and it diverges as $\delta_t \to \infty$. In addition, when output is large enough,

$$g^{US}(\delta_t) \;<\; g(\delta_t) \;<\; g^{RoW}(\delta_t) \;. \tag{21}$$

Recall from equation (12) that $g^k(\delta_t)$ is a simple modification of the state price density, π_t^k, which can be interpreted as the marginal utility of consumption for the representative agent in country k. Equation (21) implies that the marginal utility of U.S. agents is higher under autarky than under globalization, whereas the opposite is true for RoW agents.

Inequality under autarky obeys equation (17), except that $g(\delta_t)$ is replaced by $g^k(\delta_t)$.

Proposition 3. *For every δ_t, U.S. inequality is lower under autarky than under globalization, whereas the opposite is true for RoW inequality:*

$$V_t^{US}\left[g^{US}(\delta_t)\right] \;<\; V_t^{US}\left[g(\delta_t)\right] \tag{22}$$

$$V_t^{RoW}\left[g^{RoW}(\delta_t)\right] \;>\; V_t^{RoW}\left[g(\delta_t)\right] \;. \tag{23}$$

The intuition is simple. RoW agents desire smooth consumption, both across states and over time. Under globalization, RoW agents are able to achieve a large degree of consumption smoothing by trading not only among themselves but also with U.S. agents. As a result, RoW consumption shares are similar to each other, and RoW inequality is relatively small under globalization. But when they cannot trade with U.S. agents, RoW agents achieve less consumption smoothing, resulting in more RoW inequality. The opposite is true for U.S. agents, who are more willing to substitute consumption across states and time. By trading with RoW agents, U.S. agents end up with uneven consumption paths, resulting in large dispersion in their consumption shares. Under autarky, U.S. agents trade only among themselves, so their consumption paths are less uneven, and U.S. inequality is lower.

In portfolio terms, under globalization, RoW agents tend to hold large positions in bonds issued by U.S. agents. Given the similarity of RoW agents' portfolio holdings, the differences in their consumption shares are relatively small. In contrast, U.S. agents tend to hold levered positions in stocks. This leverage amplifies the differences in consumption shares across U.S. agents. Under autarky, cross-border insurance is absent, resulting in smaller inequality in the U.S. but larger inequality in RoW. See Figure 5.

5.2. Elections

At time $\tau \in [0, T]$, both countries vote for one of two candidates. The mainstream candidate commits to maintain globalization, whereas the populist commits to a shift to autarky, both lasting through time T. To determine who agent $i \in \mathcal{I}^k$ votes for, let U_i^G and U_i^A denote the agent's utilities from globalization and autarky, respectively, at time τ:

$$U_i^G(\delta_\tau; k, \tau, T) = \mathrm{E}_\tau \left[\int_\tau^T e^{-\phi(s-\tau)} \left(\frac{C_{is}^{1-\gamma_i}}{1-\gamma_i} - \eta^i V_s^k \right) ds \mid \text{mainstream elected} \right] \quad (24)$$

$$U_i^A(\delta_\tau; k, \tau, T) = \mathrm{E}_\tau \left[\int_\tau^T e^{-\phi(s-\tau)} \left(\frac{C_{is}^{1-\gamma_i}}{1-\gamma_i} - \eta^i V_s^k \right) ds \mid \text{populist elected} \right] . \quad (25)$$

We assume that the agent votes for the populist candidate if and only if

$$U_i^A(\delta_\tau; k, \tau, T) > U_i^G(\delta_\tau; k, \tau, T) . \quad (26)$$

This assumption of sincere voting seems reasonable because, due to their infinitesimal size, agents cannot affect the election outcome through strategic voting.

5.2.1. Voting by U.S. Agents

When deciding who to vote for, agents assess the effects of a move to autarky on both consumption and inequality. A shift to autarky decreases the consumption of U.S. agents (compare equations (18) and (20)) but also reduces inequality (Proposition 3). This consumption-inequality tradeoff is at the heart of the voting decision of each U.S. agent.

Proposition 4. *For any U.S. agent i with $\eta_i > 0$, there exists $\overline{\delta}^i$ such that for any $\delta_\tau > \overline{\delta}^i$, the agent votes for the populist candidate.*

If δ_τ is large enough, the agent prefers autarky because the reduction in inequality more than outweighs the reduction in consumption. Lower consumption does not bother the agent much because his marginal utility of consumption is low in a strong economy (when $\delta_\tau \to \infty$, the marginal utility goes to zero). The reduction in inequality matters more because the drop in inequality, $V_\tau^{US}[g(\delta_\tau)] - V_\tau^{US}\left[g^{US}(\delta_\tau)\right]$, is bounded below as $\delta_\tau \to \infty$. Therefore, when δ_τ is large enough, the gain from a more equal society more than compensates for the loss of consumption that the agent suffers when moving to autarky.

Equality can be interpreted as a luxury good in that society demands more of it when it becomes wealthier. When δ_τ is higher, agents are more willing to sacrifice consumption in exchange for more equality. Consistent with this argument, the recent rise in populism appears predominantly in rich countries. In poor countries, the marginal utility of consumption is high and agents are less willing to give up consumption for nonpecuniary values.

Corollary 3. *For any δ_τ, any U.S. agent i with $\eta_i = 0$ votes for the mainstream candidate.*

This result highlights the importance of inequality aversion for our results. Agents whose η_i is zero, or small, reject populism to preserve the benefits of globalization. Therefore, for our following result, we assume that $\eta_i > 0$ for more than half of U.S. agents.

The U.S. election is decided by the U.S. median voter. If the fraction of U.S. agents for whom the relation (26) holds exceeds one half, the election is won by the populist and the U.S. moves to autarky. We now present our main result.

Proposition 5. *There exists $\overline{\delta}$ such that for any $\delta_\tau > \overline{\delta}$, the populist wins the U.S. election.*

In a sufficiently strong economy, the populist wins the U.S. election because the median voter values the lower inequality under autarky more than the higher consumption under globalization. The result follows from Proposition 4, in which the threshold $\overline{\delta}_t^i$ varies across agents. The median value of $\overline{\delta}_t^i$ across all U.S. agents is equal to the value of $\overline{\delta}$ in Proposition 5. This value of $\overline{\delta}$ is indicated by the vertical line in Figure 8.

Proposition 5 highlights the fragility of globalization in this model. Heterogeneity in preferences leads agents to adopt different exposures to global growth. The largest exposures are adopted by agents with the lowest γ_i's, who benefit the most from growth. Growth pushes up inequality under both globalization and autarky, but more so under globalization because cross-border trading maximizes the dispersion in U.S. agents' exposures to growth. Given agents' preference for equality, in a growing economy, it is just a matter of time before output grows to a level at which more than half of the agents find it optimal to vote populist.

Proposition 5 fits the recent populist backlash in the West, which occurred after decades of prosperity. The only major recession since World War II was associated with the 2008 financial crisis. The decade following the crisis witnessed significant growth in western economies, with a few exceptions in southern Europe. As of 2019, the U.S. is in the 11th year of a macroeconomic expansion, the longest boom on record, and U.S. stock prices have more than quadrupled since 2008. The fruits of this growth have not been shared equally, resulting in a steady rise of inequality.[19] High inequality triggers a backlash in our model.

[19]For example, the top 10% income share rose from 34.2% in 1980 to 47.0% in 2014 in the U.S., and from 28.4% in 1979 to 40.0% in 2014 in the UK, according to the World Inequality Database.

5.2.2. Who Votes for the Populist?

We now analyze the cross section of U.S. agents' voting preferences.

Proposition 6. *Agents with higher values of γ_i and η_i are more likely to vote populist.*

The expression "more likely" should be interpreted as follows. Holding η_i and ψ_i constant, there exists a threshold $\overline{\gamma}$ such that agent i votes populist if and only if $\gamma_i > \overline{\gamma}$. Similarly, holding γ_i and ψ_i constant, there exists a threshold $\overline{\eta}$ such that agent i votes populist if and only if $\eta_i > \overline{\eta}$. Given the randomness in γ_i, η_i, and ψ_i, populist voters tend to exhibit more aversion to both risk and inequality, as shown in Figure 9.

The result that high-η_i agents vote populist is straightforward. Recall that a move to autarky benefits U.S. agents by reducing within-U.S. inequality but hurts them by reducing their consumption. In this consumption-inequality tradeoff, higher-η_i agents put a larger weight on inequality, which makes autarky more appealing to them.

The result that high-γ_i agents vote populist follows from their optimal choice of smooth consumption plans. Equation (11) shows that the equilibrium consumption of higher-γ_i agents is less sensitive to changes in g_t^k. As a result, such agents suffer a smaller drop in consumption when the global value g_t changes to the local value g_t^{US}, where $g_t^{US} < g_t$ (equation (21)). Since higher-γ_i agents are better insured against the adverse consumption consequences of a shift to autarky, they are more likely to vote populist.

Lower-γ_i agents tend to accumulate more wealth than higher-γ_i agents by time τ. The negative relation between γ_i and wealth is not perfect, but it becomes stronger as time passes and the effect of initial endowments dwindles. Panel C of Figure 9 shows that there are wealthy voters who vote populist, as well as poor voters who vote mainstream, but on average, mainstream voters are wealthier. They also consume more than populist voters, on average, and suffer larger drops in consumption upon a move to autarky (Figure 10).

5.2.3. Voting by RoW Agents

Proposition 7. *RoW agents never elect the populist candidate.*

To understand this result, recall that a move to autarky would increase not only RoW's inequality (Proposition 3) but also its consumption. Consumption would rise because under globalization, RoW agents consume less than their tree's output, whereas under autarky, they consume all of it (compare equations (19) and (20)). But this increase in RoW consumption would come at the expense of U.S. consumption, and we rule out expropriation.

5.3. Redistribution

According to Proposition 5, U.S. voters eventually end globalization. While globalization is fragile in a democracy, it would be resilient in a benevolent dictatorship. A social planner would eschew autarky because of its inefficient consumption smoothing. The social planner's problem is intractable, but we know its solution differs from our competitive market solution due to a consumption externality caused by the presence of inequality in the utility function. By consuming a lot, the elites raise inequality, imposing a negative externality on others. The planner can overcome this externality by constraining agents' consumption plans.

