A Model of Global Firms and Capital Markets*

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Abstract

We develop a general-equilibrium model of the global economy that integrates heterogeneous firms competing in product markets with countries that allocate capital around the world. Combining a hedonic demand system on the product side with a mean-variance portfolio system on the asset side, we obtain almost closed-form solutions for the equilibrium of the model. We use firm-level data on balance sheets, geographic breakdowns of revenue and employment, and business descriptions along with country-level data on bilateral equity holdings and trade costs to quantify the model to a cross section of roughly 23,000 listed firms in 48 countries. We use the model to evaluate the reallocation and welfare effects of globalization. Both financial and trade liberalization concentrate activity among the largest firms and raise welfare, with gains being larger in emerging and mid-sized open economies respectively. Product- and capital-market frictions amplify each other, meaning that liberalizing one market reduces the gains from liberalizing the other.

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1 Introduction

The world has unambiguously become more globalized over the past decades. Increasing economic integration is observed in both product and capital markets, with firms selling their products in global markets and sourcing their capital internationally. Product and capital markets are deeply intertwined, as developments in capital markets affect the allocation of inputs to production and developments in product markets affect investors' incentives to allocate capital. The international trade literature has built rich theories of how firms operate in integrated product markets, but typically either ignores the supply of capital that finances production or treats it as the residual that balances trade in goods. The international finance literature has built rich theories of how investors allocate portfolios across countries, but typically aggregates firms within a country into a representative producer.

Our goal in this paper is to develop a new framework that speaks to both dimensions of globalization at the firm level. We build a general-equilibrium model of product market competition and international asset pricing, where heterogeneous firms interact simultaneously in global product and capital markets. We quantify the model to a broad cross section of worldwide publicly traded firms with an extensive data collection effort that tracks firms' diverse geographical footprints and positions in the product market space. We use the model to study the reallocation and welfare consequences of removing product- and capital-market frictions. Both liberalizations concentrate activity among the largest firms and cause smaller firms to reduce their economic activity. The observed equilibrium in global capital markets is closer to financial autarky than to an equilibrium that would emerge under financial liberalization, and so there are significant welfare gains from further liberalizing capital markets. There are also welfare gains from eliminating tariffs and non-tariff measures that impede trade in product markets. Financial liberalization raises welfare more in emerging markets than in developed economies, and trade liberalization raises welfare more in mid-sized open economies. Importantly, we find that product- and capital-market frictions amplify each other, meaning that liberalizing one market reduces the welfare gains from liberalizing the other.

The model economy consists of households, domestic non-traded firms, global firms competing in product markets, and country-level investors allocating wealth between equity and a risk-free asset. The framework integrates two classic theoretical traditions in a way we describe as Markowitz-Sharpe meets Lancaster-Rosen. On the goods side, quadratic preferences over differentiated products admit a hedonic-characteristics microfoundation in the spirit of Lan-

caster (1966) and Rosen (1974), generating variable demand elasticities and rich cross-product substitution patterns. On the capital side, country-level investors have mean-variance preferences in the tradition of Markowitz (1952) and Sharpe (1964), choosing international portfolios. Capital markets affect production decisions, as part of the equity supplied by investors becomes physical capital. Product markets affect investment decisions, as investors tend to allocate more wealth to firms with higher profit margins.

The economy is competitive and subject to only two frictions. Trade frictions, such as tariffs, non-tariff measures, and shipping costs, raise the cost of products that cross borders. Financial frictions, such as capital controls and other barriers to cross-border investment, lower the returns of assets that are invested abroad. In general equilibrium, capital markets for firms' equity, product markets for firms' products, domestic labor markets, and domestic goods markets clear simultaneously. Combined with an outside good that enters linearly in utility, Leontief production by global firms, and a domestic non-traded sector with decreasing returns, the equilibrium reduces to a fixed point in country wages, with all firm-level prices, quantities, production inputs, profit shares, equity, and expected returns solved for in closed form.

The quantification of the model rests on an extensive data construction effort that combines firm-level and country-level sources. We obtain firms' staff costs, market capitalization, profits, and physical capital from balance sheet data. We measure the geographic footprint of each firm along two dimensions: the distribution of its revenues across countries and the distribution of its workforce across countries, so that the model captures global firms that both sell and hire around the world. We build a matrix of product similarity across firms from a textual analysis of firms' business descriptions and a variance-covariance matrix of equity returns from stock returns. We use recent advances in the measurement of bilateral cross-border equity and bond holdings restated on a nationality basis and construct bilateral trade frictions that combine tariffs, non-tariff measures, and shipping costs from independent sources. Country-level aggregates on population, employment, wages, and price levels complete the dataset. Our model covers 48 countries, approximately 23,000 publicly listed firms, almost six billion consumers, and 200 trillion dollars of household wealth in 2023.

We quantify the model in two steps. We first measure as many objects as possible directly from the data, so that the calibrated model reproduces, firm by firm, the observed cross section of profits, capital, employment, equity, revenues, and the geographic breakdown of revenues, together with country-level wages, employment, and non-traded prices. We then use the equilib-

rium conditions of the model to recover the objects that are not directly observed: the expected return on each firm's equity, the matrix of bilateral financial frictions, firm-level productivities and product demand, and country-level preference and productivity shifters. Owing to the closed-form solutions, our identification is transparent. Given a variance-covariance matrix of equity returns estimated from the data, the amount of equity that investors hold in their own country's firms pins down expected returns under the assumption that investors face no friction at home. The remaining, cross-border equity positions then pin down the bilateral financial frictions. Product substitution parameters and trade costs are measured outside the model, which allows us to back out each country's demand shifters for each firm. By construction, the quantified model matches the firm-level and country-level data perfectly.

We use the model to evaluate the consequences of liberalizing global capital and product markets. We find significant differences across firms in their responses to liberalizing either market. Larger firms expand their economic activity as they benefit from a lower financing cost from abroad or a lower cost of selling goods across borders. Smaller firms also benefit from lower international frictions, but, in equilibrium, they contract their economic activity as they face more intense competition from larger firms. Thus, the liberalized world features a larger concentration of economic activity among the larger firms. The model generates divergent outcomes across firms, because it features a rich set of interdependencies across firms, which operate through the variance-covariance matrix of equity returns on the asset side and the product substitution matrix on the goods side. Without these elements, firms would respond more homogeneously. The lesson is that the reallocation effects of openness are sensitive to the underlying details of the competition in product and capital markets.

Turning to aggregates, eliminating international financial frictions generates a welfare gain of almost 6 percent of labor income for the median country, with a range among large economies from roughly 3 percent in the United States to 10 percent in India. These gains accrue mainly through cheaper access to the products of global firms in emerging economies and through higher portfolio returns in most advanced economies. Moving from financial autarky to the observed level of financial integration generates only small welfare changes, because the estimated bilateral financial frictions keep the world close to autarky on the cross-border equity dimension. Trade liberalization, which eliminates tariffs and non-tariff measures, generates welfare gains of almost 4 percent for the median country, with the gains being smaller in large and advanced economies and larger in mid-sized open economies.

A contribution of our paper is to highlight the interaction of frictions in the product and capital markets. The welfare gains from liberalizing either market are smaller once the other market has already been liberalized. Thus, product- and capital-market frictions amplify each other. Our model generates a joint role for both frictions because both trade and finance serve important roles in the utility from consuming goods. Trade frictions raise the price of imports and reduce the surplus from consuming imported varieties. Financial frictions also reduce this surplus by restricting capital flows to exporters of goods. For high-income countries, welfare gains from liberalizing one market increase by almost 10 percent when both frictions are present relative to the gains predicted when liberalizing one market in the absence of frictions in the other. For lower-income countries, the gap in the welfare gains is substantially larger, because larger home biases in both goods and asset markets imply that product- and capital-market frictions reinforce one another in a stronger way than in higher-income countries. For these countries, the welfare gain from removing capital-market frictions is almost 30 percent larger and the gain from removing product-market frictions is around 45 percent larger, relative to a counterfactual in which the other friction has already been eliminated.

Our work contributes to various strands of the literature. On the product side, our preferences over horizontally differentiated products build on the hedonic tradition of Lancaster (1966) and Rosen (1974), as extended by Epple (1987) and Pellegrino (2025) with a quadratic specification. On the empirical side, we build on Pellegrino (2025), who uses firm-level textual analysis of business descriptions in the spirit of Loughran and McDonald (2011) and Hoberg and Phillips (2016) to construct the matrix of product similarities for U.S. listed firms. We contribute to this literature by applying the hedonic demand system to a cross section of approximately 23,000 listed firms in 48 countries that features roughly half a billion cross-demand elasticities. Our open-economy model with variable elasticities of demand connects to a tradition in international trade including Neary (2003), Atkeson and Burstein (2008), and Melitz and Ottaviano (2008). Our firm-level reallocation results also connect to the tradition of heterogeneous firms pioneered by Melitz (2003), in which opening to trade reallocates activity from less to more productive firms. Our reallocation operates through variable demand elasticities and bilateral capital flows rather than fixed export costs and selection.

On the asset side, we adopt the mean-variance framework of Markowitz (1952), Tobin (1958), and Sharpe (1964), recently revived in international macroeconomics by Gabaix and Maggiori (2015), Maggiori (2017), and Itskhoki and Mukhin (2021). Our data on bilateral cap-

ital holdings come from the Global Capital Allocation Project of Coppola, Maggiori, Neiman, and Schreger (2021). We are closest to a growing literature that uses portfolio demand systems to understand global asset positions. Kleinman, Liu, Redding, and Yogo (2026) embed bilateral capital frictions into a multi-country neoclassical growth model and Koijen and Yogo (2026) derive exchange rates and asset prices from a global asset demand system. Jiang, Richmond, and Zhang (2024) develop a portfolio approach to global imbalances, Pellegrino, Spolaore, and Wacziarg (2025) use a demand-system approach to study barriers to global capital allocation, and Capelle and Pellegrino (2025) use a demand system to quantify country-level wedges in cross-border investment. Our framework generally differs in three respects. First, we work at the level of individual firms rather than country aggregates, and we obtain the cross section of demand elasticities, expected equity returns, and profit shares jointly from the same equilibrium. Second, the model recovers a firm-by-country matrix of bilateral financial frictions that rationalizes observed equity portfolios, generalizing the home-bias adjustment used in standard international finance models. Third, we evaluate trade and financial frictions jointly.

Our framework can be read as a two-period production-based asset pricing model in the tradition of Cochrane (1991) and Liu, Whited, and Zhang (2009). Here, expected equity returns reflect household-level primitives, such as preferences for products and demand elasticities, firm-side primitives, such as productivities and leverage, and investor-side primitives, such as risk aversion, wealth, and financial frictions. Expected equity returns are related to firms' profit shares or markups. Our model therefore contrasts with standard imperfect-competition frameworks in which markups depend only on the elasticity of demand. The view that markups embed more than market power resonates with recent macro-finance work. For example, David, Schmid, and Zeke (2022) emphasize the role of risk in capital allocation across firms, Eeckhout and Veldkamp (2024) focus on the role of firms' data stocks, and Di Tella, Malgieri, and Tonetti (2025) show that markups reflect compensation for risk.

Finally, the paper relates to the literature that quantifies the welfare gains from openness. Our welfare gains from trade liberalization are not directly comparable to the welfare gains predicted by standard trade frameworks in the spirit of Arkolakis, Costinot, and Rodríguez-Clare (2012), because we remove tariffs and non-tariff barriers, but hold constant shipping costs and home-biased preferences that lead to low levels of trade flows. More directly comparable to the trade literature, our model generates a trade elasticity of around -4. The international finance literature has not yet converged on a central estimate for the gains from openness.

Our welfare gains when moving from the observed equilibrium to financial liberalization are somewhat higher than some earlier estimates that we review later. Kleinman, Liu, Redding, and Yogo (2026), however, find significant welfare gains when moving from a closed economy in both goods and capital markets to the observed equilibrium, with a median gain of around 15 percent. These gains partly reflect the dynamic capital- and wealth-accumulation channels that operate along the transition path to a new steady state, which are absent from our static model. Conversely, our framework features product and portfolio reallocations across firms, which are absent in their representative-firm framework, and thus our welfare gains mostly come from improvements in consumers' surplus from variety, which complements the mechanism highlighted by Kleinman, Liu, Redding, and Yogo (2026).

2 The Model

The world consists of I countries denoted by $i = 1, \ldots, I$. Each country is populated by a measure P_i of households, a representative investor that allocates household wealth across assets, and a representative domestic firm that hires labor and sells only locally. The world is populated by J global firms, denoted by $j = 1, \ldots, J$, which are financed by investors, hire labor, and sell output worldwide. An outside, freely traded good serves as the numeraire. The economy is competitive, meaning that households, investors, domestic firms, and global firms are price-takers in all markets.

2.1 Households

A representative household in country i has preferences over consumption of goods produced by global firms, q_{ji}, the outside traded good, m_i, and the domestically-produced good, n_i, as well as disutility from labor supply, ℓ_i. All lowercase choice variables of the household are in per-capita terms. The household maximizes the utility function:

$$\max_{\{q_{ji}\},m_i,n_i,\ell_i} u_i = P \sum_j \left(b_{ji}\, q_{ji} - \frac{q_{ji}^2}{2} - \sum_h \frac{\sigma_{jh}\, q_{ji}\, q_{hi}}{2} \right) + m_i + \bar{n}_i \frac{n_i^{1-1/\psi} - 1}{1 - 1/\psi} - \bar{\ell}_i^{-1/\varepsilon} \frac{\ell_i^{1+1/\varepsilon}}{1 + 1/\varepsilon}, \tag{1}$$

where $P = \sum_i P_i$ is world population.[1]

[1]The constant P scales per-capita preferences by world population in a convenient way, because it makes aggregate demand for global goods independent of the size of the world economy.

The first term in the utility function (1) captures the consumption of differentiated goods produced by global firms. Parameter $b_{ji} > 0$ is a country-specific preference shifter for the product of firm j, while $\sigma_{jh} = \sigma_{hj} \geq 0$ is an index of substitution between the products of firms j and h. The quadratic specification can be derived from hedonic preferences over a set of underlying product characteristics, as in Pellegrino (2025).[2] In this microfoundation, σ_{jh} is proportional to the cosine similarity of the vectors that contain the common characteristics of firms j and h. Parameter σ_{jh} is zero for products with no overlap in the common characteristics and equal to parameter $\alpha > 0$ for identical products.[3]

Preferences over the outside traded good, m_i, are quasi-linear, which allows us to maintain tractability in our analyses as there are no income effects on the demand for global goods. Preferences over the domestic good, n_i, are of the constant-elasticity form, where $\bar{n}_i > 0$ is a country-specific preference shifter and $\psi > 0$ is the elasticity of demand for domestic goods. The disutility of labor supply, ℓ_i, is also of the constant-elasticity form, where $\bar{\ell}_i > 0$ is a country-specific preference shifter and $\varepsilon > 0$ is the elasticity of labor supply.