In the absence of a social planner, could we save globalization by redistributing wealth across agents? Specifically, if agents were offered a third voting option—a candidate offering to not only preserve globalization but also redistribute wealth from the rich to the poor—would they take it over autarky? For many redistributive policies, the answer is no.

Proposition 8. *For any lump-sum tax policy $\{\mathcal{T}_{i,t}\}$ such that $\int \mathcal{T}_i(\delta_t)di = 0$, there exists a redistribution of the endowments at time 0 that achieves the same consumption plans.*

In other words, any state-contingent lump-sum redistributive tax policy is equivalent to a redistribution of initial endowments. This claim follows from market completeness. Under redistribution, agent i's static budget constraint can be written as

$$\mathrm{E}_0\left[\int_0^T \pi_t^k\, C_{it}\, dt\right] = w_i + \mathrm{E}_0\left[\int_0^T \pi_t^k\, \mathcal{T}_{it}\, dt\right] \ . \tag{27}$$

Any redistributive policy $\{\mathcal{T}_{i,t}(\delta_t)\}$ can thus be implemented at time 0 by augmenting agent i's initial endowment with $\tilde{w}_i = \mathrm{E}_0\left[\int_0^T \pi_t^k\, \mathcal{T}_{it}\, dt\right]$. It is easy to verify that $\int \tilde{w}_i di = 0$.

Proposition 8 is in fact more general than stated. It applies not only to lump-sum taxes but also to any other redistributive policy that does not affect the equilibrium value of π_t^k. One example is a flat income tax. As we show in the Appendix, such a tax affects agents' optimal portfolios but not their equilibrium consumption or π_t^k.

Building on Proposition 8, we ask whether globalization can be saved by redistributing wealth from low-γ_i agents, who benefit the most from globalization, to high-γ_i agents, who benefit the least. Recall from Section 3.2 that, for tractability, we restrict the distribution of initial endowments w_i to those described by equation (13), which can be rewritten as

$$w_i \;=\; e^{\psi_i}\,\mathrm{E}_0\left[\int_0^T e^{-\phi t+\left(g_t^k-y\right)/\gamma_i-g_t^k}\,dt\right]\;. \tag{28}$$

We can pick any value of y and any distribution of ψ_i whose mean is $\mathrm{E}^{\mathcal{I}}\left[e^{\psi_i}|i\in\mathcal{I}\right] = 1/\mathrm{E}^{\mathcal{I}}\left[e^{-y/\gamma_i}|i\in\mathcal{I}\right]$. Equation (28) shows that by increasing the value of y, we redistribute wealth from low-γ_i agents to high-γ_i agents. This fact is also apparent from Panel A of Figure 11: as y increases, so does the correlation between γ_i and w_i. The most relevant type of redistribution—from the wealthy to the poor—can thus be implemented by varying y.

Because all of our prior results are independent of y, they hold for any redistribution captured by different values of y. We formalize this statement in the following corollary.

Corollary 4. *Suppose that the mainstream candidate promises to not only preserve globalization but also implement a redistributive policy that is equivalent to a change in y. For any y, there exists $\overline{\delta}$ such that for any $\delta_\tau > \overline{\delta}$, the populist candidate wins the U.S. election.*

This class of redistributive policies thus cannot prevent the breakdown of globalization. Panel B of Figure 11 shows that increased redistribution implies a higher value of the threshold $\overline{\delta}$ from Proposition 5. Therefore, increased redistribution makes it less likely that the populist gets elected at any given time τ. But for any finite redistributive policy y, when τ is large enough, $\delta_\tau > \overline{\delta}$ holds almost surely. In that sense, redistribution can "delay" the election of the populist but cannot prevent it from happening eventually.

Corollary 4 is noteworthy because redistribution is often proposed as a remedy for the inequality caused by global trade. It is commonly argued that to obtain the first-best solution, we should preserve globalization and make transfers from the beneficiaries of globalization to those adversely affected by it.[20] This argument has some merit in the context of our model because redistribution can reduce the probability of the populist getting elected, for any given τ. But it also has limitations because for any given finite redistributive policy y, there exists τ large enough that the populist almost surely gets elected. A related point is made by Musto and Yilmaz (2003), who show in a different setting that agents can trade away the effects of redistributive policies by trading in complete markets.

The mainstream candidate could save globalization by levying a Pigouvian tax on consumption, taxing agents based on their contribution to inequality (i.e., taxing those who consume a lot and subsidizing those who consume little). A progressive consumption tax

[20]For example, Rodrik (1997, page 73) argues that "If the external risks that buffet national economies and workers were fully observable, a set of transfers contingent on the realization of the shocks would work best. But the world is obviously too complicated for first-best solutions..."

with agent-specific rates could address the externality by distorting agents' first-order conditions. Of course, such a tax would be difficult to implement in practice. Progressive income taxation could also in principle address the externality. Whereas a flat income tax does not affect the equilibrium state price density, heterogeneity in the tax rates does, as we show in the Appendix. The design of optimal tax policies is beyond the scope of this paper.

To summarize, globalization cannot be saved by offering rich-to-poor redistribution as the third voting option, unless the redistribution is of a specific form that internalizes the consumption externality. Examples that do not work are lump-sum redistribution, flat income tax, and redistribution captured by changing y. Examples of policies that might potentially work are progressive consumption and income taxes with agent-specific rates. In reality, voters are often offered only two options, such as "Remain" or "Leave" in the case of the Brexit referendum, and Trump or Clinton in the case of the 2016 U.S. election.

While redistribution seems like the most natural alternative to autarky, inequality could in principle also be reduced in other, more dramatic, ways. For example, instead of shutting down only cross-border trade, agents could shut down all trade. Or they could destroy capital, which is held mostly by the rich. However, these alternatives would be very costly in practice. We focus on anti-globalization and redistribution because we view them as more realistic ways of containing inequality. Our particular emphasis on anti-globalization is motivated by the fact that its inequality-reducing effects have not been previously studied from the finance perspective. We establish novel theoretical connections between globalization, inequality, and preference heterogeneity in the context of capital markets.

5.4. Model Extensions

In the Appendix, we extend the model in five different ways. First, we allow the countries' output shares to fluctuate over time, departing from equation (7). Second, we let the countries' population shares vary over time. Third, we assume that a move to autarky reduces subsequent output, either by destroying capital or by lowering the long-term growth rate of output. Fourth, we assume that a shift to autarky makes output more volatile. Finally, we add to our third extension the assumption that stocks are levered claims on output. In all five extensions, our main results, including Proposition 5, continue to hold.

The extensions also yield additional insights. The first extension shows that the populist victory in the U.S. is more likely after a decline in the U.S. share of global output. When RoW grows relative to the U.S., U.S. agents have more RoW risk to share, which deepens U.S.

inequality. Autarky, in which RoW risk is no longer shared, then becomes more appealing. In recent decades, the U.S. share of global output indeed shrank, in part due to the fast growth of China. China grew even during the 2008 crisis, which impoverished the West.

The second extension shows that immigration from RoW to the U.S. makes the populist victory in the U.S. more likely. Intuitively, when the mass of U.S. agents increases, autarky becomes more attractive to U.S. agents because they have more other U.S. agents to trade with, which allows them to achieve better consumption-smoothing outcomes under autarky. In reality, though, the role of immigration in the populist backlash is far more complicated. For example, immigrants affect the wages of locals, but there is no labor market in our model. To the extent that low-skill immigrants hurt the wages of the poor more than those of the rich, anti-immigration policies of many populist parties are equalizing and thus consistent with the spirit of our model.[21] However, voters' attitudes toward immigration are also associated with non-economic reasons that are outside our model.

The third extension shows that the prospect of lower output does not discourage agents from voting populist. A loss of output implies lower consumption but also lower inequality because it hurts the rich more than the poor. When output is large enough, the median voter welcomes its reduction because she values the increase in equality more than the decrease in consumption. This holds even if we remove autarky from the model. When inequality grows large enough, agents find it optimal to destroy capital to bring inequality down.

The fourth extension emphasizes another potential cost of autarky: after cross-border trade stops, agents can no longer diversify country-specific risks. In the presence of such risks, a shift to autarky would raise the output volatility faced by agents. Motivated by this fact, we extend our model by allowing σ_δ in equation (6) to rise at time τ if autarky occurs. The fifth extension has interesting implications for asset prices, as we discuss in Section 6.1.

6. Asset Prices

The model makes interesting predictions for stock and bond prices. The state price density under globalization is $\pi_t = e^{-\phi t - g(\delta_t)}$, which follows immediately from equation (12). Applying Ito's Lemma, we obtain

$$\frac{d\pi_t}{\pi_t} = -r\left(\delta_t\right)dt - \sigma_\pi\left(\delta_t\right)dZ_t \ , \tag{29}$$

[21] We are grateful to one of our referees for this insight.

where

$$r(\delta_t) = \phi + g'(\delta_t)\,\mu_\delta - \frac{1}{2}\left(g'(\delta_t)^2 - g''(\delta_t)\right)\sigma_\delta^2 \tag{30}$$

$$\sigma_\pi(\delta_t) = g'(\delta_t)\,\sigma_\delta \ . \tag{31}$$

The dependence of the interest rate, $r(\delta_t)$, on δ_t is unclear as the interplay between intertemporal substitution (the term that involves μ_δ) and precautionary savings (the term that involves σ_δ^2) is complicated. But the price of risk, $\sigma_\pi(\delta_t)$, always decreases with δ_t because $g''(\delta_t) < 0$. When δ_t is high, the price of risk is small because a large amount of consumption is attributed to low-γ_i agents who demand low compensation for risk.

Under autarky, equations (30) and (31) look identical, except that the common values $g(\delta_t)$, $r(\delta_t)$, and $\sigma_\pi(\delta_t)$ are replaced by the country-specific values $g^k(\delta_t)$, $r^k(\delta_t)$, and $\sigma_\pi^k(\delta_t)$. To help us understand how the price of risk depends on the trading regime, we show that[22]

$$(g^{US})'(\delta_t) \ < \ g'(\delta_t) \ < \ (g^{RoW})'(\delta_t) \ . \tag{32}$$

From equations (31) and (32), we immediately obtain the following proposition.

Proposition 9. *The U.S. market price of risk, σ_π^{US}, is lower under autarky than under globalization, for any δ_t. The opposite is true for RoW.*

Consider the risk associated with the output of the U.S. tree. Under globalization, this risk is borne by both U.S. and RoW agents, whereas under autarky, it is borne by U.S. agents only. Since these agents are less risk-averse than RoW agents, they demand lower compensation for risk. The same arguments, but in reverse, hold for RoW. Proposition 9 is visualized in Panel A of Figure 12 in the context of our calibration.

6.1. Stock Prices

The market price of country k's stock is the present value of dividends from country k's tree:

$$P_t^k = \mathrm{E}_t\left[\int_t^T \frac{\pi_s^k}{\pi_t^k}\, D_s^k\, ds\right] \ . \tag{33}$$

Proposition 10. *For $t < \tau$, an increase in δ_t leads to an increase in the global market share of U.S. stocks, $P_t^{US}/(P_t^{US} + P_t^{RoW})$.*

[22] While equation (32) appears to hold generally, we can prove the first inequality, $(g^{US})'(\delta_t) < g'(\delta_t)$, only in the special case when the distribution of γ_i satisfies equation (4). Our proofs of the other two inequalities, $(g^{US})'(\delta_t) < (g^{RoW})'(\delta_t)$ and $g'(\delta_t) < (g^{RoW})'(\delta_t)$, are fully general (see the Appendix).

When δ_t increases, so does the probability of $\delta_\tau > \overline{\delta}$ in Proposition 5, which increases the probability of the populist's victory. This victory reduces the discount rate for U.S. stocks but raises it for RoW stocks (Proposition 9). As the market anticipates this outcome, the global market share of U.S. stocks rises. Panel B of Figure 12 pictures Proposition 10 for the parameter values in our calibration.

Increases in δ_t push up not only the U.S. stock price but also its price-dividend ratio (P/D). This prediction is generated by time-varying discount rates because the expected cash flow, μ_δ, is constant. Good output news lifts P/D by reducing the equity risk premium, whereas bad news depresses P/D by raising the risk premium. Our model thus implies predictability of stock returns by P/D, which is well known to be present in the data.

The result that a move to autarky lifts U.S. stock prices can be reversed in the fifth model extension described in Section 5.4. In that extension, we modify our model by adding two assumptions: that a move to autarky reduces the expected growth rate of output, and that stocks are levered claims on output. The first assumption ensures that a move to autarky reduces stocks' expected future cash flows. The second one implies this cash flow effect can overcome the effects of intertemporal smoothing and risk premia, which pull the other way. As a result, a move to autarky depresses stock prices. See the Appendix for details.

6.2. Bond Prices

At time $t < \tau$, consider two zero-coupon risk-free bonds maturing at time $t' > \tau$. The "U.S. bond" pays one unit of consumption good in the U.S. at time t'; the "RoW bond" does the same in RoW.

Proposition 11. *For $t < \tau$, an increase in δ_t leads to a decrease in the yield of the U.S. bond but an increase in the yield of the RoW bond.*

An increase in δ_t makes it more likely that $\delta_\tau > \overline{\delta}$, in which case autarky arrives at time τ (Proposition 5). Upon a shift to autarky, country k's state price density jumps from π_τ to π_τ^k, where $\pi_\tau^k/\pi_\tau = e^{g(\delta_\tau)-g^k(\delta_\tau)}$. Given equation (21), a move to autarky increases state prices in the U.S. but decreases them in RoW. The reason is that a move to autarky decreases U.S. agents' consumption, thereby increasing their marginal utility of consumption. Buying the U.S. bond allows U.S. agents to postpone consumption until after time τ when its marginal utility is higher. Since an increase in δ_t makes autarky more likely, it makes the U.S. bond more valuable, reducing its yield. The same arguments, in reverse, apply to RoW.

Panel C of Figure 12 visualizes Proposition 11. When δ_t is low, markets expect globalization to continue beyond time τ, resulting in similar bond yields in both countries. When δ_t grows, a move to autarky becomes more likely; the U.S. bond thus becomes more valuable and the RoW bond less so. When δ_t grows so much that a shift to autarky is all but certain, the U.S. bond's price rises so much that its yield turns negative. This happens because the U.S. bond guarantees a unit of consumption in a future state in which the marginal utility of consumption is very high.

Propositions 10 and 11 describe the behavior of stock and bond prices before time τ. At time τ, asset prices jump if a move to autarky takes place because the state price density jumps, from π_t to π_t^k. As noted earlier, autarky increases state prices in the U.S. but decreases them in RoW; therefore, U.S. stock and bond prices jump down while RoW prices jump up. These jumps make U.S. agents poorer but RoW agents richer; in that sense, autarky transfers wealth from the U.S. to RoW. Consequently, the consumption of U.S. agents decreases after a move to autarky while that of RoW agents increases, as discussed earlier.

7. Discussion

In this section, we discuss additional aspects of the model, including evidence that supports as well as invalidates the model's predictions. In Sections 7.1 through 7.4, we examine the model's strengths and weaknesses in relation to portfolio holdings, consumption volatility, global imbalances, and the state of the economy. In Section 7.5, we discuss an alternative interpretation of the model, which replaces financial contracts by labor contracts.

7.1. Portfolio Holdings and Expected Returns

Agents' portfolios exhibit heterogeneity both within and across countries. Panel A of Figure 13 shows that richer agents have larger stock positions, due to their lower γ_i's. For the same reason, U.S. agents have larger stock positions than RoW agents at each wealth percentile.

Mapping model-implied holdings to the data faces two challenges. First, equity is unlevered in the model but levered in the data because firms issue debt. Second, our model omits governments, which issue debt and repay it by levying taxes on agents. Model-implied holdings must therefore be adjusted for both taxation and firm leverage. In the Appendix, we explain how we make both adjustments by using tax and leverage data.

Panel B of Figure 13 plots the adjusted stock holdings of U.S. agents, along with U.S. investors' actual holdings. The latter holdings, which come from Guiso and Sodini (2013), represent the average equity investment as a share of financial assets obtained from the 2007 Survey of Consumer Finances. The model-implied pattern in stock holdings looks similar to the pattern observed in the data. Both patterns indicate that richer households hold larger shares of their wealth in equity. The levels of stock holdings are also similar, except that the model is unable to replicate the very low equity holdings among households with the least amount of wealth. Those low holdings could be due to fixed participation costs, the lack of financial sophistication, or other elements missing from the model.

Panel C of Figure 13 plots U.S. agents' expected returns on wealth against their net worth. Richer agents earn higher returns as they hold larger fractions of their wealth in stock, as noted earlier. This pattern resembles those observed in the data by Bach, Calvet, and Sodini (2019) for Swedish households and Fagereng et al. (2020) for Norwegian households. Bach et al. attribute this pattern to differences in risk exposures, consistent with our model. While Panel C matches the data qualitatively, the return gap between rich and poor agents is smaller than in the data. The model-implied gap between the first and last percentiles of net worth is just under 1%, whereas Fagereng et al. report a gap between 1% and 2%, and Bach et al. find a gap of 2% to 6%. The small model-implied gap is a by-product of the equity premium puzzle, which is a natural consequence of the CRRA preferences.

7.2. Consumption Volatility

Like stock holdings and expected returns, consumption volatility is larger for richer agents, as we show in the Appendix. A positive cross-agent relation between the level and volatility of consumption is also observed in the data (Davis and Kahn, 2008). The level of consumption volatility in the model ranges from 2% to 7%, but it seems larger in the data. For example, Gorbachev (2011) reports the volatility of food consumption ranging from 9% to 15%. Our model thus gets the pattern across agents right, but not the level. This deficiency stems from the model's simplicity. The model does not include agent-specific income shocks, which surely contribute to individual consumption volatility in the data.

A transition to autarky affects agents' consumption volatilities differentially depending on their country of residence. To see this, note that equilibrium consumption volatility of agent i is equal to $g'(\delta_t)\sigma_\delta/\gamma_i$. When the economy moves to autarky, $g'(\delta_t)$ increases for RoW but decreases for the U.S. (see equation (32)), implying the following result.

Corollary 5. *When the economy moves to autarky, consumption volatility of U.S. agents decreases, while that of RoW agents increases.*

Given the similarity between consumption volatility and the price of risk in equation (31), this result is a corollary of Proposition 9. To quantify it, note that for $\delta_t = \overline{\delta}$, the price of risk under globalization is 18.4% (see Panel A of Figure 12). Upon autarky, this price drops to 16.9% for the U.S. but jumps to 19% for RoW, implying a -8.2% change in consumption volatility for each U.S. agent and a 3.3% change for each RoW agent.

7.3. Current Account Balance

In Section 4.2, we show that the U.S. runs a trade deficit when output is sufficiently large. While trade balance is a key component of the current account, this account has also other components driven by the countries' asset holdings. Those holdings are asymmetric because U.S. agents, who have lower γ_i's, optimally choose riskier portfolios than RoW agents.[23] Indeed, we prove in the Appendix that the U.S. is a net borrower whereas RoW is a net lender. For our parameter values, the aggregate portfolio of U.S. agents is about 110% in stocks and -10% in bonds, whereas the RoW portfolio is 97% in stocks and 3% in bonds (see the Appendix for a plot). In the data, the U.S. as a whole is indeed net long risky assets and net short safe assets (e.g., Gourinchas and Rey, 2014), consistent with the model.

As the returns of U.S. stocks and RoW stocks are the same in the model, the split between them in agents' portfolios is indeterminate. We thus assume that U.S. agents own all of the U.S. stocks plus some RoW stocks, whereas RoW agents own no U.S. stocks.[24] The U.S. current account balance then includes the trade balance plus the return to U.S. agents from their holdings of RoW stocks, minus bond interest paid by the U.S. to RoW.