The household allocates its resources across the global goods, q_{ji}, the outside good, m_i, and the domestic good, n_i. The budget constraint is

$$\sum_j (1 + \tau_{ji})\, p_j\, q_{ji} + m_i + p_{ni}\, n_i \;=\; w_i\, \ell_i + \pi_{ni} + (1 + r_i)\, \bar{e}_i, \tag{2}$$

where τ_{ji} is an iceberg-type trade cost of delivering good j to country i and p_j is the producer price of good j. In our quantitative analyses, we consider tariffs, non-tariff measures, and shipping costs as parts of τ_{ji}. The price of the outside traded good is one and the price of the domestic good is p_{ni}. The household derives resources from labor income, $w_i \ell_i$, profits of the domestic firm, π_{ni}, returns from investments, $r_i \bar{e}_i$, and its wealth endowment, $\bar{e}_i$, which is denominated in units of the outside good. The household takes the wage, w_i, and the portfolio return, r_i, as given.

[2] Apart from the open-economy focus of this paper, there are other modeling differences relative to Pellegrino (2025). For example, our model features heterogeneity in consumers, capital markets that finance firms, and general equilibrium that determines the prices of non-traded goods, labor, and capital.

[3] Output q_j from firm j has one idiosyncratic characteristic and K common characteristics encoded in the vector $\mathbf{a}_j = [a_{1j}, \ldots, a_{Kj}]'$, normalized so that $\sum_k a_{kj}^2 = 1$. Household's i consumption of characteristic k is $x_{ki} = \sum_j a_{kj}\, q_{ji}$. Quadratic hedonic preferences over common and idiosyncratic characteristics yield the utility component in (1) with $b_{ji} = \alpha \sum_k a_{kj}\, b_{ki}^x + (1-\alpha)\, b_{ji}^q$, where b_{ki}^x and b_{ji}^q are preference shifters over common and idiosyncratic characteristics, and substitution coefficients $\sigma_{jh} = \alpha\,(\mathbf{a}_j' \mathbf{a}_h - \mathbf{I}_{j=h}) \in [0, \alpha]$. In matrix form, the utility component over global firms' products is $P\big(\mathbf{q}_i' \mathbf{b}_i - \frac{1}{2} \mathbf{q}_i' \big[\mathbf{I} + \alpha(\mathbf{A}'\mathbf{A} - \mathbf{I})\big] \mathbf{q}_i\big)$, where $\mathbf{A}$ is the $K \times J$ matrix that stacks the characteristic vectors, $\mathbf{A}'\mathbf{A}$ collects the cosine similarities between products, and $\alpha \in [0, 1]$ governs the degree of horizontal differentiation. We discuss this microfoundation in detail in Appendix A.1.

The first-order condition for the household's optimal choice of q_{ji} yields a linear inverse demand function,

$$(1+\tau_{ji})\,p_j \;=\; P\left(b_{ji} - q_{ji} - \sum_h \sigma_{jh}\,q_{hi}\right), \tag{3}$$

which holds for every country i and every firm j. We derive the global demand for firm j by summing households' demands across countries. Let $q_j \equiv \sum_i P_i\,q_{ji}$ be the global output of firm j, $b_j \equiv \sum_i P_i\,b_{ji}$ be the global preference shifter, and $1+\tau_j \equiv \sum_i P_i\,(1+\tau_{ji})/P$ be the population-weighted trade cost that firm j faces. Demand for firm j is $q_j = b_j - (1+\tau_j)p_j - \sum_h \sigma_{jh}q_h$. Stacking these equations into the $J\times 1$ vectors $\mathbf{q}$, $\mathbf{b}$, $\boldsymbol{\tau}$, and $\mathbf{p}$, the global demand system is written compactly as

$$\mathbf{q} \;=\; (\mathbf{I}+\boldsymbol{\Sigma})^{-1}\big(\mathbf{b} - (\mathbf{1}+\boldsymbol{\tau})\circ\mathbf{p}\big), \tag{4}$$

where $\boldsymbol{\Sigma}$ is the $J\times J$ substitution matrix that collects the product substitution coefficients σ_{jh}, $\mathbf{I}$ is the identity matrix, and $\circ$ denotes the Hadamard product that multiplies entry by entry two matrices of the same size.

The system in equation (4) generates variable elasticities of demand that depend on firm size and product substitution. Differentiating (4) with respect to the consumer price of firm h, we obtain the cross-price elasticity

$$\epsilon_{jh} \;\equiv\; \frac{\partial q_j}{\partial\big[(1+\tau_h)\,p_h\big]}\frac{(1+\tau_h)\,p_h}{q_j} \;=\; -\frac{(1+\tau_h)\,p_h}{q_j}\,\big[(\mathbf{I}+\boldsymbol{\Sigma})^{-1}\big]_{jh}. \tag{5}$$

Equation (5) implies that larger firms face a less elastic demand. Depending on the off-diagonal entries of $(\mathbf{I}+\boldsymbol{\Sigma})^{-1}$, products of different firms can be either substitutes or complements. Inverse cross-price elasticities are larger in absolute value for firms whose products are more similar, as captured by a higher σ_{jh}.

The household's demand for domestic goods is given by $n_i = (\bar{n}_i/p_{ni})^{\psi}$ and supply of labor is given by $\ell_i = \bar{\ell}_i w_i^{\varepsilon}$. The demand for outside traded goods is pinned down residually from the budget constraint (2), $m_i = w_i\ell_i + \pi_{ni} + (1+r_i)\bar{e}_i - p_{ni}n_i - \sum_j(1+\tau_{ji})p_jq_{ji}$.[4]

[4]In principle, we allow m_i to become negative and interpret $m_i<0$ as production of the outside good that is exported. For all model environments that we consider below, m_i is always positive for all countries in the baseline model with product- and capital-market frictions. Egypt, Pakistan, and Venezuela have a negative m_i in the trade liberalization counterfactual.

2.2 Domestic Firms

In each country i, a representative domestic firm produces aggregate output, N_i, of the non-traded good using only domestic labor, L_{ni}. Production exhibits decreasing returns,

$$N_i \;=\; \frac{z_{ni}}{\theta_i}\, L_{ni}^{\theta_i}, \tag{6}$$

where $\theta_i \in (0,1)$ governs country-specific returns to scale and $z_{ni} > 0$ is country-specific productivity in the domestic sector. The firm hires labor at the domestic wage, w_i, to maximize profits,

$$\max_{L_{ni}} \; \Pi_{ni} \;=\; p_{ni}\, N_i - w_i\, L_{ni}, \tag{7}$$

which yields the labor demand condition $w_i = p_{ni}\, z_{ni}\, L_{ni}^{\theta_i - 1}$. Total production is absorbed only domestically, so $N_i = P_i\, n_i$ where n_i is per-capita demand for non-traded goods. Aggregate profits Π_{ni} are rebated lump sum to households, so that per-capita profits entering the budget constraint (2) are $\pi_{ni} = \Pi_{ni}/P_i$.

2.3 Global Firms

Each global firm j takes its price, p_j, as given and produces output, q_j, using physical capital, k_j, and labor, ℓ_{ji}, hired from each country i. Physical capital is chosen by the investors, as described below.[5] The production technology is Leontief across physical capital and each country's labor input,

$$q_j \;=\; \min\left\{ z_j\, k_j,\; \frac{\ell_{j1}}{c_{j1}},\; \ldots,\; \frac{\ell_{jI}}{c_{jI}} \right\}, \tag{8}$$

where $z_j > 0$ is firm-specific capital productivity and $c_{ji} \geq 0$ is the unit labor requirement of firm j in country i.

Operating profits are given by

$$\pi_j \;=\; p_j\, q_j - \sum_i w_i\, \ell_{ji}. \tag{9}$$

[5] Modeling firms as price-takers, despite the product differentiation captured by the matrix $\mathbf{\Sigma}$, follows the hedonic-pricing tradition of Rosen (1974). When firms differ in characteristics and many firms and consumers overlap in the characteristics space, the equilibrium price function depends on the vector of common characteristics across firms and is consistent with competitive behavior. Treating k_j as given, rather than as a choice of the firm, preserves tractability because the demand and supply functions for k_j cross at a single point. Alternative formulations such as decreasing returns to labor, constant returns in ℓ and k with k chosen by the firm, or Cournot conduct with a more flexible production function either deliver intractable marginal cost expressions or generate multiple equilibria.

The firm chooses labor inputs, ℓ_{ji}, in each country, paying the local wage, w_i. Profit maximization yields the labor requirement $\ell_{ji} = c_{ji}\, q_j$. We adopt the convention that when $c_{ji} = 0$ the firm hires no labor from country i and the corresponding term ℓ_{ji}/c_{ji} is dropped from the minimum in equation (8). The required physical capital is $k_j = q_j/z_j$. Operating profits accrue to the investors who finance the firms.

We now derive the demand for physical capital as a function of the return to physical capital, $\rho_j \equiv \pi_j/k_j$. Combining the demand for each firm's output in equation (4), the definition of profits in equation (9), and the production function $q_j = z_j\, k_j$, we obtain

$$\rho_j \;\equiv\; \frac{\pi_j}{k_j} \;=\; z_j \left[\overbrace{\frac{1}{1+\tau_j}\left(b_j - z_j\, k_j - \sum_h \sigma_{jh}\, z_h\, k_h \right)}^{p_j} - \sum_i w_i\, c_{ji} \right]. \tag{10}$$

The return on physical capital, ρ_j, is decreasing in physical capital, k_j. This result comes from the dilution of profits when capital increases. The other variables that enter equation (10) shift the relationship between the physical return and physical capital. A higher trade friction, τ_j, decreases the demand for capital, because it reduces profits. A higher willingness to pay for firm j's output, b_j, increases the demand for capital, because it tends to increase the price and profits. A higher physical capital from similar competitors, k_h with $\sigma_{jh} > 0$, puts downward pressure on firm j's price and lowers the demand for its physical capital. A higher marginal cost of production, $\sum_i w_i c_{ji}$, puts downward pressure on profits and also lowers the demand for physical capital.

Next, we describe the link between physical and financial capital. Physical capital produces output, as described in the production function (8). Financial capital, e_j, refers to the equity that investors allocate to finance firm j. Financial and physical capital are linked by

$$k_j \;=\; \chi_j\, e_j, \tag{11}$$

where $\chi_j > 0$ is a firm-specific exogenous rate of transformation between physical and financial capital, also known as the book-to-market ratio or the inverse of Tobin's q. Equation (11) recognizes that the firm's physical capital can differ from its market value of equity due to factors such as financial leverage and adjustment costs.

Finally, we relate the rate of return to physical capital, ρ_j, to the rate of return on financial capital, μ_j. The latter return matters for the decision of investors to allocate equity across firms. We define μ_j as the ratio of the resources that accrue to investors to their invested

equity in firm j,

$$\mu_j \equiv \frac{\text{owners receipts}}{e_j} = \frac{\pi_j + \text{other}_j}{e_j} = \chi_j\,(\rho_j + \iota_j). \tag{12}$$

Owners receive the operating profits of the firm, π_j, as described in equation (9). The exogenous variable ι_j summarizes additional contributions to physical returns beyond operating profits that we do not explicitly model. Examples include corporate taxes, the depreciation of physical capital, the liquidation value of the firm, and valuation effects.

2.4 Investors

In each country i, a representative investor allocates aggregate household wealth, $\bar{E}_i \equiv P_i\,\bar{e}_i$, across a risk-free asset and equity in global firms. Investors have access to a risk-free technology that allows them to grow their endowment of the outside good at an exogenous return r_0. The share of wealth invested in the risk-free technology is $s_{0i} = E_{0i}/\bar{E}_i$, where E_{0i} denotes the country's total holdings of risk-free assets. A share $s_{ji} = E_{ji}/\bar{E}_i$ of wealth is invested in the equity of firm j, where E_{ji} denotes the country's total holdings of firm j's equity, with $\bar{E}_i = E_{0i} + \sum_j E_{ji}$.

Equity returns from the perspective of investor i take the form

$$r_{ji} = \underbrace{\mu_j}_{\text{constant, endogenous}} + \underbrace{\zeta_j}_{\text{random, exogenous}} + \underbrace{\delta_{ji}}_{\text{constant, exogenous}}. \tag{13}$$

The first component of the return, μ_j, is the equilibrium expected return to equity in firm j in the absence of frictions, which is determined endogenously by equations (10) and (12). The second component of the return, ζ_j, is a mean-zero random shock. This component introduces risk into investor portfolios. The variance-covariance matrix of the random shocks is the $J \times J$ matrix $\mathbf{V} \equiv \text{Var}(\boldsymbol{\zeta})$, where $\boldsymbol{\zeta} = (\zeta_1, \ldots, \zeta_J)'$.[6] The third component of the return, δ_{ji}, is a country-firm specific wedge that captures financial frictions, capital controls, international taxes, and other bilateral barriers to investment. We stack the international financial frictions into a $J \times I$ matrix $\boldsymbol{\Delta}$ that allows for arbitrary heterogeneity across investor-firm pairs.

[6] We model the effects of risk as an additive shock to firm returns, so that investor portfolios depend only on $\mathbf{V}$. Productivity shocks (z_j or c_{ji}) that affect output supply and input demand would imply that $\text{Var}(\mathbf{r}) \neq \text{Var}(\boldsymbol{\zeta})$, which would make the solution of the model intractable. We instead model risk by including an additive cash flow shock f_j that, after production and input demand are realized, changes profits to $\tilde{\pi}_j = p_j q_j - \sum_i w_i \ell_{ji} + f_j$. The after-shock rate of return becomes $\tilde{\mu}_j = \frac{\pi_j + f_j + \text{other}_j}{e_j} = \mu_j + \zeta_j$, where we assume $f_j = \zeta_j e_j$, and the rate of return to equity equals $r_{ji} = \tilde{\mu}_j + \delta_{ji} = \mu_j + \zeta_j + \delta_{ji}$.