For our parameter values, when output is large enough, the U.S. current account balance is positive, unlike trade balance (see the Appendix for a plot). The reason is that the U.S. trade deficit is more than offset by the net return U.S. agents earn on their foreign holdings. Although they pay interest to RoW agents, U.S. agents earn sufficiently high returns on their holdings of RoW stocks that the U.S. runs a current account surplus.

While a negative U.S. trade balance is realistic, a positive current account balance is not. For example, in 2018, the U.S. trade balance is -3.1% GDP and its current account balance

[23] The consumption volatility of agent i is $g'(\delta_t)\sigma_\delta/\gamma_i$, as noted earlier. Higher-γ_i agents thus optimally choose less volatile consumption paths. To support these paths, higher-γ_i agents choose safer portfolios.

[24] The amount invested in RoW stocks by U.S. agents is positive when output is large enough because U.S. agents' wealth then exceeds the value of all U.S. stock outstanding, as we prove in the Appendix.

is −2.4% GDP. The model-implied gap between the two balances has the right sign, but its magnitude is too large. The reason is the model's failure to match the U.S. net foreign asset position. This position is negative in the data (i.e., the value of U.S. assets held by RoW agents exceeds the value of RoW assets held by U.S. agents) but positive in the model when output is sufficiently large. Due to this discrepancy, U.S. agents earn higher payoffs on their net foreign asset holdings in the model than they do in the data.

7.4. Populism in Good Times

Our model predicts that a populist backlash is more likely in prosperous times because that is when inequality is particularly large. This prediction seems to fit the pivotal 2016 votes in the U.S. and UK, as noted earlier. It also fits the popularity of Bernie Sanders, a self-described socialist, at the beginning of the 2020 U.S. presidential campaign, which began during the longest macroeconomic expansion in the U.S. history. However, there are also many historical examples of populism when the economy was weak. For example, in the 2010s, populism spread in several European countries with slow growth rates, such as Italy and Spain. Algan et al. (2017) blame the recent rise of populism in Europe on the Great Recession. Funke, Schularick, and Trebesch (2016) show that far-right populism tends to rise after financial crises. This evidence does not necessarily contradict our model, for two reasons. First, crises might elevate aversion to inequality, especially if voters feel, as many did during the 2008 financial crisis, that elites' high incomes have been earned unfairly. If the values of η_i in equation (1) increase as a result of a crisis then our model predicts a post-crisis pushback. Second, populism is likely to have multiple causes besides inequality. One obvious cause is voter frustration in a weak economy. It seems natural for voters unhappy with status quo to vote for candidates promising radical change. In that sense, the emergence of populism in bad times seems easy to explain. It seems more difficult to explain why voters might push back in good times, which is what our model aims to accomplish.

On a related note, our two-country model predicts that a populist gets elected in the richer country. In reality, populists often get elected also in poor countries, including multiple examples in Latin America. Our model does not shed light on such events, but it is not difficult to understand why voters in relatively mismanaged countries may vote for radical candidates. It seems more challenging to explain why voters sometimes do that in rich and well-managed countries, and that is what we attempt to do.

7.5. Labor Interpretation

We interpret contracts between agents as financial, but an alternative interpretation is that agents enter into labor contracts in the spirit of Kihlstrom and Laffont (1979). These contracts determine how the stream of output, which follows equation (6), is shared among agents. An agent's wage is her share of total output. Each agent chooses a career whose wage stream delivers the optimal consumption from equation (11). High-γ_i agents choose careers that deliver smooth consumption across states and time: they take fixed-wage jobs and begin working without delay. In contrast, low-γ_i agents choose careers with variable income and are willing to defer consumption.[25] As time passes, low-γ_i agents become increasingly wealthy relative to high-γ_i agents. Under globalization, U.S. agents employ RoW agents through relatively safe job contracts while retaining risk, whereas under autarky, cross-border employment is absent. This alternative labor-based interpretation produces identical consumption choices and political outcomes in equilibrium.

The labor interpretation offers a way of understanding why the support for populism is weaker among more educated workers. In models of human capital investment, better-educated workers are likely to have lower γ_i's, for two reasons. First, interpreting γ_i as risk aversion, lower-γ_i agents are more likely to invest in acquiring higher education because such an investment is risky.[26] Second, interpreting γ_i as EIS, lower-γ_i agents are more likely to acquire higher education because they are more willing to defer their consumption. Recall from Proposition 6 that lower-γ_i agents are less likely to vote populist because they suffer a larger drop in consumption when autarky arrives. This logic implies that better-educated agents oppose autarky because they have more to lose when globalization ends.

8. Conclusions

We highlight the fragility of globalization in a democratic society that values equality. In our model, a pushback against globalization arises endogenously as a rational voter response to growing inequality. Of course, our parsimonious model cannot come close to fully capturing the complexity of the recent rise of populism in the West. Many forces outside the model, economic and non-economic, must have also played a role. Abstracting from such forces

[25] Consistent with the risk interpretation, Schulhofer-Wohl (2011) finds, by using survey data, that less risk-averse workers tend to hold jobs whose earnings carry more aggregate risk. Similarly, Calvet et al. (2019) report that Swedish households with lower risk aversion have riskier labor incomes. Both studies interpret their findings as showing that people share risk by sorting into jobs according to risk preferences.

[26] A significant fraction of students fail to complete college while carrying student loans (e.g., Athreya and Eberly, 2018). Shaw (1996) finds a negative relation between education and risk aversion.

allows us to connect several phenomena—a backlash against globalization, rising inequality, global imbalances, and differences in financial development—through a simple but powerful economic mechanism. Our frictionless, complete-markets model can serve as a rational benchmark for contemplating the long-term survival of globalization.

Countries with high inequality, high financial development, and trade deficits are especially vulnerable to anti-global backlash, according to the model. The model also predicts the backlash is more likely when the economy is strong because that is when inequality is particularly large. The backlash should be led by agents with the strongest anti-elite preferences (high η_i) and agents whose consumption suffers the least from a move to autarky (high γ_i). The model's extensions imply the backlash is more likely in countries facing immigration and countries growing more slowly than the rest of the world.

What can policymakers do to save globalization? The model suggests two approaches: keep inequality in check or reduce voters' aversion to inequality. A progressive consumption tax would be particularly effective in the context of our model because it would help internalize the consumption externality. Such a tax would be difficult to implement in practice, but it could be approximated by a value-added tax with high rates on luxury goods. Another way to reduce inequality is by reducing the heterogeneity in preferences across agents. While innate preferences may be immutable, effective preferences depend also on the amount of uninsurable background risk that agents face. Policies that improve agents' ability to insure against such risk—for example, by providing health insurance to agents who lack it—could effectively reduce some of the largest risk aversion values in the population. To reduce voters' aversion to inequality, policymakers could foster a business environment in which voters feel that high incomes are earned fairly. For example, voters are likely to be more tolerant of inequality in an environment without corruption or political favouritism.

Our model is related to two well-known theories of the dynamics of inequality. Kuznets (1955) suggests that inequality first rises due to industrialization but then falls after industries attract much of the rural labor force. Piketty (2014) argues that inequality naturally rises because the rate of return on capital exceeds the rate of economic growth, and it falls as a result of state intervention or conflict. Unlike Kuznets or Piketty, we have a formal model. Our model also predicts a rise and fall in inequality, but the mechanism is different—inequality first rises as a consequence of heterogeneous exposure to global growth, but then it falls as a result of political decisions that reverse global integration.

Political decisions can reduce inequality in various ways. Some of the largest historical reductions in inequality were caused by violent political events such as wars and revolutions

(Scheidel, 2017). While Scheidel describes the effects of violence on inequality, our mechanism can deliver reverse causality in which inequality causes violence. When inequality grows large enough, inequality-averse agents find it optimal to upset the elites by destroying some of the endowment, as we show in a model extension. Such destruction reduces inequality because it hurts the rich more than the poor.[27] Our model thus highlights perils beyond a possible reversal of globalization. The model's broader message is that when inequality grows large enough, it becomes unsustainable because agents take political action to reduce it.

[27]This result is somewhat reminiscent of Ljungqvist and Uhlig (2015), who find that in the Campbell-Cochrane habit model, government interventions that destroy part of the endowment can improve welfare. Alesina and Perotti (1996) show empirically that high income inequality causes socio-political instability. High inequality leads to political instability also in the model of Acemoglu and Robinson (2001). Note that the first era of globalization ended during World War I (O'Rourke and Williamson, 2001; James, 2001).