A country's wealth at the end of the period is $(1 + r_i)\bar{E}_i$, where the portfolio return is

$$r_i = \sum_j (r_{ji} - r_0) s_{ji} + r_0. \tag{14}$$

The investor has mean-variance preferences over the portfolio return and chooses shares to

$$\max_{\{s_{ji}\}} \mathbb{E}_i(r_i) - \frac{\gamma}{2} \operatorname{Var}(r_i), \qquad \text{such that} \quad \sum_j s_{ji} + s_{0i} = 1, \tag{15}$$

where $\gamma > 0$ is the coefficient of relative risk aversion.[7]

Mean-variance preferences are a tractable workhorse for portfolio choice that goes back to Markowitz (1952), Tobin (1958), and Sharpe (1964), and have been widely applied in international finance beginning with the synthesis of Adler and Dumas (1983) and continuing with the portfolio-balance approach of Hau and Rey (2006). Mean-variance preferences have recently been revived by Gabaix and Maggiori (2015), who model intermediaries as risk-averse financiers with mean-variance preferences and use the resulting closed-form portfolio shares to study exchange rate dynamics.[8] Two features make mean-variance preferences especially attractive in our setting. First, they coincide with standard expected-utility preferences to the second order. Second, when combined with our quadratic preferences over global firms' products, they deliver a linear system of equilibrium conditions that we can solve in closed form up to the wages, for approximately $23,000$ firms and 48 countries. Without these properties, the solution for the equilibrium cross section of equity holdings, equity returns, goods prices, and goods quantities would be considerably less tractable.

The first-order conditions for the optimal shares yield closed-form expressions for the supply of equity by country i and the aggregate supply of equity to firms j,

$$P_i \, \mathbf{e}_i = (\gamma \mathbf{V})^{-1} (\boldsymbol{\mu} + \boldsymbol{\delta}_i - \mathbf{1}\, r_0)\, \bar{E}_i, \tag{16}$$

$$\mathbf{e} = \sum_i P_i \, \mathbf{e}_i = (\gamma \mathbf{V})^{-1} \big(\boldsymbol{\mu}\mathbf{1}' + \boldsymbol{\Delta} - \mathbf{1}\mathbf{1}' r_0\big)\, \bar{\mathbf{e}}, \tag{17}$$

where $\mathbf{e}_i$ is the $J \times 1$ vector of country i's per-capita equity holdings of each global firm, $\boldsymbol{\delta}_i$ is the $J \times 1$ vector with elements δ_{ji}, $\bar{\mathbf{e}} = (\bar{E}_1, \ldots, \bar{E}_I)'$ is the $I \times 1$ vector of wealth endowments across

[7] The objective is the second-order approximation of expected utility over end-of-period wealth, $(1 + r_i)\bar{E}_i$, when preferences exhibit constant relative risk aversion. Under this interpretation, γ is independent of country wealth, which is consistent with our calibration of a common γ across countries in our subsequent analyses.

[8] The mean-variance arbitrage-financier framework has since been applied to a wide range of international questions, including reserve currencies in Maggiori (2017), exchange-rate disconnect in Itskhoki and Mukhin (2021), global portfolio rebalancing in Camanho, Hau, and Rey (2022), U.S. monetary policy and global risk premia in Kekre and Lenel (2026), and the global demand system for equities and bonds in Koijen and Yogo (2026).

countries, and $\mathbf{1}$ is a conformable vector of ones. Equation (17) shows that, holding aggregate wealth fixed, equity flows to firm j are increasing in its expected excess return, $\mu_j - r_0$, loaded against firms whose returns correlate strongly with the rest of the portfolio (through $\mathbf{V}^{-1}$), and shifted by the matrix $\boldsymbol{\Delta}$ of bilateral international financial frictions.

To describe the model environment more transparently, we have separated investors, who care about mean and variance of portfolio returns, from households, who derive resources from the realized return r_i. With quasi-linear preferences, households and investors can be merged into one economic unit by endowing the household with a disutility term that depends on the variance of the portfolio, as in equation (15). When we measure welfare outcomes in our counterfactuals we adopt this interpretation.

2.5 Equilibrium

A general equilibrium of the world economy is a vector of firm-level prices $\{p_j\}_{j=1}^J$, country-level prices $\{p_{ni}, w_i\}_{i=1}^I$, expected equity returns $\{\mu_j\}_{j=1}^J$, firm-level quantities $\{q_j, k_j, e_j\}_{j=1}^J$ and $\{\ell_{ji}\}_{j=1,\,i=1}^{J,\,I}$, portfolio shares of firm equity, $\{s_{ji}\}_{j=1,\,i=1}^{J,\,I}$, and the risk-free asset, s_{0i}, and country-level quantities $\{n_i, L_{ni}, m_i, \ell_i\}_{i=1}^I$ such that households choose quantities of global firms, the outside traded good, the domestic good, and labor supply to maximize their utility function (1) subject to the budget constraint (2), domestic firms choose the labor input to maximize their profits (7) subject to the production technology (6), global firms choose labor inputs to maximize their profits (9) subject to the production technology (8), investors choose portfolio shares to solve the mean-variance problem (15), and

(i) *Capital markets* for global firms clear by equating demand in equations (10) and (12) to supply in equation (17),

$$\boldsymbol{\mu} \;=\; \boldsymbol{\chi} \circ (\mathbf{z} \circ (\mathbf{p} - \mathbf{C}\mathbf{w}) + \boldsymbol{\iota}), \qquad \mathbf{e} \;=\; (\gamma \mathbf{V})^{-1} \big(\boldsymbol{\mu}\mathbf{1}' + \boldsymbol{\Delta} - \mathbf{1}\mathbf{1}' r_0\big)\, \bar{\mathbf{e}}, \tag{18}$$

where $\mathbf{C}$ is the $J \times I$ matrix of unit labor requirements, with elements c_{ji}, and $\mathbf{w}$ is the $I \times 1$ vector of wages across countries.

(ii) *Product markets* for global firms clear by equating demand in equation (4) to production in equation (8),

$$\mathbf{q} \;=\; (\mathbf{I} + \boldsymbol{\Sigma})^{-1} \big(\mathbf{b} - (\mathbf{1} + \boldsymbol{\tau}) \circ \mathbf{p}\big), \qquad \mathbf{q} = \mathbf{z} \circ \mathbf{k} = \mathbf{z} \circ (\boldsymbol{\chi} \circ \mathbf{e}). \tag{19}$$

(iii) *Domestic labor markets* clear for each country, $\sum_j \ell_{ji} + L_{ni} = P_i\,\ell_i$, where global firms' labor requirement is given by $\ell_{ji} = c_{ji}\,q_j(\mathbf{w})$ and households' labor supply is given by $\ell_i = \bar{\ell}_i\,w_i^{\varepsilon}$.

(iv) *Domestic goods markets* clear for each country. Substituting the labor demand condition $w_i = p_{ni}\,z_{ni}\,L_{ni}^{\theta_i - 1}$ into the production function in equation (6) yields output supply. Equating this supply with demand by the households, $P_i n_i = P_i(\bar{n}_i/p_{ni})^{\psi}$, pins down the domestic price of non-traded goods as a function of the wage:

$$p_{ni} \;=\; \left(P_i\,\theta_i\,\bar{n}_i^{\psi}\,z_{ni}^{-\frac{1}{1-\theta_i}}\,w_i^{\frac{\theta_i}{1-\theta_i}}\right)^{\frac{1-\theta_i}{\psi(1-\theta_i)+\theta_i}}. \tag{20}$$

(v) The market for the *outside good* clears at the normalized price $p_0 = 1$, $\sum_i P_i\,m_i = M_0$.[9]

Quantities (n_i, m_i, ℓ_i, q_{ji}, $\bar{e}_i$) are in per-capita terms and quantities (N_i, L_{ni}, $\bar{E}_i$) are aggregate at the country level. Labor input ℓ_{ji} is firm j's aggregate input from country i and equity e_j is firm j's equity from all countries.

The equilibrium can be solved in the following steps. First, taking as given the vector of wages, $\mathbf{w}$, we substitute into the production function the link between physical and financial capital, $\mathbf{q} = \mathbf{z} \circ \mathbf{k} = \mathbf{z} \circ (\boldsymbol{\chi} \circ \mathbf{e})$. Next, we use the demand for equity in equation (12) to express $\boldsymbol{\mu}$ as a function of prices, and substitute the resulting expression into the supply of equity in equation (17) to express $\mathbf{e}$ as a function of prices. Thus, the system of capital and goods market clearing conditions yields a closed-form expression for global firms' quantities as a function of prices for a given level of wages,

$$\mathbf{q} \;=\; \bar{\mathbf{q}} + \boldsymbol{\Phi}\,(\mathbf{p} - \mathbf{C}\mathbf{w}), \tag{21}$$

where

$$\bar{\mathbf{q}} \equiv \mathbf{z} \circ \boldsymbol{\chi} \circ \left[(\gamma\mathbf{V})^{-1}((\boldsymbol{\chi} \circ \boldsymbol{\iota})\mathbf{1}' + \boldsymbol{\Delta} - \mathbf{1}\mathbf{1}'\,r_0)\bar{\mathbf{e}}\right], \quad \boldsymbol{\Phi} \equiv \left[(\gamma\mathbf{V})^{-1} \circ (\boldsymbol{\chi}\boldsymbol{\chi}') \circ (\mathbf{z}\mathbf{z}')\right](\mathbf{1}'\bar{\mathbf{e}}). \tag{22}$$

Appendix A.2 details the steps that yield the expressions for the vector $\bar{\mathbf{q}}$ and the matrix $\boldsymbol{\Phi}$. Equating output supply in equation (21) to output demand in equation (4) yields closed-form expressions for prices and quantities of global firms as a function of the vector of wages. Finally, we plug these expressions into the domestic labor market clearing conditions, $\sum_j c_{ji}\,q_j(\mathbf{w}) + L_{ni}(w_i) = P_i\,\ell_i(w_i)$, to solve a non-linear system of I equations in I unknowns. Given the solutions for wages, the remaining model equations determine all other endogenous variables.

[9] We assume the supply of the outside good, M_0, is perfectly elastic at a price of one. The income, M_0, generated by this sector is not spent on any of the model goods.

3 Quantification

We quantify the model using a comprehensive cross section of global firms, with information on their balance sheets, goods flows, and labor hiring, and data on countries' portfolio allocations and domestic product and labor markets. The quantification for year 2023 covers 48 countries, approximately 23,000 publicly listed firms, almost six billion consumers, and around 200 trillion dollars of household wealth. Section 3.1 describes the data sources and the measurement of variables in the data. Section 3.2 describes how we recover the unobserved variables.

3.1 Data

Table 1 summarizes our data sources and maps model variables into the relevant data sources. We combine data from Worldscope, FactSet GeoRev, Revelio Labs, Datastream, the Global Capital Allocation Project, the Global Tariff Database, the World Bank / UNCTAD dataset, the Organisation for Economic Co-operation and Development (OECD), the Bank for International Settlements (BIS), the International Labour Organization (ILO), and the Penn World Tables (PWT).

We begin with the measurement of firm-level objects. The wage bill, $w_j \ell_j$, is total staff cost from Worldscope (via WRDS).[10] When staff cost is missing in Worldscope, we impute it based on a regression that uses Revelio Labs wage bills, Worldscope cost of goods sold, and Worldscope reported employment. We use employment data from Revelio Labs to calculate the salaries that firm j pays in country i, $w_i \ell_{ji}$, where we obtain the country-level wage, w_i, from the ILO.[11] Combining salaries by country with the total wage bill of the firm, we obtain the share of firm j's wage bill that accrues to country i, $\theta_{ji} = \frac{w_i \ell_{ji}}{w_j \ell_j}$. We use these shares to allocate employment across countries according to the formula:

$$\ell_{ji} = \theta_{ji} \times \frac{w_j \ell_j \text{ (from Worldscope)}}{w_i \text{ (from ILO)}}. \tag{23}$$

If firm j does not exist in the Revelio Labs dataset, we assign all its labor to domestic labor. Implicit in equation (23) is the assumption that all firms operating in a country i pay the

[10] We identify firms in Worldscope using their ISIN. We exclude firms that have missing business descriptions, zero employees, invalid ISINs, or missing market capitalization, as well as firms classified as REITs. We convert all local-currency values to U.S. dollars using exchange rates with respect to the dollar. We remove duplicate firms, identified by company name or ISIN, as well as a small number of firms identified as duplicates due to a high cosine similarity of business descriptions.

[11] Revelio Labs is a workforce-intelligence firm that provides data on the global employment of firms by aggregating and standardizing hundreds of millions of public employment records. The records primarily come from LinkedIn profiles and job postings, employee sentiment reviews, and layoff notices. It covers more than 4 million companies in more than 200 countries.

Table 1: Data Sources

Source	Variable	Model Object
Worldscope (WRDS)	Staff cost (+imputations, COGS)	$w_j \ell_j$
Revelio Labs	Salaries by country	$w_i \ell_{ji} / (w_j \ell_j)$
Worldscope (WRDS)	Market capitalization	e_j
Worldscope (WRDS)	Total assets, current assets, PPE	k_j
Worldscope (WRDS)	EBITDA	π_j
ILO	Population	P_i
ILO	Employment	$P_i \ell_i$
ILO	Labor compensation	w_i
ILO	Labor share	θ_i
PWT	Price levels, GDP(PPP), consumption	p_n
Worldscope (WRDS)	Extended business descriptions	$\mathbf{\Sigma}$
Loughran-McDonald	Stop-word lists	$\mathbf{\Sigma}$
Datastream (WRDS)	Returns	$\mathbf{V}$
Datastream (WRDS)	Exchange codes	$\mathbf{S}$
Global Tariff Database	Bilateral tariffs	τ_{ji}
WB/UNCTAD	Bilateral non-tariff measures	τ_{ji}
OECD ITIC	Shipping costs	τ_{ji}
Global Capital Allocation	Bilateral equity/bonds holdings	$\mathbf{S}, \bar{E}_i$
World Bank	Stock market capitalization	$\mathbf{S}, \bar{E}$
BIS	Bonds outstanding by country	$\bar{E}_i$
FactSet GeoRev	Revenue shares	q_{ji}/q_j

Notes. Each row lists an empirical data source (first column), the empirical variable it provides (second column), and the model object that variable is used to construct (third column).

same salary to all workers. We make this assumption because we lack detailed data required to differentiate between the salaries of international and domestic workers.

Equity, e_j, is a firm's market capitalization from Worldscope. Physical capital, k_j, is total assets net of current assets, which captures property, plant, and equipment, as well as intangibles. If a firm has a missing value for total assets net of current assets, we impute its physical capital using information on property, plant, and equipment alone. Operating profits are measured using the formula

$$\pi_j = \frac{1 - \hat{s}_j^\ell}{\hat{s}_j^\ell} \times \text{Staff Cost}, \tag{24}$$

where $\hat{s}_j^\ell \in [0, 1]$ is the predicted labor share from an estimated Beta distribution of the labor

share in Worldscope, $\frac{\text{Staff Cost}}{\text{EBITDA+Staff Cost}}$.[12] Given measurements of profits and physical capital, the return on physical capital is $\rho_j = \pi_j / k_j$.