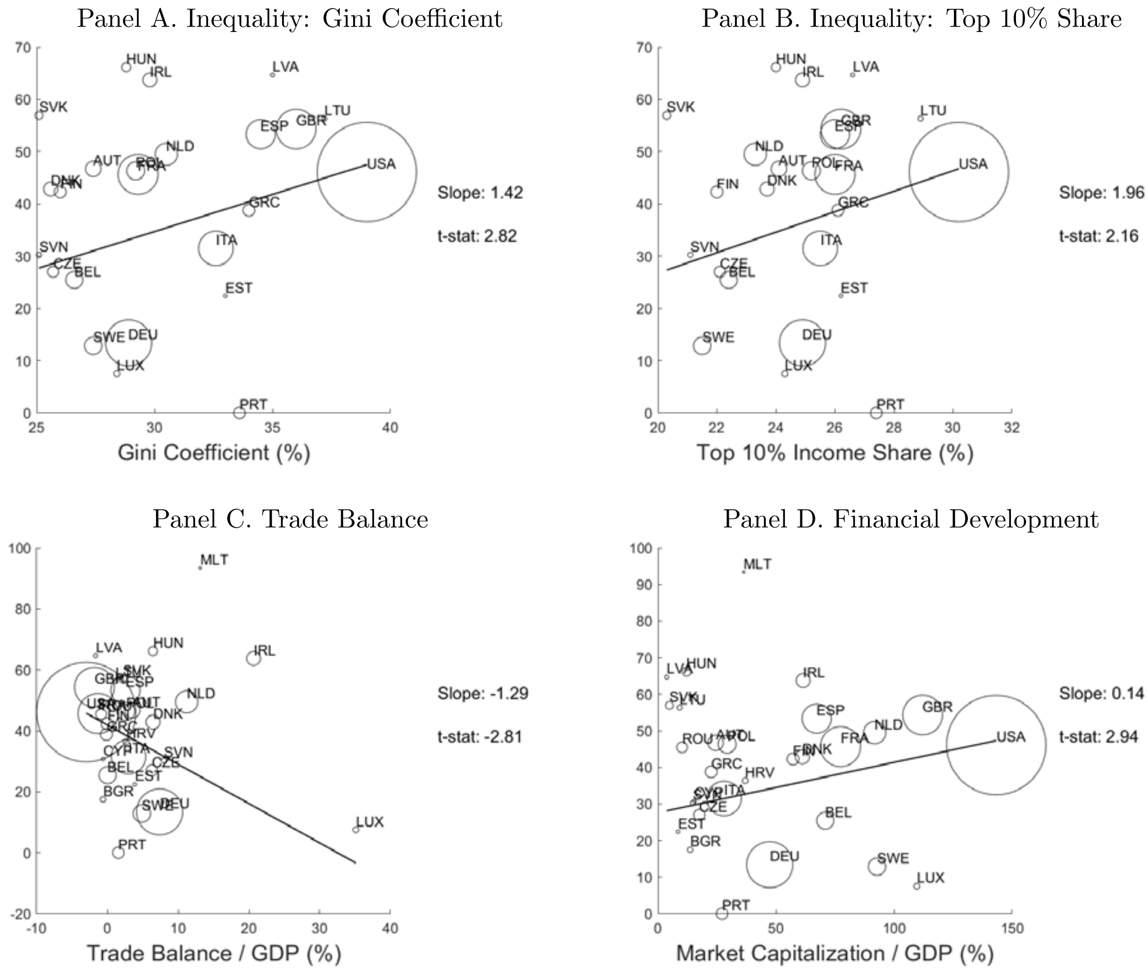

Figure 1. Vote Share of Nationalist Parties. This figure plots the election vote share of the parties we classify as nationalist, in percent. For each country, we use either the most recent national parliamentary election as of January 1, 2017 or the same country's May 2014 European Parliament election, whichever occurs later. The vote share is plotted against country-level measures of the Gini coefficient of disposable net income (Panel A), the share of income going to the top 10% of earners (Panel B), trade balance as a fraction of GDP (Panel C), and the ratio of stock market capitalization to GDP (Panel D). The circle around each country's observation has an area proportional to the country's GDP. The slope and its t-statistic are from the GDP-weighted cross-country regression.

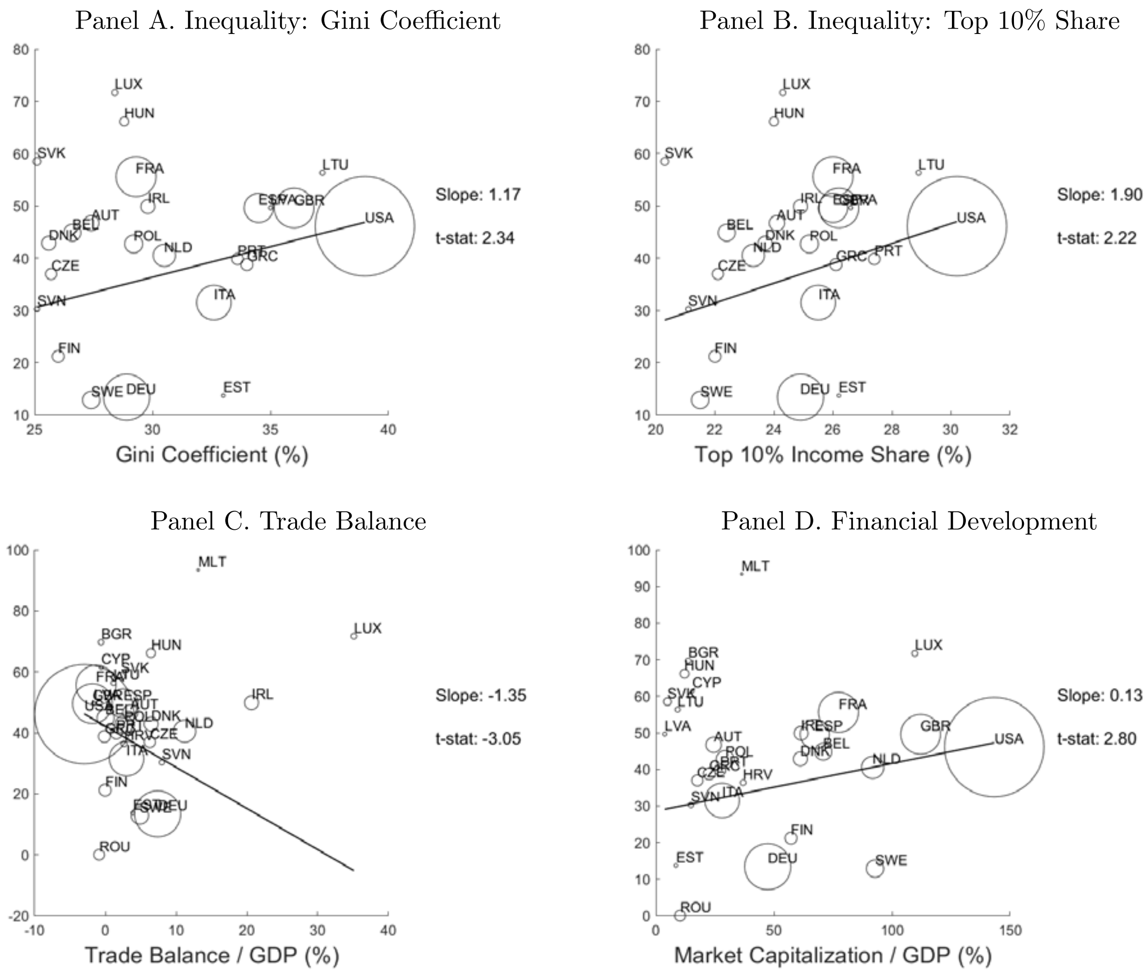

Figure 2. Vote Share of Anti-Immigrant Parties. This figure plots the election vote share of the parties we classify as anti-immigrant, in percent. For each country, we use either the most recent national parliamentary election as of January 1, 2017 or the same country's May 2014 European Parliament election, whichever occurs later. The vote share is plotted against country-level measures of the Gini coefficient of disposable net income (Panel A), the share of income going to the top 10% of earners (Panel B), trade balance as a fraction of GDP (Panel C), and the ratio of stock market capitalization to GDP (Panel D). The circle around each country's observation has an area proportional to the country's GDP. The slope and its t-statistic are from the GDP-weighted cross-country regression.

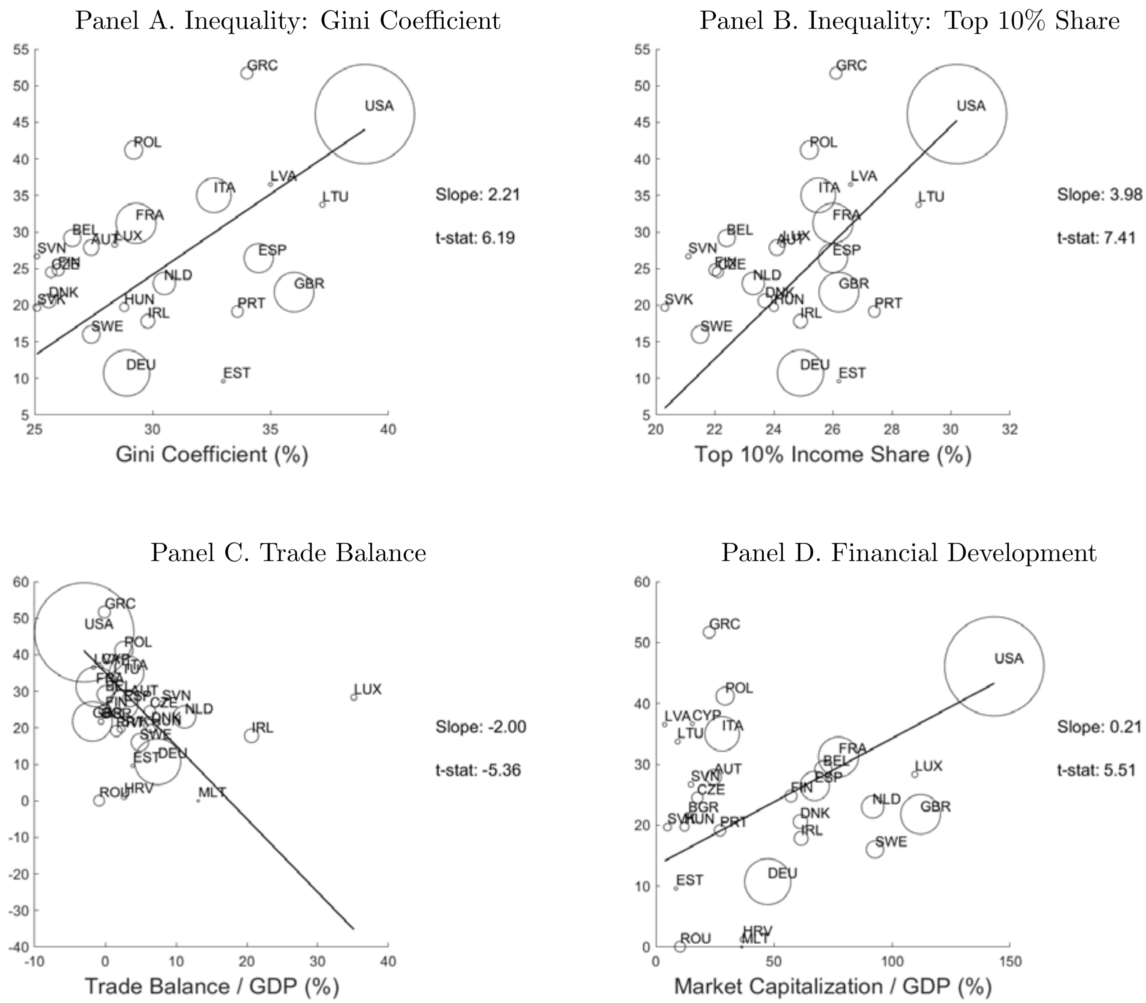

Figure 3. Vote Share of Anti-Elite Parties. This figure plots the election vote share of the parties we classify as anti-elite, in percent. For each country, we use either the most recent national parliamentary election as of January 1, 2017 or the same country's May 2014 European Parliament election, whichever occurs later. The vote share is plotted against country-level measures of the Gini coefficient of disposable net income (Panel A), the share of income going to the top 10% of earners (Panel B), trade balance as a fraction of GDP (Panel C), and the ratio of stock market capitalization to GDP (Panel D). The circle around each country's observation has an area proportional to the country's GDP. The slope and its t-statistic are from the GDP-weighted cross-country regression.