Country population, P_i, total employment, $P_i \ell_i$, total labor compensation, and the labor share, θ_i, are all from the ILO. The country-level wage, w_i, is total labor compensation divided by total employment.[13] We calculate the relative price of the non-traded good in country i at year t using data from the PWT in 2019 and the formula

$$p_{ni,t} \;=\; \text{plgdpo}_t^{1/0.7} \, \frac{\text{plc}_{2019}}{\text{plc}_t}. \tag{25}$$

For year 2019, the relative price of non-traded goods is the price of output in PWT ("plgdpo") raised to a power of 1/0.7. Our logic is to equate the price of tradeables across countries and assign a common weight of 0.7 to non-traded goods expenditure across countries. For counterfactual exercises in other years t, we also include an inflation adjustment using the price level of consumption ("plc"), since our model features only constant-price variables.[14]

We measure non-traded employment, in a first step, as the difference between total employment and the employment of global firms, $L_{ni} = P_i \ell_i - \sum_j \ell_{ji}$. It is important that our model captures the size of the domestic sector relative to the sector that features the global firms, because the changes in various aggregates between the baseline economy and counterfactual economies depend on this relative size. The relative size of the two sectors is affected by the presence of missing observations for listed firms. For instance, in the United States we observe around 3,000 firms, as opposed to around 4,000 listed firms according to the World Bank (https://data.worldbank.org/indicator/CM.MKT.LDOM.NO). Our solution is to adjust non-traded employment and total population for each country by a factor of 0.527, which is the ratio of the number of firms that we observe in Worldscope to the number of firms that the World Bank estimates to be publicly listed for the world as a whole.

Next, we discuss our measurement of the matrix of substitution coefficients, $\mathbf{\Sigma}$. This matrix depends on the primitive matrix $\mathbf{A}$, of size $K \times J$, that collects the K common characteristics for the J firms, according to the formula $\mathbf{\Sigma} = \alpha(\mathbf{A}'\mathbf{A} - \mathbf{I})$ derived in Appendix A.1. To

[12] Relative to measuring profits using EBITDA directly from Worldscope, this calculation guarantees that the profit share of income and the labor share of income lie between 0 and 1. We estimate a Beta distribution with a β_ℓ parameter equal to 2.5 and an α_ℓ parameter that targets an in-sample average labor share of 0.52.

[13] Our labor input measure refers to employed persons as opposed to total hours worked to maximize the country coverage. Correspondingly, our measure of the wage is average earnings per employed person.

[14] The 0.7 exponent is not relevant for the quantification of the baseline model and all counterfactuals, except for counterfactuals that change preferences or productivity in the non-traded sector. Picking a different value for the exponent would result in a different level of calibrated productivity, z_{ni}, that matches the same data for employment and wages in the baseline.

measure $\mathbf{A}$, we use the extended business descriptions in Worldscope, which describe each firm's products and services in narrative form. We pre-process these descriptions by removing company names, geographic names, dates, numerical tokens, and stop-words from the lists of Loughran and McDonald (2011). The resulting vocabulary defines a $K \times J$ matrix $\mathbf{A}$ in which the column $\mathbf{a}_j$ for firm j stores the term frequency-inverse document frequency (TF-IDF) values, $\text{TF-IDF}_{kj} = \text{TF}_{kj} \times \log(N/\text{observations}_k)$, normalized so that $\sum_k a_{kj}^2 = 1$. The matrix $\mathbf{A}'\mathbf{A}$ collects the cosine similarities, $\mathbf{a}_j'\mathbf{a}_h = \cos(\varphi_{jh})$, between every pair of firms. We pick the value of the horizontal-differentiation parameter, $\alpha = 0.12$, from Pellegrino (2025). The resulting product substitution matrix, $\mathbf{\Sigma}$, has entries for U.S.-traded firms that are similar to those in the matrix of Pellegrino (2025) constructed only for U.S.-traded firms.

We estimate the variance-covariance matrix of equity returns, $\mathbf{V}$, from daily total return indices in LSEG Datastream in 2023. We compute daily returns as log changes in the return index, set zero returns to missing, and annualize the standard deviations. We drop firms with fewer than 126 non-missing daily return observations. We regularize the pairwise correlation matrix of returns by shrinking it toward the identity matrix, with shrinkage intensity that is an increasing function of the magnitude of estimated correlations. The off-diagonal entries of $\mathbf{V}$ are the regularized correlations scaled by the outer product of the annualized standard deviations.[15]

We measure bilateral trade frictions between a country i that imports from country k as a combination of three trade costs,

$$1 + \tau_{ik} = \big(1 + \text{tariff}_{ik} + \text{NTM}_{ik}\big)\big(1 + \text{shipping}_{ik}\big). \tag{26}$$

Tariffs are the simple-average bilateral statutory rates from the Global Tariff Database of Teti (2024), defined at the product level as the minimum of the most-favored-nation and applied preferential rates and aggregated to bilateral pairs by simple averages. We use the most recent observation in 2021, with a backfill to the closest preceding year for a small number of pairs. Non-tariff measures (NTMs) are obtained from the World Bank/UNCTAD ad valorem-equivalent estimates from TRAINS for 2012–2016.[16] We scale these estimates using the cumula-

[15] The shrinkage estimator is $\hat{\mathbf{R}} = (1-\hat{\lambda})\mathbf{R} + \hat{\lambda}\mathbf{I}$ applied to the pairwise correlation matrix $\mathbf{R}$ of daily returns, with $\hat{\lambda} = \min\{1, (\|\mathbf{R}-\mathbf{I}\|_F/\text{tr}(\mathbf{R}))^2\}$ and $\|\cdot\|_F$ the Frobenius norm. This shrinkage intensity, which depends on the average magnitude of estimated correlations, improves numerical stability and differs from the noise-based Ledoit-Wolf shrinkage. The realized value in our sample is $\hat{\lambda} \approx 0.008$, so the adjustment is small. The variance-covariance matrix is then $\mathbf{V} = \hat{\mathbf{R}} \circ (\hat{\boldsymbol{\sigma}}\hat{\boldsymbol{\sigma}}')$, where $\hat{\sigma}_j = \sqrt{252}\,\text{sd}(r_{j,t})$ is the annualized standard deviation of firm j's daily returns.

[16] The World Bank/UNCTAD dataset collects NTMs by reading and analyzing national laws, decrees, and

tive count of new NTMs through 2020 from Kuenzel (2024). Shipping costs are the unweighted averages across products of the margins between Free on Board (FOB) and Cost, Insurance, and Freight (CIF) prices from the OECD International Transport and Insurance Costs of Merchandise Trade (ITIC) dataset over 2020–2023, converted into ad valorem shipping costs as $\text{shipping}_{ik} = (\text{CIF} - \text{FOB})/\text{FOB}$. We treat the few observations with reported zero shipping costs as missing data and impute them from population-weighted bilateral distances and importer-exporter fixed effects (see Appendix B.1 for more details).[17]

For each firm j located in country k and exporting to country i, we allocate a trade cost that reflects the bilateral trade cost, $\tau_{ji} = \tau_{ik}$. In our reported statistics and counterfactuals, we use two summary statistics of trade costs. We label the first one the production trade cost that firm j faces, which, consistent with the logic of the aggregation in the model, equals the population-weighted trade cost across all countries:

$$\tau_j = \sum_i \tau_{ji} \frac{P_i}{P}. \tag{27}$$

The consumption trade cost that consumers in country i face is a weighted-average using expenditures of the trade costs across all firms, including domestic ones with zero trade costs:

$$\tau_i = \sum_j \tau_{ji} \frac{p_j q_{ji}}{\sum_j p_j q_{ji}}. \tag{28}$$

Next, we describe our measurements of asset holdings by countries and equity flows to firms. Our primary data comes from the Global Capital Allocation Project (Coppola, Maggiori, Neiman, and Schreger, 2021), which contains 2017 data on equity, E_{ik}, and bond, B_{ik}, holdings of country k in country i. These holdings are restated on a nationality basis to overcome biases related to existence of tax havens that intermediate the financing of global firms. From the bilateral holdings in this dataset, we obtain domestic equity holdings using the equation $E_{ii} = E^i - \sum_{k \neq i} E_{ik}$, where E^i denotes the stock market capitalization of country i from the World Bank in 2017. To maintain consistency with the Global Capital Allocation Project, we restate aggregate market capitalization to national using LSEG Datastream and the domicile

directives. The database contains more than 50,000 distinct measures that cover almost 200 distinct non-tariff measures. The ad-valorem estimates of NTMs are calculated using TRAINS data and gravity regressions with dummy variables for the presence of NTMs that capture the proportionate change in quantity imported to the presence of an NTM. The estimates represent lower bounds of the effects of NTMs on trade, because prohibitive NTMs that result in no trade are excluded from these regressions.

[17] The mean trade cost, τ_{ik}, is 29 percent. Around half of the trade cost reflects non-tariff measures, around a quarter reflects shipping costs, and the rest reflects tariffs and interaction terms between shipping costs and the other two components.

country from Worldscope. Similarly, we calculate domestic bond holdings using the equation $B_{ii} = B^i - \sum_{k \neq i} B_{ik}$, where B^i denotes total issuance of sovereign and corporate bonds by country i from the Bank for International Settlements in 2017. These two calculations also allow to calculate the shares, s^e_{ik}, s^b_{ik}, of equity and bond holdings of country k in country i's total equity and bond issuance for 2017. Using the 2017 shares and updated aggregates, E^i, B^i, from the same sources but for year 2023, we update to 2023 the holdings E_{ik} and B_{ik}.[18]

We allocate equity flows from a country k to a firm j domiciled in country i proportionally, so that effectively countries invest in the other countries' indices.[19] Thus, firm j located in country i receives equity from country k equal to

$$E_{j(i)k} = e_j \times (E_{ik} / \sum_k E_{ik}), \tag{29}$$

where e_j is firm market capitalization in 2023 from Worldscope. Finally, a country's wealth is calculated as the sum across asset classes

$$\bar{E}_i = \sum_k E_{ki} + \sum_k B_{ki}. \tag{30}$$

Table 2 reports the coverage of the resulting cross section of firms and countries. We have roughly 23,000 global firms across 48 countries, accounting for 5.7 billion consumers and 196 trillion dollars of household wealth. In this and in subsequent tables, we display the ten largest economies in terms of revenues generated by their global firms, together with Brazil and Russia given the large size of these emerging economies (see Appendix Table A.1 for other countries).

3.2 Inference

We use the model's equilibrium conditions to recover model objects that are not directly observable. These objects are the expected equity returns, μ_j, the bilateral international financial

[18] When BIS does not report total debt outstanding for a country, we impute it as the sum of available domestic and international securities. For the small number of countries where domestic debt is entirely missing in 2017 or 2023, we assign the sample-average bond share in total wealth, which is approximately 50 percent. To make equity and bond holdings comparable in size, we scale the bond component of wealth by $\sum_k s^e_{ki} \times$ (listed firms$_k$/WB firms$_k$), where s^e_{ki} is the share of country k's equity held by country i, listed firms$_k$ is the number of listed firms that we observe in Worldscope in country k, and WB firms$_k$ is World Bank's estimate of listed firms in country k.

[19] Bertaut, Curcuru, Faia, and Gourinchas (2025) use confidential, security-level Treasury International Capital data on U.S. cross-border equity holdings matched to firm-level measures of productivity, markups, and intangible capital. With access to such data, one could measure E_{ji} directly. While their analysis identifies systematic tilts of international portfolios toward firms at the top of these distributions, the absolute magnitudes of departures from holding the market cap are not that large. For example, a one-standard-deviation increase in firm characteristics shifts the gap between a firm's share in international portfolios and its share in the corresponding market capitalization by only a fraction of a percentage point, with average net shares themselves on the order of a few basis points.

Table 2: Coverage Statistics of the Quantitative Model

		(millions)		(billions)
	Number of Firms	Population	Employment	Wealth
World	22,813	5,669	2,586	196,173
USA	3,085	337	169	83,631
CHN	4,690	1,411	745	20,692
JPN	3,439	125	67	17,468
DEU	372	83	43	7,008
FRA	429	68	29	8,398
GBR	570	68	34	8,133
CAN	572	40	21	5,390
CHE	182	9	5	2,605
IND	1,587	1,438	564	4,985
KOR	2,061	52	29	3,967
BRA	248	211	98	3,016
RUS	100	144	72	748

Notes. Number of listed firms, total population (millions), employment (millions), and household wealth (billions of U.S. dollars) for the world and for the twelve countries. The world covers 48 countries. Countries are ranked by total revenues of global firms. The table reports the raw values for population and employment, whereas for the solution of the model we scale these values by 0.527 as explained in the main text.

frictions, δ_{ji}, the firm-level objects, b_{ji}, z_j, χ_j, ι_j, c_{ji}, and the country-level objects, $\bar{n}_i$, z_{ni}, $\bar{\ell}_i$. We set the remaining preference and technology parameters at standard values: $r_0 = 0.02$, $\gamma = 4$, $\varepsilon = 1$, and $\psi = 1$. We present sensitivity analyses for some of these values below.

Our quantitative strategy for inferring these objects is to ensure that the model exactly matches the firm-by-firm observations of π_j, k_j, ℓ_{ji}, ρ_j, e_j, E_{ji}, $p_j q_j$, and $p_j q_{ji}$, as well as the country-level observations of w_i, ℓ_i, L_{ni}, and p_{ni}. We start with the recovery of expected equity returns, $\boldsymbol{\mu}$, and the bilateral international financial frictions, $\boldsymbol{\Delta}$. Define the matrix of equity-holding shares, $\mathbf{S}$, with entries $E_{ji}/\bar{E}_i$, where E_{ji} is aggregate wealth invested from country i to firm j.[20] Our identifying assumption to recover the expected returns is that investors face no frictions when financing their own country's firms, that is $\delta_{j(i)i} = 0$. Thus, inverting the diagonal of the equity supply equation (17) yields

$$\boldsymbol{\mu} \;=\; \mathrm{dom}\big(\gamma \mathbf{V}\mathbf{S} + \mathbf{1}\mathbf{1}' r_0\big)\,, \tag{31}$$

[20] We note that the columns of $\mathbf{S}$ do not add up to one, because countries' portfolios also consist of risk-free assets.

where the operator dom$(\cdot)$ extracts from each row of its argument the element corresponding to the firm whose country of domicile coincides with the investor country. We infer that equity returns, μ_j, are higher for firms held disproportionately by their domestic investors. Given a fixed $\mathbf{S}$, equity returns are higher for firms with higher return variance and for firms whose returns are more correlated with their domestic investors' portfolios since these firms have worse hedging properties. Plugging the recovered $\boldsymbol{\mu}$ back into the off-diagonal elements of equation (17) yields the matrix of international financial frictions:

$$\boldsymbol{\Delta} \;=\; \gamma \mathbf{V}\mathbf{S} - \boldsymbol{\mu}\mathbf{1}' + \mathbf{1}\mathbf{1}' r_0. \tag{32}$$

By construction $\delta_{j(i)i} = 0$ along the domestic diagonal. The off-diagonal δ_{ji} is more negative when firm j's expected return is high but the foreign investor i holds a relatively small share of it, which is the familiar home bias intuition in the international finance literature. Appendix B.2 works through three numerical examples that illustrate how the cross-country pattern of the equity holdings matrix $\mathbf{S}$ maps into the cross section of $\boldsymbol{\mu}$ and $\boldsymbol{\Delta}$.

Next, we infer firm-level quantities and prices. We define firm revenues as the sum of operating profits and the wage bill, $p_j\, q_j \;=\; \pi_j + \sum_i w_i\, \ell_{ji}$. Because our profit measure is based on EBITDA, which already subtracts cost of goods sold (including intermediate inputs), our notion of revenues corresponds more closely to firm value added rather than gross output. Splitting revenue into a quantity component and a price component requires one additional restriction, because we lack measurements of prices and firms in our model lack market power to set prices. Our model implies that the absolute value of the own-inverse-elasticity of demand satisfies the relationship, $\tilde{\epsilon}_{jj} = q_j/((1+\tau_j)\, p_j)$. Our identifying assumption is that the absolute value of the inverse elasticity equals the profit share, that is $\tilde{\epsilon}_{jj} = \pi_j/(p_j q_j)$. The two relations imply:

$$q_j \;=\; \sqrt{(1+\tau_j)\, \pi_j}. \tag{33}$$

We then recover p_j as the ratio of firm revenues, $p_j q_j$, to quantity, q_j, in equation (33). Our identifying assumption is familiar, because it implies that the inverse of the labor share, or the "markup" for firm j, equals $1/(1-\tilde{\epsilon}_{jj})$. This identifying assumption would also emerge as an equilibrium outcome under different assumptions on firm conduct, such as Cournot conduct.[21]

[21] This choice of units also has an implication regarding the elasticity of the demand for capital with respect to the physical rate of return. From equation (10) we have $\partial \rho_j / \partial k_j = -z_j^2/(1+\tau_j)$, so the elasticity of ρ_j with respect to k_j is $\frac{\partial \rho_j/\rho_j}{\partial k_j/k_j} \;=\; -\frac{z_j^2\, k_j}{(1+\tau_j)\, \rho_j} \;=\; -\frac{z_j\, q_j}{(1+\tau_j)\, \rho_j} \;=\; -\frac{q_j^2}{k_j\, (1+\tau_j)\, \rho_j} \;=\; -1$ where the last equality uses equation (33). The unit elasticity of capital demand lies between the Cobb-Douglas case of $-1/(1-\eta)$ (where η is the elasticity of output with respect to capital), and the Leontief case of zero.

Firm-specific productivity, transformation factor, other equity-return component, and unit labor requirements follow from:

$$z_j = \frac{q_j}{k_j}, \qquad \chi_j = \frac{k_j}{e_j}, \qquad \iota_j = \frac{\mu_j}{\chi_j} - \rho_j, \qquad c_{ji} = \ell_{ji}/q_j. \tag{34}$$

Given measurements of trade costs, τ_{ji}, we infer a country-level preference shifter for each firm's demand by inverting the per-capita inverse demand (3),

$$b_{ji} \;=\; \frac{(1+\tau_{ji})\,p_j}{P} + q_{ji} + \sum_h \sigma_{jh}\, q_{hi}. \tag{35}$$

For this inference, we require data on quantities sold from firm j to each country i, q_{ji}. We use data from FactSet GeoRev on the distribution of sales by each firm j across the world. Consistent with our model in which there is no pricing-to-market, we equate the sales share in FactSet GeoRev, $P_i q_{ji}/q_j$, to the quantity share in our model.[22]

Finally, we invert the equilibrium conditions of the model to obtain the country-level preference and productivity shifters as:

$$z_{ni} = L_{ni}^{1-\theta_i}\,\frac{w_i}{p_{ni}}, \qquad \bar{n}_i = p_{ni}\left(\frac{z_{ni}\,L_{ni}^{\theta_i}}{P_i\,\theta_i}\right)^{1/\psi}, \qquad \bar{\ell}_i = \ell_i\, w_i^{-\varepsilon}. \tag{36}$$

By construction, the model exactly matches the firm-level and country-level moments listed at the start of this subsection.

4 Baseline Results

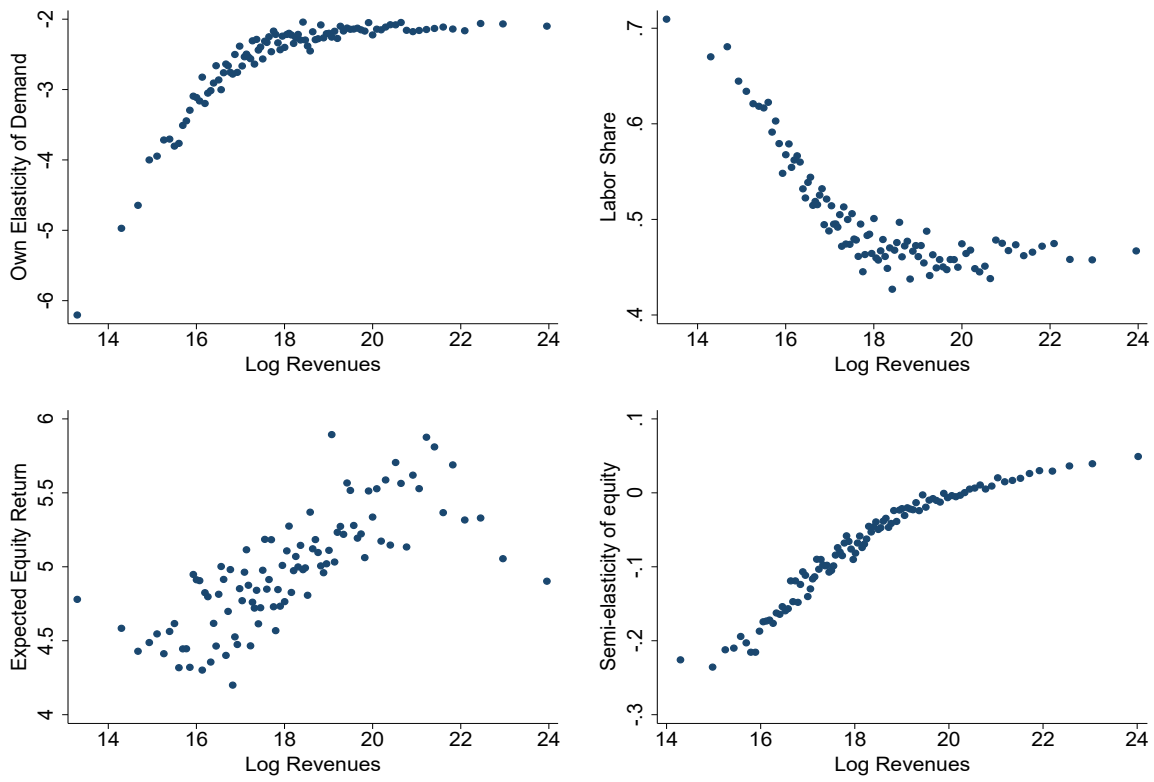
This section presents results for the baseline economy. We first describe firm-level outcomes and then present country-level outcomes.

4.1 Firm Outcomes

Figure 1 presents bin scatters (across 100 bins) across firms of different size. In the upper left panel, we observe that larger firms, measured by log revenue, have lower demand elasticities in absolute value. These values vary from around 5 to 6 for the smallest firms to around 2 for the

[22] FactSet GeoRev (Geographic Revenue Exposure) provides data on companies' revenues broken down by geographic region of sale, distinguishing where a firm is domiciled from where a firm's revenue is generated. The dataset covers roughly 50,000 publicly listed firms from around 200 countries. FactSet GeoRev extracts geographic-segment revenue using companies' annual reports, regulatory filings, footnotes, ancillary tables, and in-text disclosures. When firms do not disclose at full geographic detail, FactSet applies an estimation algorithm based on GDP weighting and accounting logic to allocate the residual unreported revenue to specific countries.

Figure 1: Cross Section of Firms in the Baseline Economy



Notes. Bin scatters across 100 size bins for the universe of listed firms in the baseline economy. Each panel plots a firm-level moment against log firm revenue, $\log p_j q_j$, on the horizontal axis. Top-left: own-price elasticity of demand, ϵ_{jj}. Top-right: labor share, $\sum_i w_i \ell_{ji}/(p_j q_j)$. Bottom-left: expected equity return, μ_j. Bottom-right: semi-elasticity of equity with respect to a decline in the risk-free rate, η_j, defined in equation (37). Firm-level variables are winsorized at the 1 percent level. The semi-elasticity panel applies an additional trim at the 5th and 95th percentile to improve visibility.

largest firms.[23] The upper right panel shows that larger firms tend to have lower labor shares, $\sum_i w_i \ell_{ji}/p_j q_j$, although this relationship flattens for the largest firms.[24] The bottom left panel shows the relationship between firm size and expected equity returns. We find an inverted-U shaped relationship, with larger firms displaying a higher expected return up to a certain size.

[23]This range of elasticities is consistent with estimates obtained from demand-system estimation in the industrial-organization literature, where elasticities are identified from prices and quantities rather than from operating profit shares. Berry, Levinsohn, and Pakes (1995) estimate own-price elasticities for U.S. automobile models in the 3 to 7 range. Nevo (2001) reports median own-brand elasticities of between roughly 2 and 4 for ready-to-eat cereal. Broda and Weinstein (2006) estimate elasticities from disaggregated trade data and find a median elasticity of around 3 with a fat right tail.

[24]The negative cross-sectional relationship between firm size and the labor share is consistent with a growing body of micro-level evidence. Autor, Dorn, Katz, Patterson, and Reenen (2020) and Kehrig and Vincent (2021) use U.S. Census data to document that larger firms have lower labor shares.

For roughly the top 10 percent of firms, larger firms display smaller expected returns.[25]

The bottom right panel of Figure 1 presents the semi-elasticity of equity with respect to a decline in the risk-free rate, which is an important object for understanding the heterogeneity of responses across firms in our counterfactuals. Equation (A.16) in Appendix A.3 derives a firm's equity in closed form as function of the primitive parameters of all firms in the world economy.[26] Taking the derivative of this solution with respect to the risk-free rate, r_0, helps guide intuition on how different firms are affected in response to a change in fundamentals which is common across firms. The semi-elasticity of a firm's equity with respect to a decline in the risk-free rate is

$$\eta_j \equiv -\frac{1}{100}\frac{\partial \ln e_j}{\partial r_0} = \frac{\bar{E}}{100\gamma e_j}\left(\omega_{jj} + \sum_{h\neq j}\omega_{jh}\right), \tag{37}$$

where $\bar{E} = \sum_i \bar{E}_i$ is the world's total wealth.

Firms' fundamentals transmit to other firms through the matrix $\mathbf{\Omega}$, which depends on the variance-covariance matrix of returns, $\mathbf{V}$, and the product substitution matrix, $\mathbf{\Sigma}$. The diagonal elements of this matrix, ω_{jj}, represent the effects of a change in firm j's primitives on firm j's equity and the off-diagonal elements ω_{jh} represent the effects of changes in competitor h's primitives on firm j's equity. We divide the semi-elasticity by 100, which means that the semi-elasticity measures the change in log equity with respect to a one percentage-point decline in the risk-free rate. We note that once equity is pinned down, all other firm-level variables are pinned down analytically using the equations presented in Section 2.

We observe significant dispersion in firm responses according to size, with larger firms displaying positive semi-elasticities and smaller firms displaying negative semi-elasticities. There is also dispersion of semi-elasticities not accounted for by size. Firms at the 75th percentile of the unconditional distribution have a semi-elasticity of around 0.05 and firms at the 25th percentile have a semi-elasticity of around -0.15. Negative semi-elasticities arise naturally from the rich interdependencies in product and capital markets featured in our model. A reduction in the risk-free rate lowers equity of firm j when the own effect, ω_{jj}, which is typically positive,

[25]The decline in expected returns at the top of the size distribution is consistent with the size factor of Fama and French (1992) for U.S. equities. Fama and French (2012) find no size premium internationally, but Asness, Frazzini, Israel, Moskowitz, and Pedersen (2018) argue the international size premium is robust once firm quality is controlled for. The rising portion of our inverted-U does not have a direct counterpart in this literature, but our μ_j is a model-implied object that reflects both firm-level return variance and the intensity of domestic investor holdings, and need not coincide with realized average returns.

[26]This closed-form solution yields the equity for every firm, taking as given only the general equilibrium determination of wages, but incorporating solutions for equity returns and goods prices. It gives the equilibrium equity for every firm in the special case of an infinitely elastic labor supply.

is smaller in absolute value than the sum, $\sum_{h \neq j} \omega_{jh}$, which is typically negative and captures the expansion of economic activity of firm j's competitors.

To illustrate in some further detail the richness of our firm-level data, Table 3 lists statistics of the sixteen largest U.S. firms by equity market capitalization, including Apple, Microsoft, Alphabet, Amazon, Nvidia, Meta, Tesla, and Berkshire Hathaway. Table 4 reports the corresponding statistics for the largest non-U.S. firms, which include Saudi Aramco, Novo Nordisk, Samsung, LVMH, Tencent, and Nestlé. Most U.S. mega firms sell their products globally and hire labor globally. These international patterns are more muted for the largest non-U.S. firms, with some firms hiring labor only domestically. Among the largest U.S. firms in 2023, we calculate that Tesla and Nvidia have the highest expected equity returns. An example of a mega firm with low expected return is UnitedHealth Group, which is intuitive given the low volatility of its stock and the fact that the stock is not highly correlated with other stocks. Among the largest non-U.S. firms in 2023, Novo Nordisk, the producer of drugs that treat diabetes and obesity, and Alibaba, the retail giant, have the highest expected returns. The largest firms in the world typically have own-price elasticities of demand below 2 in absolute value. All of the largest firms shown in the two tables have positive semi-elasticities of equity, which means that they expand their economic activity in response to common, positive changes in fundamentals.