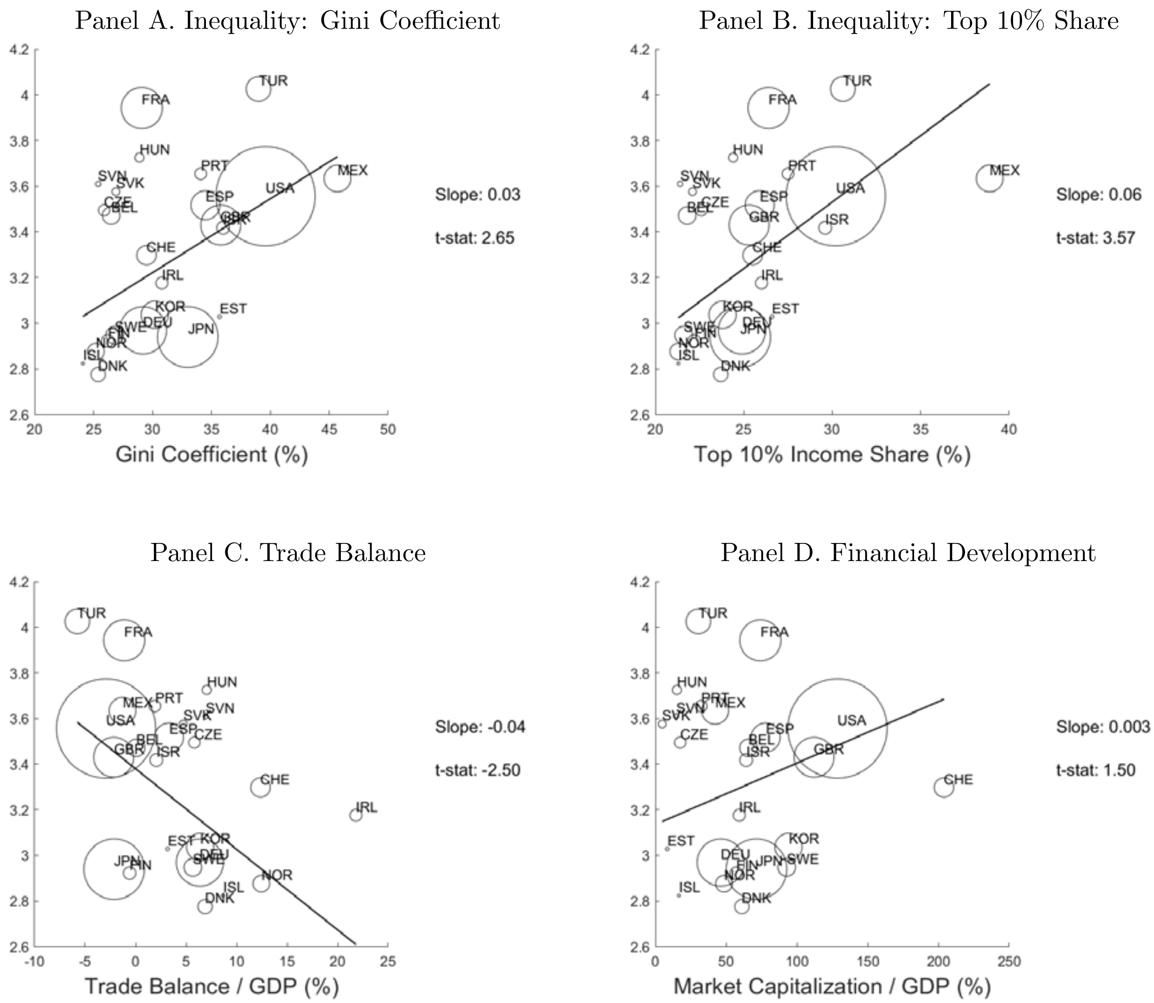

Figure 4. Support for Protectionism. This figure plots the extent to which the country's respondents in the 2013 ISSP survey agree with the statement "Country should limit the import of foreign products." The survey responses range from 1 to 5, with 5 indicating "agree strongly" and 1 "disagree strongly," so that a higher score indicates stronger support for protectionism. The country-level score is the average of all individual responses in the country. This score is plotted against country-level measures of the Gini coefficient of disposable net income (Panel A), the share of income going to the top 10% of earners (Panel B), trade balance as a fraction of GDP (Panel C), and the ratio of stock market capitalization to GDP (Panel D). The circle around each country's observation has an area proportional to the country's GDP. The slope and its t-statistic are from the GDP-weighted cross-country regression.

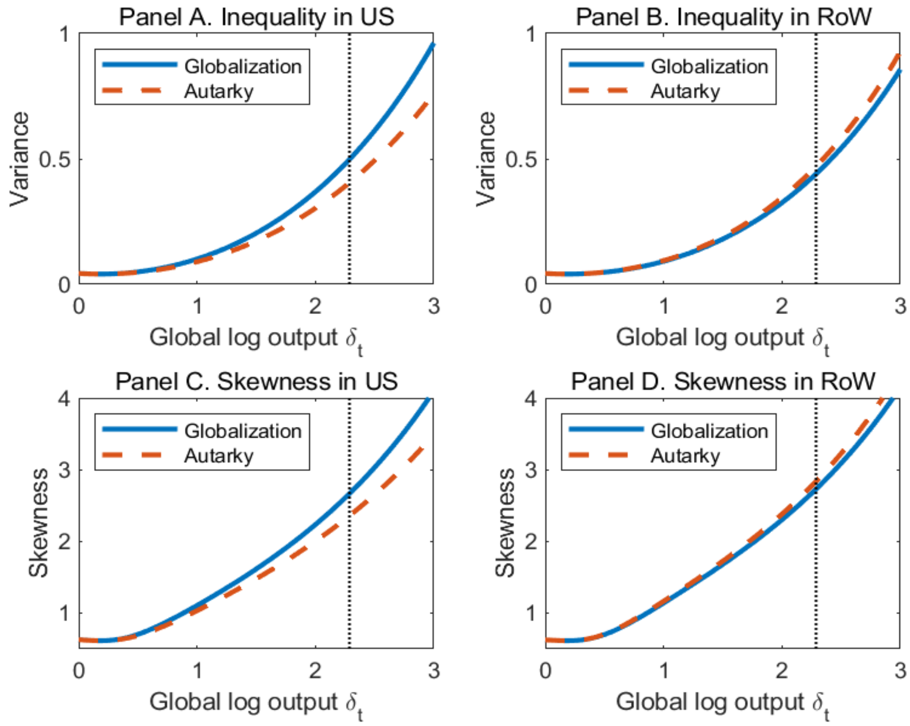

Figure 5. Inequality and Skewness of the Consumption Distribution. This figure plots V_t^k and S_t^k as a function of δ_t for $k \in \{US, RoW\}$, under globalization (solid line) and autarky (dashed line).

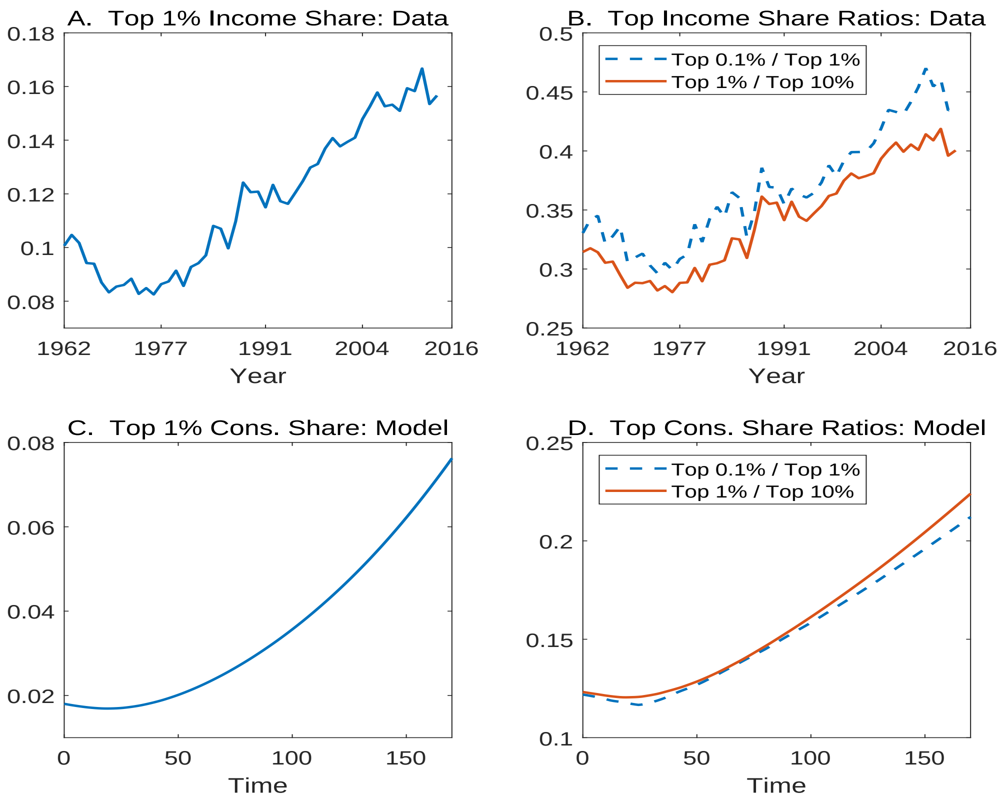

Figure 6. Top Shares and Their Ratios: Data vs. Model. Panel A plots the annual time series of the top 1% income share in the U.S. Panel B plots the time series of top income share ratios, namely top 1% to top 10% (solid line) and top 0.1% to top 1% (dashed line), in the U.S. Both series are based on income net of taxes and transfers from the World Inequality Database. Panels C and D plot analogous quantities for equilibrium consumption shares generated under the expected path from our model (i.e., setting $dZ_t = 0$ in equation (6)).