4.2 Aggregate Outcomes

Table 5 reports summary statistics across countries. The first three columns show the share of employment allocated to the non-traded sector, $L_n/(P\ell)$, the wage, w, and the relative price of the non-traded good, p_n. The share of employment in the non-traded sector ranges from roughly two-thirds of total employment for economies such as the United States, the United Kingdom, Canada, and Switzerland, to more than 90 percent for emerging markets such as India, Brazil, and Russia. The wage and the price of non-traded goods display intuitive patterns across countries. Developed economies such as the United States and Switzerland have the highest wages and the most expensive non-traded goods, whereas emerging markets such as China and India have lower wages and cheaper non-traded goods. An inspection of equation (36) shows that our model generates a higher wage denominated in terms of non-traded goods for countries with higher non-traded productivity, z_n. Countries with a higher preference for non-traded goods, $\bar{n}$, have more expensive non-traded goods.

The next two columns of Table 5 report country-level averages of equity returns, μ_j, and

Table 3: Largest U.S. Firms

	($\times 10^9$)			($\times 10^3$)		(percent)				
	e	pq	π	k	ℓ	$\frac{(pq)_i}{pq}$	$\frac{\ell_i}{\ell}$	μ	$\lvert\epsilon_{jj}\rvert$	η_j
APPLE	2,994	94	72	191	363	39	42	5.8	1.3	0.26
MICROSOFT	2,795	96	68	208	561	54	29	6.1	1.4	0.24
ALPHABET	1,741	87	63	219	482	55	33	6.9	1.4	0.15
AMAZON.COM	1,578	204	85	342	2,128	71	43	7.6	2.5	0.09
NVIDIA	1,220	21	18	15	64	44	37	9.4	1.3	0.23
META PLATFORMS	906	39	31	144	156	48	37	8.5	1.3	0.12
TESLA	791	24	13	50	159	53	65	10.5	1.9	0.11
BERKSHIRE HATHAWAY	782	76	63	826	162	86	100	4.4	1.2	0.10
LILLY (ELI) AND CO	553	11	7	33	72	67	44	3.2	1.6	0.64
VISA	527	20	15	57	124	47	30	4.6	1.5	0.25
JPMORGAN CHASE & CO	489	112	66	22	952	81	40	5.1	1.8	0.05
UNITEDHEALTH GROUP	486	35	24	10	210	97	48	2.6	1.5	0.18
BROADCOM	462	15	11	52	73	24	22	7.1	1.4	0.19
WALMART	423	172	62	176	2,101	88	46	3.3	2.8	0.06
MASTERCARD	398	17	11	22	115	42	32	5.1	1.6	0.24
EXXON MOBIL	397	46	36	280	210	42	21	3.9	1.3	0.08

Notes. The sixteen largest U.S. firms by equity market capitalization in the baseline economy. Equity, e, revenue, pq, profits, π, and capital, k, are in billions of U.S. dollars. Employment, ℓ, is in thousands of workers. The columns $(pq)_i/pq$ and ℓ_i/ℓ report the share of revenue and employment located in the firm's country of domicile (in percent). μ is the firm's expected equity return (percent). $|\epsilon_{jj}|$ is the absolute value of own-price elasticity of demand. η_j is the semi-elasticity of equity with respect to a decline in the risk-free rate, defined in equation (37).

Table 4: Largest Non-U.S. Firms

	($\times 10^9$)			($\times 10^3$)		(percent)				
	e	pq	π	k	ℓ	$\frac{(pq)_i}{pq}$	$\frac{\ell_i}{\ell}$	μ	$\lvert\epsilon_{jj}\rvert$	η_j
SAUDI ARABIAN OIL CO	2,129	104	90	460	353	67	100	4.8	1.2	0.23
NOVO NORDISK	461	21	13	23	134	0	43	10.1	1.6	0.31
SAMSUNG ELECTRONICS	412	29	22	193	145	19	52	5.7	1.3	0.16
LVMH MOET HENNESSY	404	40	25	106	203	8	100	5.2	1.7	0.11
TENCENT HLDGS	356	40	25	145	673	92	96	8.4	1.7	0.09
KWEICHOW MOUTAI	305	5	5	6	29	97	100	5.0	1.1	0.53
NESTLE SA	304	36	19	112	552	1	3	3.5	1.9	0.14
L'OREAL SA	266	18	10	38	194	3	10	4.1	1.9	0.20
ALIBABA GROUP	263	23	15	151	344	92	72	8.6	1.5	0.09
INDUSTRIAL AND COMM	240	67	47	30	929	86	100	3.3	1.5	0.04
ROCHE HOLDING	232	40	20	60	345	3	12	3.6	2.0	0.08
CHINA CONSN	229	61	43	20	842	98	100	3.3	1.5	0.05
HERMES INTERNATIONAL	221	7	5	6	41	11	31	5.0	1.5	0.31
SHELL	214	52	38	266	353	15	9	3.6	1.5	0.04
ASTRAZENECA	209	25	13	71	254	7	13	2.9	2.0	0.12
NOVARTIS	206	28	15	65	271	2	8	3.5	2.0	0.11

Notes. The sixteen largest non-U.S. firms by equity market capitalization in the baseline economy. Columns are defined as in Table 3.

Table 5: Country Statistics in the Baseline Economy

	Aggregates							Top one percent share			
	$L_n/P\ell$	w	p_n	μ	ρ	δ_j	δ_i	pq	k	ℓ	e
USA	66.3	82.2	1.1	6.2	22.2	-2.3	-3.5	31.7	33.9	32.2	45.0
CHN	89.3	21.4	0.6	5.3	13.3	-2.7	-3.9	49.0	37.4	50.6	32.6
JPN	78.8	46.5	1.0	3.3	23.3	-0.9	-4.0	41.1	50.4	44.4	38.8
DEU	82.1	72.6	0.9	3.2	31.8	-0.2	-3.9	30.3	40.0	30.4	23.2
FRA	78.4	78.2	0.9	3.0	28.8	-0.1	-3.9	19.8	24.4	18.3	36.2
GBR	61.9	62.3	0.9	3.5	26.8	-0.5	-3.6	27.6	42.0	26.4	35.9
CAN	62.7	64.7	0.9	4.9	13.5	-1.6	-3.3	26.7	27.2	28.9	23.5
CHE	65.7	106.4	1.2	4.5	34.3	-1.4	-3.4	25.8	22.9	22.8	25.4
IND	94.7	14.0	0.2	4.0	24.9	-1.6	-4.1	41.2	49.6	40.3	37.0
KOR	81.0	54.2	0.7	5.3	12.1	-2.4	-3.8	44.1	54.2	42.4	53.0
BRA	92.5	24.5	0.5	5.7	18.4	-2.9	-4.1	18.7	28.6	16.2	17.1
RUS	93.8	38.9	0.3	7.9	21.7	-5.8	-4.3	12.3	27.7	19.4	11.5

Notes. Country averages of selected baseline objects for the twelve countries shown in Table 2. $L_n/(P\ell)$ is the share of employment allocated to non-traded goods (percent). w is the average wage in thousands of U.S. dollars per worker. p_n is the relative price of the domestic good. μ is the average expected return on equity (percent), and ρ is the median return on physical capital (percent). The table reports the median ρ, because the distribution of ρ has a heavy tail. δ_j is the average bilateral financial friction that foreign investors face when investing in firms domiciled in country j, averaged over investor countries (percentage points). δ_i is the average friction that investors of country i face when investing abroad, averaged over destination countries (percentage points). The last four columns report the share of country revenue pq, physical capital k, employment ℓ, and equity market capitalization e accounted for by the top one percent of firms in the country (percent).

median physical returns, ρ_j. Expected returns on equity are typically higher in emerging markets such as China, Brazil, and Russia than in advanced economies, reflecting both higher firm-level variance and weaker hedging properties of these countries' equity for their domestic investors. An exception is the United States, for which we obtain a mean return of 6.2 percent.[27] Returns on physical capital significantly exceed returns on equity. This is an intuitive result because returns to physical capital are gross, meaning they include depreciation, taxes, and other costs that are lumped into operating profits. To give an illustrative calculation, if the firm-level capital to output ratio is two and the profit share is one-half, then we expect the physical return to be 25 percent.

[27]Our U.S. expected equity return of 6.2 percent (which implies a 4.2-percentage-point equity premium over the risk-free rate) is consistent with practitioner long-term capital-market assumptions for U.S. large-cap equity, which have ranged between roughly 4 and 7 percent in recent vintages from J.P. Morgan, Vanguard, and BlackRock, and with academic estimates of the U.S. equity premium spanning Mehra and Prescott (1985), Fama and French (2002), and Jordà, Knoll, Kuvshinov, Schularick, and Taylor (2019).

The next column of Table 5 presents the average of the international financial friction that foreign investors face when investing in a country, δ_j. This friction varies quite a bit across countries, from less than one percentage point in absolute value in Japan, Germany, France, and the United Kingdom, to around 3 percentage points in Brazil and to more than 5 percentage points in absolute value in Russia. We find these differences intuitive. To give an example, we infer that Russian firms have a high expected rate of return μ_j, because domestic investors hold Russian firms despite these firms having high variance and worse hedging properties. However, foreign investors do not hold as much equity in Russian firms as would be implied by the domestic equity return. Hence, it must be that foreign investors face a significant financial friction that reduces their return when holding Russian firms.[28] The next column of the table shows that the international financial friction that investors face when investing abroad, δ_i, does not vary significantly across countries. This friction is calculated as the unweighted average across other countries and so it reflects the potential friction that investors face. Below, we present the equilibrium friction, which incorporates equilibrium portfolio positions.

The last four columns of Table 5 report the share of countries' revenues, pq, physical capital, k, employment, ℓ, and equity market capitalization, e, accounted for by the top one percent of firms in each country. There is substantial concentration along all four dimensions, with the top one percent of firms typically accounting for around one-third, and in some cases for close to or more than half, of aggregates. Concentration is most striking in equity market capitalization, especially in advanced economies with the largest publicly traded firms. The top one percent of U.S. firms account for 45 percent of total U.S. equity, well above their 32 percent shares of revenue and employment. Korea, France, and the United Kingdom display similar patterns, with equity concentration exceeding revenue and employment concentration by 8 to 18 percentage points. A larger concentration in equity than in revenues, capital, and labor is intuitive, given that larger firms tend to have lower demand elasticities in absolute value and higher profit shares.

Appendix Table A.2 reports summary statistics of countries' portfolio investments in equity. The extent of home bias varies significantly across countries. Developed economies such as the United Kingdom and Canada have a low home bias in equity investments and invest heavily in the United States. By contrast, emerging markets such as China, India, Brazil, and Russia in-

[28]The exception to the intuitive patterns of δ_j is again the United States, with our model inferring a roughly 2 percentage points reduction of foreigners' returns when investing in the United States. The logic of this result is that U.S. firms have higher expected returns, relatively low variance, and relatively better hedging properties. Despite these desirable properties, foreign investors do not invest as much in the United States.

Table 6: Household Resources Lost to Frictions in the Baseline Economy

	Goods Trade		Asset Trade	
(percent of income/total)	Cost	Foreign Exp.	Cost	Foreign Inv.
USA	1.4	26.2	0.7	13.6
CHN	1.2	33.5	0.0	2.0
JPN	1.4	27.2	1.8	32.7
DEU	2.3	66.0	0.6	41.6
FRA	1.8	49.8	0.7	31.5
GBR	3.7	62.0	2.0	63.4
CAN	12.8	66.0	0.6	55.1
CHE	4.2	63.2	1.5	34.5
IND	1.1	53.1	0.0	0.1
KOR	1.8	38.7	0.5	17.6
BRA	3.5	59.4	0.1	3.7
RUS	1.9	63.3	0.0	0.8

Notes. Goods Trade reports the cost of trade frictions, $\sum_j \tau_{ji} p_j q_{ji}$, as a percent of household income, $w_i \ell_i + \pi_{ni} + r_i \bar{e}_i$ (Cost), and the share of household expenditure on foreign-produced goods (Foreign Exp.). Asset Trade reports the cost of bilateral financial frictions, $-\sum_j \delta_{ji} E_{ji}/P_i$, as a percent of household income (Cost), and the share of the household's equity portfolio invested abroad (Foreign Inv.). All values are in percent.

vest almost their entire equity portfolio domestically. Appendix Table A.3 reports the allocation of countries' wealth between own equity, foreign equity, and risk-free assets, alongside countries' mean and standard deviation of portfolio returns in the baseline equilibrium. Risk-free assets absorb between roughly one-third and roughly three-quarters of countries' wealth, with significant heterogeneity across countries. For example, Germany, France, and Brazil allocate more than two-thirds of their wealth to risk-free assets, whereas Canada and Switzerland allocate only one-third. In terms of portfolio returns, the United States tends to achieve a higher return than most countries.[29] Consistent with our mean-variance portfolio allocation model, countries with higher portfolio returns also experience larger standard deviation of portfolio returns.

Table 6 presents summary statistics on the magnitude of goods-market and capital-market

[29]The relatively high U.S. portfolio return echoes the "exorbitant privilege" observation documented in the international finance literature, which states that the United States earns higher returns on its external assets than it pays on its external liabilities, in large part because U.S. holdings abroad are equity-tilted while foreign holdings of U.S. assets are bond-tilted. The seminal contribution is Gourinchas and Rey (2007), with Curcuru, Dvorak, and Warnock (2008) providing a quantitatively much smaller differential in returns and Atkeson, Heathcote, and Perri (2025) documenting that the privilege has eroded more recently. We caution that our result is for a single cross section in 2023, whereas this literature analyzes the time-series persistence of the U.S. return differential over much longer horizons.

frictions. In the first column, we calculate the trade cost for each country i, $\sum_j \tau_{ji} p_j q_{ji}$, as a percent of household income, $w_i \ell_i + \pi_{ni} + r_i \bar{e}_i$. With the exception of Canada, this cost is relatively small, with households in most countries foregoing between 1 and 4 percent of their income to pay for the higher consumer prices of importing goods. The cost depends on the level of the trade frictions a country faces on imports and the share of expenditures that are directed to foreign goods. As the second column of the table shows, economies such as Germany, the United Kingdom, Canada, and Switzerland allocate larger shares of their expenditures to imported goods and thus forego more income to finance these imports.

The last columns of Table 6 repeat these calculations for capital-market frictions. We define the asset cost for each country i, $-\sum_j \delta_{ji} E_{ji}/P_i$, as a percent of household income. We observe that the share of household income spent on the international financial frictions is typically lower than the share of income spent on the international trade frictions. This result partly reflects the observation that equity markets are more home biased than goods markets. For example, countries such as China, Russia, and India pay no international financial costs in equilibrium, simply because they allocate essentially all of their equity wealth domestically. But even economies that invest significantly abroad, such as the United Kingdom and Canada, do not incur costs that are as significant as their trade costs. This result highlights that our model rationalizes the observed allocation of global equity flows across countries with reasonably-sized international financial frictions.

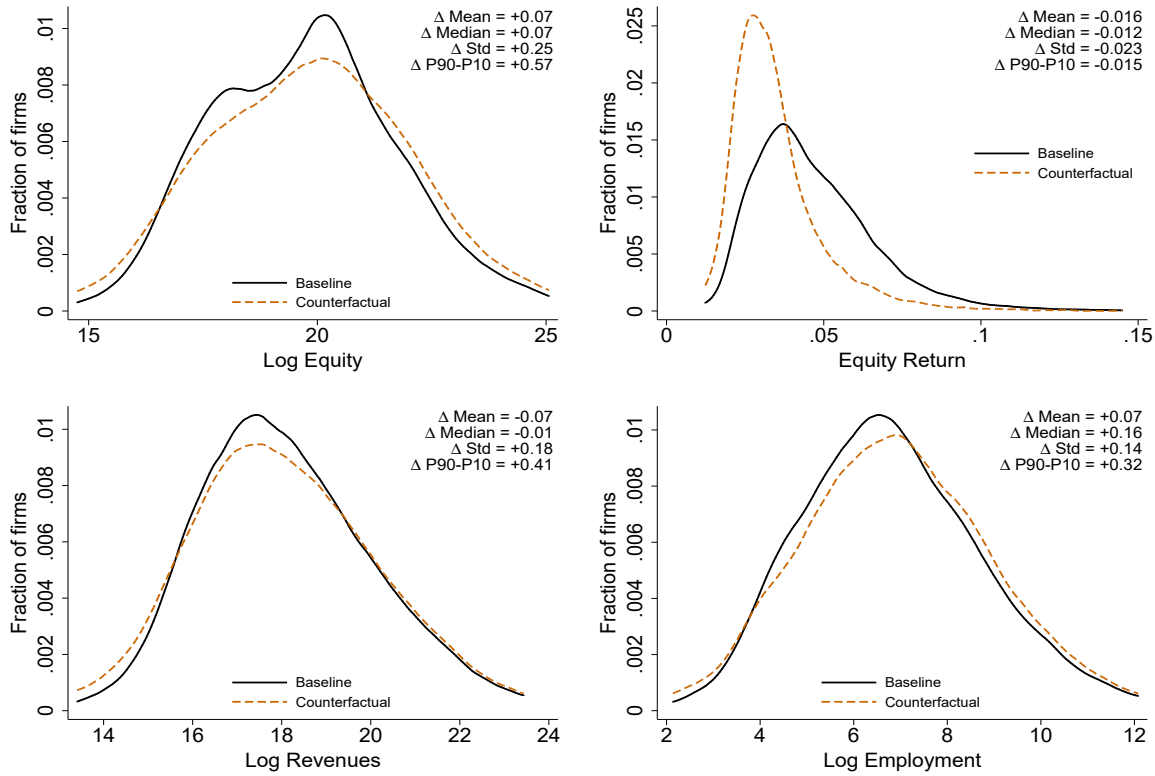
5 Counterfactuals

We begin this section by comparing a counterfactual economy under financial liberalization or autarky to our baseline economy. Next, we present the counterfactual economy under trade liberalization. We then illustrate the importance for the counterfactual outcomes of modeling simultaneously product- and capital-market imperfections and the interdependencies that these markets introduce across firms. We conclude the section by presenting some additional counterfactuals and sensitivity checks.

5.1 Financial Liberalization

The baseline model rationalizes observed capital flows by parameterizing the matrix of international financial frictions, $\mathbf{\Delta}$, in the equity supply equation (17), given inferred equity returns to domestic residents, $\boldsymbol{\mu}$, the variance-covariance matrix of returns, $\mathbf{V}$, and parameters γ and r_0.

Figure 2: Cross Section of Firms: Financial Liberalization



Notes. Kernel densities of firm-level outcomes across the universe of global firms, in the baseline economy and in the counterfactual economy under financial liberalization ($\mathbf{\Delta} = \mathbf{0}$). Top-left: log equity, $\log e_j$. Top-right: expected equity return, μ_j. Bottom-left: log revenue, $\log p_j q_j$. Bottom-right: log employment, $\log \ell_j$. Each panel reports in its upper-right corner the changes in moments between the two distributions. Kernel density and moment changes are estimated on the full data, but the x-axis is trimmed between the 1st and 99th percentile to improve visibility.

We now consider a world economy under a regime of financial liberalization, which is nested in our baseline model by replacing $\mathbf{\Delta}$ with a matrix of zeros (that is, $\delta_{ji} = 0$ for all j and i). We keep all other model primitives at their baseline values.

5.1.1 Firm Outcomes

Figure 2 presents distributions of firm outcomes in the baseline economy and the counterfactual economy under financial liberalization. Beginning with the top left panel, we observe a significant change in the distribution of log equity across firms. Mean equity expands, as investors reallocate their wealth from the risk-free asset to equities, whose net returns increase in the absence of international financial frictions. However, the reallocation of wealth is quite heterogeneous across firms. Firms at the top of the distribution expand their equity, whereas firms

at the bottom of the distribution reduce it. As the upper right corner of the panel shows, the standard deviation of equity increases by 25 percentage points and the difference between the 90th and the 10th percentile increases by 57 percentage points. As equity expands, returns fall in the upper right panel, with the average firm experiencing a decline of 1.6 percentage points. The distribution of returns becomes significantly more concentrated around its mode.

The lower left panel shows the distribution of log revenues. Similar to equity, revenues become more dispersed following a financial liberalization, with the standard deviation of revenues increasing by 18 percentage points and the difference between the 90th and the 10th percentile of the distribution increasing by 41 percentage points. The difference with equity is that mean and median revenues decline. The fall in revenues reflects that the decline in prices is larger than the increase in quantities in percent terms. In the last panel, we see that the dispersion of labor employed by firms also increases substantially.

The mechanism by which financial liberalization increases the dispersion across firms reflects the significant heterogeneity in semi-elasticities, which was previously documented in the last panel of Figure 1. Recall that the semi-elasticity defined in equation (37) referred to the response of equity with respect to a decline in the risk-free rate. However, the decline in international financial frictions affects all firms simultaneously to some degree and so it is qualitatively similar to a decline in the risk-free rate. Larger firms expand their equity and production, as they benefit from the decline in their friction of being financed from abroad. While small firms also benefit from the decline in their friction, they experience a contraction in their economic activity because of the intensified competition from the larger firms.

5.1.2 Aggregate Outcomes

We first explain how to evaluate changes in aggregates between the counterfactual and the baseline economy. We measure the welfare consequences of each counterfactual with

$$U_i = \overbrace{\mathbf{q}_i'(P\mathbf{b}_i - (\mathbf{1}+\boldsymbol{\tau}_i)\circ\mathbf{p}) - \frac{P}{2}\mathbf{q}_i'(\mathbf{I}+\boldsymbol{\Sigma})\mathbf{q}_i}^{U_q} + \overbrace{\bar{n}_i\frac{n_i^{1-1/\psi}-1}{1-1/\psi} - p_{ni}n_i}^{U_n} \tag{38}$$
$$+ \underbrace{w_i\ell_i - \bar{\ell}_i^{-1/\varepsilon}\frac{\ell_i^{1+1/\varepsilon}}{1+1/\varepsilon}}_{U_\ell} + \underbrace{r_i\bar{e}_i}_{U_r} + \underbrace{\pi_{ni}}_{U_\pi} \underbrace{-\frac{\gamma}{2}\mathrm{Var}(r_i)\bar{e}_i}_{U(\mathrm{Var})},$$

where $\boldsymbol{\tau}_i$ denotes the $J\times 1$ vector of tariffs that consumers in country i face with elements τ_{ji}. The last term in equation (38), labeled $U(\mathrm{Var})$, is the difference between our welfare measure

and the preferences of households as described by equations (1) and (2). This term captures the welfare effects of variance in portfolio returns. The logic for this adjustment is that, with quasi-linear preferences in the numeraire, if households were endowed with preferences that subtract the variance of returns and were allowed to choose portfolios directly, all equilibrium allocations would be identical to those in our baseline model. In essence, this adjustment allows households and investors to merge into the same economic unit.[30]

Welfare in equation (38) is decomposed into six components. The first component is the surplus consumers derive from the consumption of the global products. The second component is the surplus consumers derive from the consumption of non-traded goods. The third component is the surplus from providing labor supply at a wage that exceeds the average cost of labor. The fourth component refers to the capital returns earned from investing the endowment. The fifth component is the profits of the domestic non-traded goods firms. Finally, the sixth component captures welfare changes due to the variance of the returns. In our quantitative results below, we evaluate welfare changes across counterfactuals, $U_i' - U_i$, as a share of per-capita initial labor income, $w_i \ell_i$, where U_i' is welfare in a counterfactual and U_i is welfare in the baseline.[31]

Next, we discuss how we measure changes in other aggregates across counterfactuals. Objects in our model are measured in terms of the numeraire good. Across counterfactuals, both prices and quantities of global firms change. To make our calculations consistent with national income and product accounts' conventions, we define GDP in the baseline and counterfactual economy as

$$\text{GDP}_i = \sum_{j \in i} p_j q_j + p_{ni} N_i + (\text{wage adjustment})_i \tag{39}$$

$$\text{GDP}_i' = \sum_{j \in i} p_j q_j' + p_{ni} N_i' + (\text{wage adjustment})_i', \tag{40}$$

where q_j', N_i' are the new production levels in the counterfactual, whereas q_j, N_i, p_j, p_{ni} refer to the quantities and prices in the baseline economy. The wage adjustment in equation (39) takes into account that some workers produce value domestically when working for foreign firms and that some of the value produced by domestic firms happens in foreign countries.[32] Equation

[30] Our welfare measure does not include the endowment of wealth, $\bar{e}_i$, which enters the household's budget constraint as a resource. This omission is immaterial because we difference equation (38) across counterfactuals while keeping $\bar{e}_i$ constant.

[31] We express welfare changes in terms of labor income to make our figures comparable to standard trade models, as these models typically abstract from capital income.

[32] Specifically, the wage adjustment term equals $w_i(P_i \ell_i - L_{ni}) - \sum_{j \in i}(p_j q_j - \pi_j)$. Thus, GDP equals the sum of profits of all global firms domiciled in a country, the profits of non-traded firms, and all wage payments that

Table 7: From the Baseline to Financial Liberalization

	(100× log changes)				(p.p. changes)			(percent, labor income)			
	q	p	e	GDP	μ	s_e^1	s_{pq}^1	U	U_q	U_r	U(Var)
USA	4.0	-5.7	17.3	1.4	-0.7	2.0	0.8	3.1	4.6	-3.4	1.7
CHN	7.4	-20.1	34.0	0.7	-1.8	5.3	6.2	6.4	6.8	-0.9	0.4
JPN	0.3	-3.2	1.7	0.0	-0.6	2.5	0.8	9.7	4.1	11.2	-5.6
DEU	-4.6	0.0	-44.0	-0.8	0.4	11.7	1.0	4.5	2.3	4.5	-2.3
FRA	-2.7	-0.3	-11.1	-0.6	0.4	6.0	0.5	5.6	2.1	7.0	-3.5
GBR	-2.3	-0.8	-12.1	-0.5	0.0	4.3	0.5	5.3	3.1	4.4	-2.2
CAN	2.1	-5.7	41.0	0.8	-0.8	18.5	1.0	4.2	6.1	-4.4	2.2
CHE	6.7	-6.0	10.7	3.1	-0.7	0.4	0.1	3.4	3.9	-1.4	0.7
IND	5.5	-15.5	47.0	0.2	-1.4	14.1	4.7	10.5	10.1	0.8	-0.4
KOR	7.5	-45.7	96.6	1.5	-1.7	17.8	17.6	4.7	4.8	-0.4	0.2
BRA	5.4	-13.7	24.1	0.5	-2.4	9.5	1.4	8.1	7.5	1.2	-0.6
RUS	13.7	-33.1	60.5	0.7	-5.7	23.7	2.6	4.3	4.8	-1.0	0.5

Notes. Counterfactual changes when moving from the baseline economy to a fully liberalized capital market in which all bilateral financial frictions are eliminated, $\boldsymbol{\Delta} = \mathbf{0}$. Columns 1–4 report 100× log changes in firm output, q, producer price, p, equity, e, and GDP. Column 5 reports the percentage-point change in the expected equity return, μ. Columns 6 and 7 report the percentage point change in the share of equity, s_e^1, and revenues, s_{pq}^1, accounted for by firms in the top 1 percent of their respective distributions. Baseline concentration shares are reported in the last four columns of Table 5. Column 8 reports the total welfare change in percent of baseline labor income, and columns 9–11 report the components of the welfare change due to the surplus from consuming global-firm output (U_q), capital returns (U_r), and the variance penalty (U(Var)).

(40) evaluates GDP in the counterfactual at constant prices relative to the baseline. For changes in the production of global firms, we use

$$\Delta \log q = \log \big(\sum_{j \in i} p_j q_j' \big) - \log \big(\sum_{j \in i} p_j q_j \big), \tag{41}$$

$$\Delta \log p = \log \big(\sum_{j \in i} p_j' q_j' \big) - \log \big(\sum_{j \in i} p_j q_j \big) - \Delta \log q, \tag{42}$$

where equation (41) is the log change in constant-price output of the global firms and equation (42) defines the log change in the price index as the difference between the log change in expenditures and the log change in quantities.

Table 7 presents the aggregate effects of moving from our baseline model to the regime of financial liberalization that eliminates international financial frictions ($\boldsymbol{\Delta} = \mathbf{0}$). Firm output

accrue to workers who provide labor services to a country. For the counterfactual GDP in equation (40), we adjust wages to their base period values. See Appendix A.4 for more detail on how to map objects of the model to objects reported by national income and product accounts.