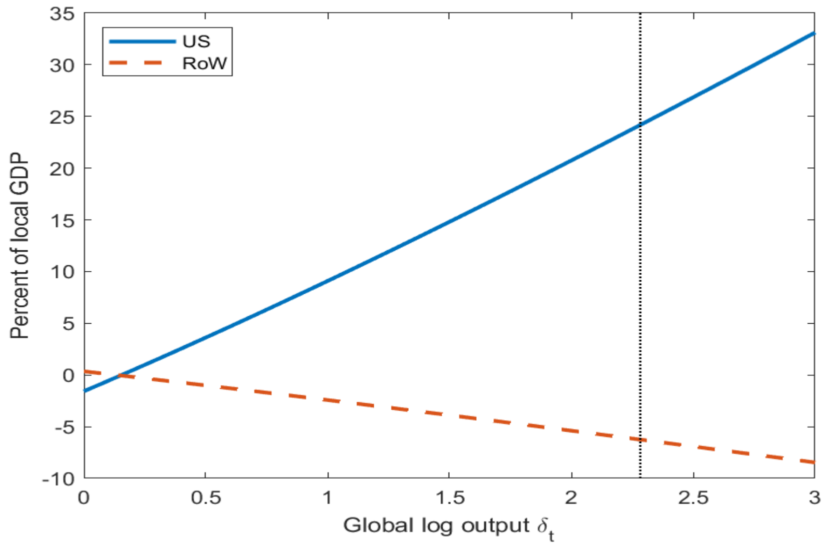

Figure 7. Trade Deficit. This figure plots the trade deficits of the two countries, as a percentage share of local GDP, against δ_t.

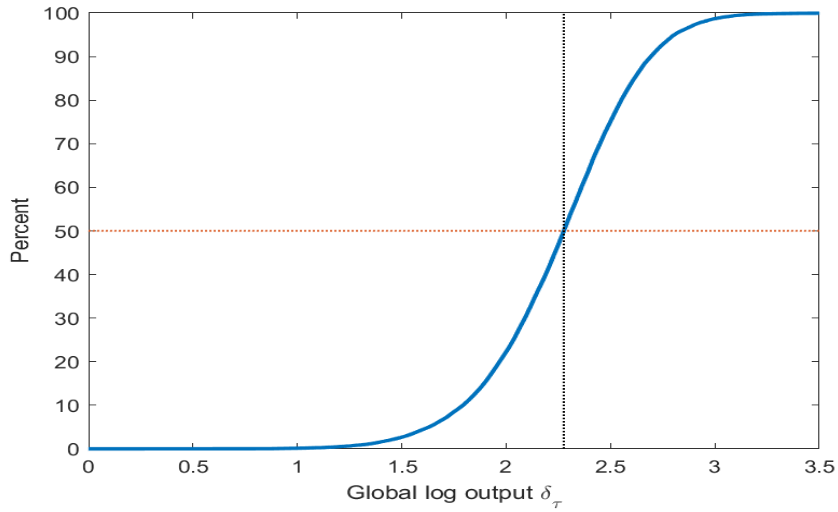

Figure 8. The Populist Vote Share. This figure plots the fraction of U.S. agents voting for the populist candidate, in percent. The vertical line denotes $\bar{\delta}$ from Proposition 5.

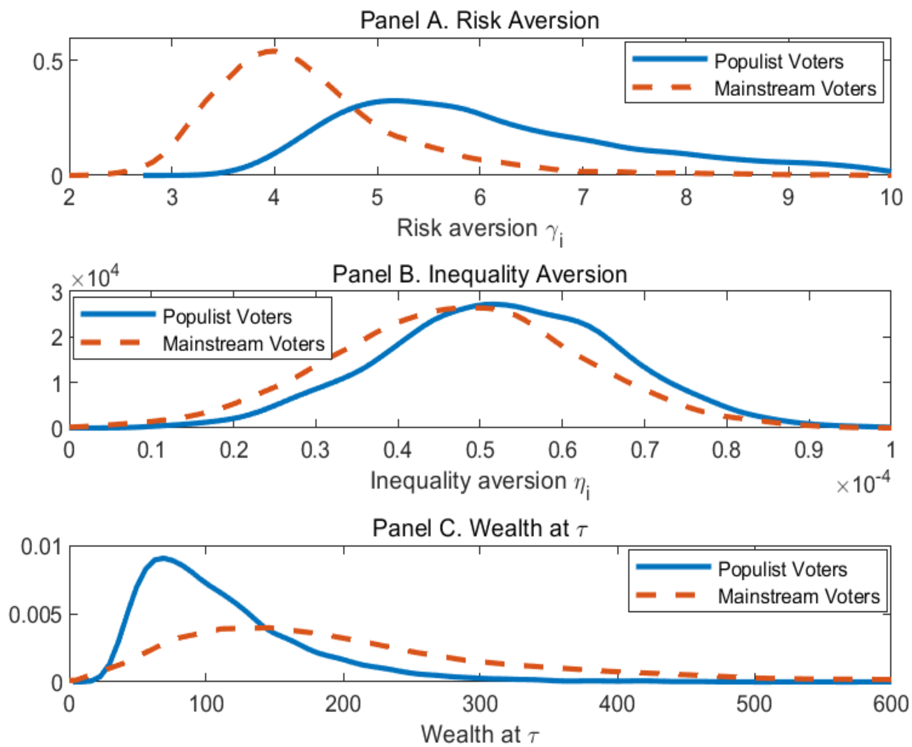

Figure 9. Characteristics of Populist and Mainstream Voters. This figure plots the distributions of γ_i (Panel A), η_i (Panel B), and wealth at the time of the election (Panel C) across populist voters (solid line) as well as mainstream voters (dashed line).

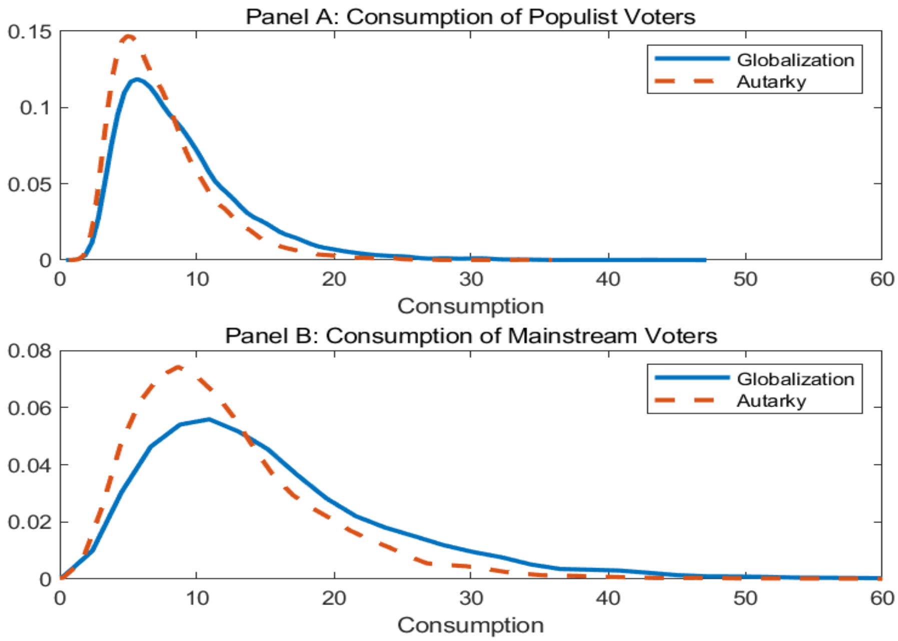

Figure 10. The Distribution of Consumption. This figure plots the distribution of consumption at time τ across populist voters (Panel A) and mainstream voters (Panel B) under two regimes: globalization (solid line) and autarky (dashed line). The value of δ_τ is such that one half of U.S. agents favor each regime.

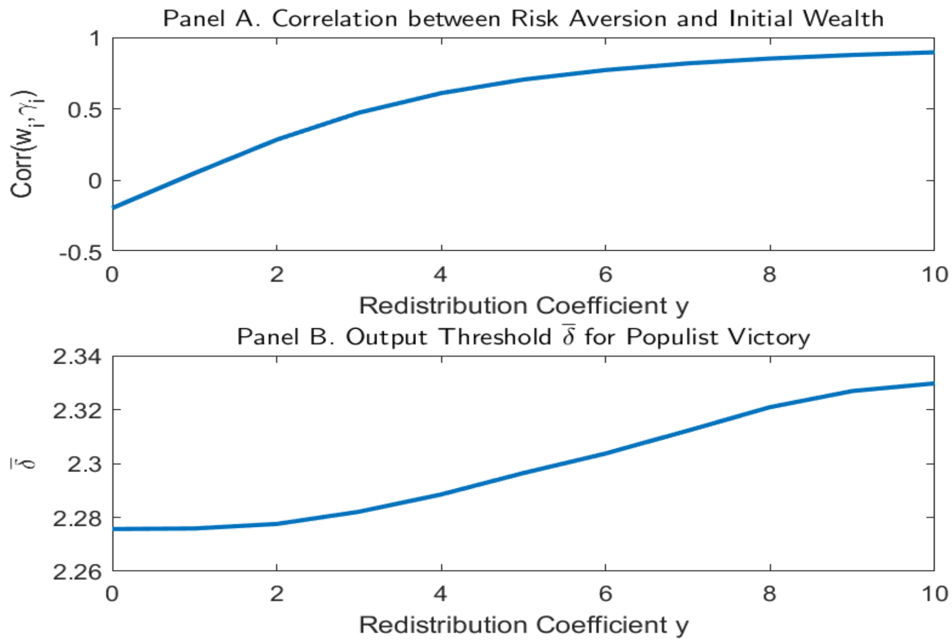

Figure 11. The Effects of Redistribution. This figure plots the correlation between risk aversion γ_i and initial endowment w_i across U.S. agents (Panel A) and the threshold $\overline{\delta}$ from Proposition 5 (Panel B) for different values of the redistribution coefficient y.

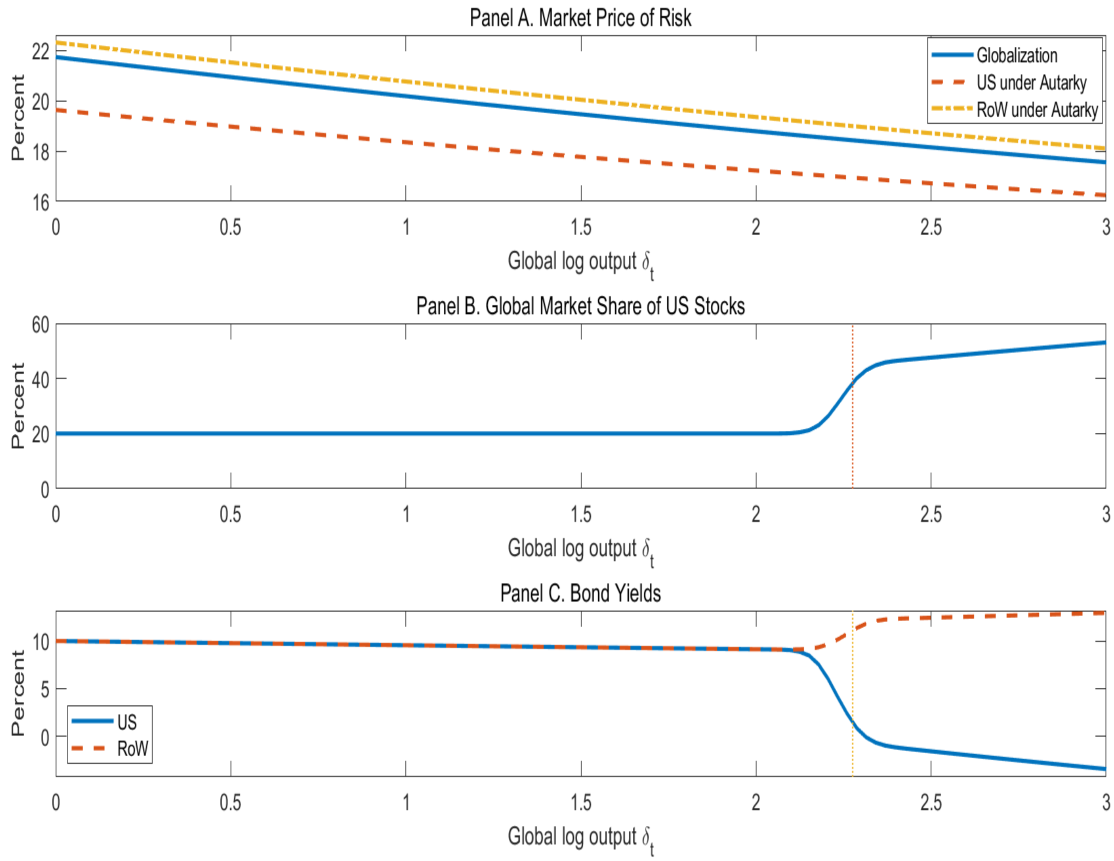

Figure 12. Asset Pricing Implications. This figure plots asset pricing quantities as a function of δ_t at time $t = \tau - 2$ years. Panel A plots the market prices of risk, σ_π^{US} and σ_π^{RoW}, under globalization (solid line) and under autarky (dashed and dash-dot lines, respectively). Panel B plots the global market share of U.S. stocks, $P_t^{US}/(P_t^{US} + P_t^{RoW})$. Panel C plots the yields on U.S. and RoW 10-year zero-coupon bonds. The vertical line in Panels B and C denotes the threshold $\overline{\delta}$ from Proposition 5.

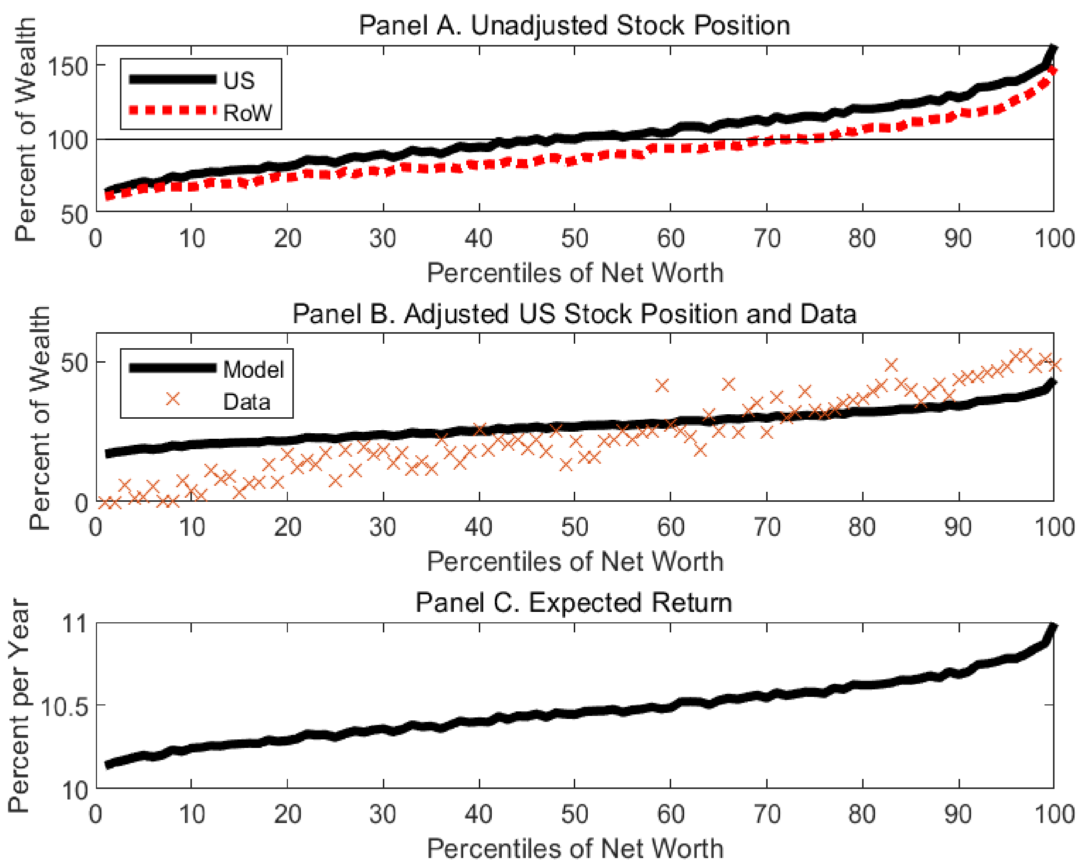

Figure 13. Portfolio Holdings and Expected Returns. Panel A plots model-implied distributions of the proportion of wealth invested in equity, for both U.S. agents and RoW agents. Panel B plots equity positions adjusted for leverage and taxes, along with the corresponding positions from the data, both for U.S. agents. The latter positions correspond to Figure 8 in Guiso and Sodini (2013), except that we plot percentiles rather than deciles. We thank Paolo Sodini for sharing the percentile data. Panel C plots model-implied expected portfolio returns. In all three panels, we condition on $\delta_t = 1$, and all quantities are plotted as functions of agents' net worth, expressed in percentiles.

Table 1
Elections in Our Sample

This table reports the dates of the national elections in our sample. For each country, we use its most recent national election as of January 1, 2017 as long as it occurred in or after May 2014. If the national election occurred before May 2014, we replace it by the May 2014 European Parliament election in the same country.

Country	National Election Date	European Parliament Election Used? (Y/N)
Austria	2013-09-29	Y
Belgium	2014-05-25	N
Bulgaria	2014-10-05	N
Croatia	2016-09-11	N
Cyprus	2016-05-22	N
Czech Republic	2013-10-25	Y
Denmark	2015-06-18	N
Estonia	2015-03-01	N
Finland	2015-04-19	N
France	2012-06-17	Y
Germany	2013-09-22	Y
Greece	2015-09-20	N
Hungary	2014-04-06	Y
Ireland	2016-02-26	N
Italy	2013-02-25	Y
Latvia	2014-10-04	N
Lithuania	2016-10-09	N
Luxembourg	2013-10-20	Y
Malta	2013-03-09	Y
Netherlands	2012-09-12	Y
Poland	2015-10-25	N
Portugal	2015-10-04	N
Romania	2016-12-11	N
Slovakia	2016-03-06	N
Slovenia	2014-07-13	N
Spain	2016-06-26	N
Sweden	2014-09-14	N
United Kingdom	2015-05-07	N
United States	2016-11-08	N

Table 2
Distribution of Risk Aversion

This table shows selected percentiles of three distributions of risk aversion across agents. Columns 2 and 3 show the distributions in the model, for the U.S. and RoW, respectively. Column 4 shows the empirical distribution estimated by Calvet et al. (2019). We thank Paolo Sodini for sharing these percentiles.

	Risk Aversion		
Percentile	U.S.	RoW	Data
1	2.97	3.23	2.80
5	3.34	3.70	3.77
10	3.60	4.01	4.22
25	4.12	4.69	4.70
50	4.92	5.67	5.11
75	6.02	6.98	5.52
90	7.39	8.35	5.96
95	8.28	9.02	6.27
99	9.48	9.77	9.40

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