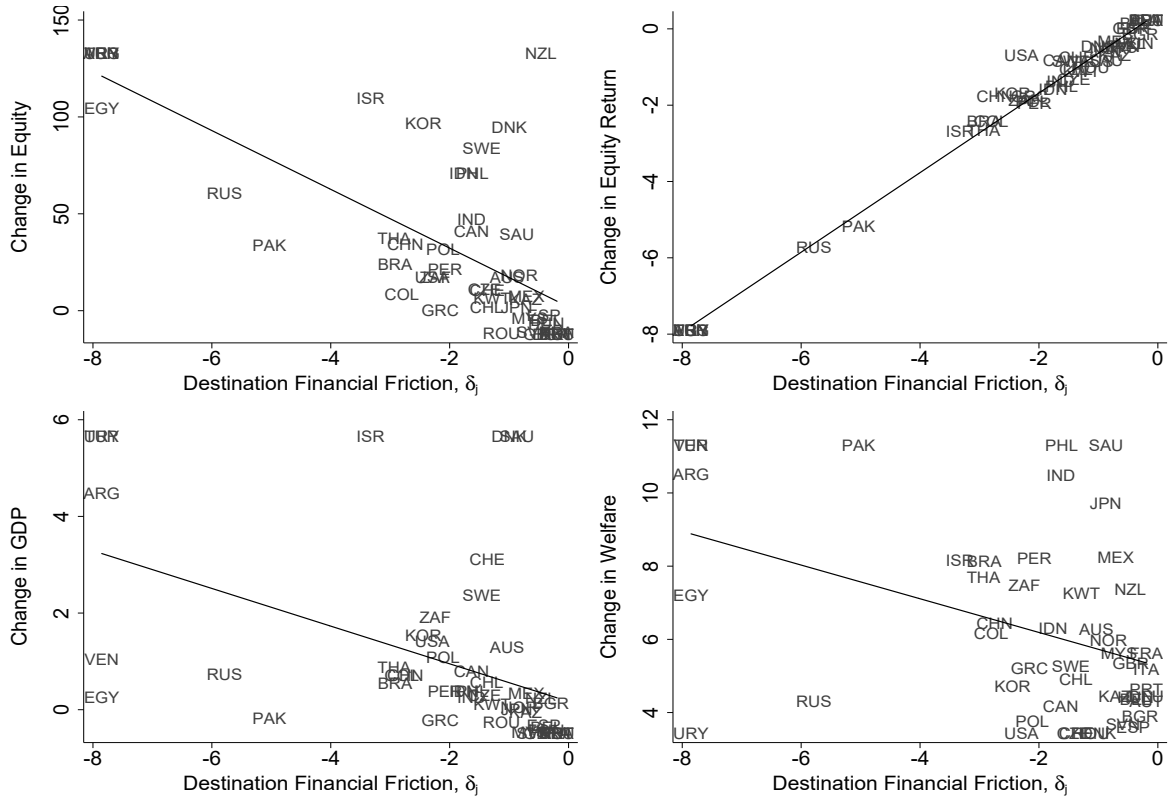
expands in capital-importing emerging economies, such as China (7.4 percent), Korea (7.5 percent), and Russia (13.7 percent), and contracts in capital-exporting advanced economies, such as Germany (−4.6 percent), France (−2.7 percent), and the United Kingdom (−2.3 percent). Revenues fall in all countries, with expanding economies experiencing a decline in producer prices that exceeds in percent terms the increase in quantities. The effects on GDP are relatively modest, because global firms account for a relatively small share of total economic activity. The changing global map of capital flows is accompanied by significant equilibrium adjustments in equity returns that fall by 0.7 percentage point in the United States, 1.8 percentage points in China, 1.4 percentage points in India, 2.4 percentage points in Brazil, and 5.7 percentage points in Russia.

The next two columns of the table show the percentage points change in the share of a country's total equity or revenues that accrues to the top one percent of firms, computed relative to the baseline concentration shares in Table 5. Following a financial liberalization, equity concentration rises in every country, with the largest increases in Russia (23.7 percentage points), Canada (18.5), and Korea (17.8). Revenue concentration rises by less, but it is still striking in Korea (17.6 percentage points) and substantial in China (6.2) and India (4.7).

Appendix Figure A.1 presents the distribution of welfare gains for all 48 countries in our sample, with a mean gain of 7.1 percent and a median gain of 5.5 percent. The last four columns of Table 7 present the welfare gains for the larger countries, ranging from 3.1 percent of labor income in the United States to 10.5 percent in India. The model generates significant welfare gains in all countries from an increase in the surplus from consuming the output of global firms, U_q. For the United States and emerging markets, this is the most important component of welfare gains. The returns component, U_r, is quantitatively important in Japan, Germany, France, and the United Kingdom, because investors gain income from financing the growth of firms located in emerging markets and the United States. The variance component, $U(\text{Var})$, is small relative to the level effects in the United States and emerging markets, while it meaningfully offsets the level gains in several developed economies.[33]

[33] Appendix Figures A.2 to A.6 present statistics of the components of the welfare changes for all countries in the sample. Appendix Figures A.7 and A.8 present statistics of changes in wages and GDP for all countries in the sample. For the largest countries, country portfolio shares between own equity, foreign equity, and risk-free assets are presented in Table A.4. Foreign equity shares rise between 36 percent (for the United States) and roughly 63 percent for most other countries, displacing both domestic equity and risk-free asset shares. The full welfare decomposition including U_n, U_ℓ, and U_π is presented in Table A.5. Changes in external balances are presented in Table A.6. The domestic-firm-profits component of welfare, U_π, is zero for all countries because, under log preferences for non-traded goods ($\psi = 1$), both the non-traded wage bill, $w_i L_{ni}$, and the value of non-traded output, $p_{ni} N_i$, have zero elasticity with respect to w_i, so non-traded profits, π_{ni}, are invariant to

Figure 3: Cross Section of Countries: Financial Liberalization



Notes. Cross section of country-level changes when moving from the baseline economy to the counterfactual economy under financial liberalization ($\mathbf{\Delta} = \mathbf{0}$). The horizontal axis in each panel is the baseline average bilateral financial friction that foreign investors face when investing in firms domiciled in the country, δ_j. Top-left: change in equity (percent). Top-right: change in expected equity return (percentage points). Bottom-left: change in GDP per capita (percent). Bottom-right: change in welfare in percent of baseline labor income. All variables are winsorized at the 10 percent level to improve visibility.

Figure 3 plots scatters of country-level outcomes against the international financial friction that the average firm in each country faces in the baseline model, which was labeled δ_j in Table 5. In the upper left panel, we see that equity tends to flow to countries that experience larger decreases in frictions. The upper right panel shows that these are the same countries with the largest declines in their expected returns. In the bottom panels, we observe that countries with larger declines in frictions tend to experience both larger increases in GDP and in welfare. However, the welfare gains are substantially larger than the GDP gains.

The international finance and macroeconomics literature has reached varied conclusions on the welfare effects of financial integration. The differences depend considerably on the details of the models and the mechanisms at work. In a celebrated result, Cole and Obstfeld (1991)

wage changes across counterfactuals that hold z_{ni} and $\bar{n}_i$ constant.

highlight that terms of trade movements substitute for missing asset markets, thereby suggesting limited welfare gains from financial integration. Gourinchas and Jeanne (2006) document elusive welfare gains of roughly 1 percent for typical non-OECD economies, driven by capital accumulation, with similar magnitudes reported by Coeurdacier, Rey, and Winant (2020) once they account for precautionary saving in a risky growth model. Mendoza, Quadrini, and Ríos-Rull (2009) report welfare gains between 0 and 4 percent through diversification and the reallocation of savings. Pellegrino, Spolaore, and Wacziarg (2025) estimate that removing all barriers to international investment in a multi-country dynamic spatial general equilibrium model would raise world output by approximately 7 percent. Kleinman, Liu, Redding, and Yogo (2026) estimate welfare gains of roughly 15 percent of consumption for the median country, when moving from a fully closed economy in both goods and asset markets to the observed equilibrium.[34] The magnitude of the welfare gains in their framework mostly reflects the dynamic capital- and wealth-accumulation channels that operate along the transition path to a new steady state, which are absent from our static comparison of equilibria. Conversely, our framework features firm-level heterogeneity in expected returns, demand elasticities, and profit shares, together with explicit gains from diversification and bilateral financial frictions, which are absent in their representative-producer setup. Thus, our welfare gains from financial liberalization mostly come from improvements in consumers' surplus, which complements the mechanisms highlighted by Kleinman, Liu, Redding, and Yogo (2026). However, our model abstracts from some other channels that the literature has emphasized.[35]

5.2 Financial Autarky

The next counterfactual considers a world economy under financial autarky. This is a constrained version of our model in which investors still maximize mean-variance preferences in equation (15) but under the constraint that they can invest only in domestic firms and the risk-free asset. Appendix A.5 presents the detailed derivations and the steps to solve the model

[34] Their gains are significantly larger for developed economies than for emerging markets. Benchmarking to the same 12 countries that we display in Table 7, the median consumption gain is 15 percent, with China, India, Brazil, and Russia experiencing gains below 5 percent.

[35] For example, we do not model endogenous capital accumulation or growth, which is the dominant channel in Obstfeld (1994), Gourinchas and Jeanne (2006), and partly Kleinman, Liu, Redding, and Yogo (2026). We also abstract from collateral constraints and pecuniary externalities that can deliver negative welfare consequences of financial integration, as in Bianchi (2011), and from firm-level credit frictions that misallocate capital and lower aggregate productivity, as documented for South Europe by Gopinath, Kalemli-Özcan, Karabarbounis, and Villegas-Sanchez (2017). Our quantitative magnitudes should therefore be interpreted as the contribution of the channels we model rather than as a complete welfare accounting.

Table 8: From Financial Autarky to the Baseline

	(100× log changes)				(p.p. changes)			(percent, labor income)			
	q	p	e	GDP	μ	s_e^1	s_{pq}^1	U	U_q	U_r	U(Var)
USA	2.1	-1.4	6.9	0.7	-0.2	0.6	0.1	-0.1	1.0	-2.4	1.2
CHN	1.2	-1.7	5.6	0.1	-0.3	-0.2	0.3	0.2	0.6	-0.8	0.4
JPN	0.7	-1.0	2.0	0.2	-0.2	0.6	0.1	0.3	0.8	-1.1	0.5
DEU	0.5	-0.5	2.3	0.1	-0.1	-0.1	0.1	0.2	0.4	-0.4	0.2
FRA	2.3	-1.4	9.9	0.6	-0.2	2.3	0.2	-0.4	0.4	-1.7	0.9
GBR	-1.0	0.5	-5.2	-0.2	0.2	1.4	0.2	1.6	0.3	2.7	-1.3
CAN	-5.5	3.0	-11.4	-1.3	0.7	-0.5	0.1	3.6	0.1	7.4	-3.7
CHE	6.0	-3.2	9.1	2.7	-0.5	0.2	-0.3	-2.6	1.0	-7.6	3.8
IND	1.4	-1.6	4.2	0.1	-0.3	-0.4	0.2	0.0	0.1	-0.3	0.1
KOR	0.9	-1.3	8.0	0.2	-0.2	0.0	0.3	0.1	0.6	-1.0	0.5
BRA	1.3	-1.3	3.5	0.1	-0.3	-0.4	0.0	0.2	0.4	-0.5	0.2
RUS	2.3	-2.1	7.0	0.1	-0.8	-0.4	0.1	0.1	0.3	-0.5	0.2

Notes. Counterfactual changes when moving from financial autarky (no cross-border equity investment) to the baseline economy. The columns are defined as in Table 7.

under financial autarky.

Table 8 reports the changes in aggregate outcomes when moving from financial autarky to the baseline economy. The quantity produced by global firms rises by 2.1 percent in the United States, 1.2 percent in China, and 6.0 percent in Switzerland, while it falls in Canada (−5.5 percent) and the United Kingdom (−1.0 percent). Producer prices exhibit the opposite pattern. Prices decline in countries that expand their production and increase in countries that contract their production. Equity flows follow a qualitatively similar pattern to quantities. In most cases, changes in GDP, equity returns, and concentration are rather insignificant.

The welfare effects of financial globalization are also small in the last four columns. Among the components of welfare, we find the most important role for the gains in the surplus from consuming the global products, U_q. Some countries, such as the United States, also experience welfare gains due to better diversification, as shown by the U(Var) term. However, the lowering of the return component of welfare, U_r, tends to offset the gains from product variety and asset diversification. The welfare changes are modest because under the baseline international financial frictions, $\mathbf{\Delta}$, the world is already close to autarky. Equivalently, under the baseline $\mathbf{\Delta}$ our model generates the large home bias in asset trade documented in Appendix Table A.2.[36]

[36]The allocation of country portfolio shares between own equity, foreign equity, and risk-free assets is presented

Table 9: Trade Liberalization: Changes in Production and Consumption Trade Costs

(changes, p.p.)	Production trade cost τ_j	Consumption trade cost τ_i
USA	-14.6	-2.1
CHN	-25.1	-4.6
JPN	-20.7	-2.1
DEU	-23.4	-6.7
FRA	-23.5	-5.2
GBR	-23.7	-6.8
CAN	-34.5	-25.0
CHE	-23.4	-9.7
IND	-15.8	-12.0
KOR	-22.8	-4.0
BRA	-16.3	-16.4
RUS	-34.5	-17.8

Notes. Implied changes (in percentage points) in the population-weighted production trade cost τ_j in equation (27) and the expenditure-weighted consumption trade cost τ_i in equation (28) when the tariff and non-tariff-measure components of τ_{ji} are eliminated. The counterfactual trade costs are evaluated at the baseline expenditure weights, P_i/P and $p_j q_{ji} / \sum_j p_j q_{ji}$.

5.3 Trade Liberalization

We next evaluate the effects of a trade liberalization. Recall that we defined the bilateral trade frictions, τ_{ji}, in equation (26) as including tariffs, non-tariff measures, and shipping costs. We adopt the view that the former two components of τ_{ji} are related to countries' policies, whereas the latter is largely a technological constraint on trading goods across countries. Thus, in our counterfactual we eliminate the tariff and non-tariff-measure components of τ_{ji}, so that only shipping costs remain. We leave all other primitives of the model unchanged, including the preference parameters b_{ji} that partly generate home bias in trade. Because the bilateral trade costs are measured directly from external sources rather than backed out as residuals from observed trade shares, the experiment changes a set of independently measured trade frictions while keeping the underlying demand system fixed.[37]

Table 9 reports the change in the country-level production trade cost, τ_j, and consumption

in Table A.7. The full welfare decomposition including U_n, U_ℓ, and U_π is presented in Table A.8. Changes in external balances are presented in Table A.9.

[37]We have not rebated any of the tariff revenues back to households. Since utility is quasi-linear, any such rebate would be absorbed by the consumption of the outside traded good. Tariffs account for 15 percent of the average trade cost in the baseline, so rebating the revenues back to households would increase increase the consumption of the outside good in the baseline economy by 15 percent of the foregone income reported in Table 6. Thus, our welfare gains would be only slightly smaller than reported below in Table 10.

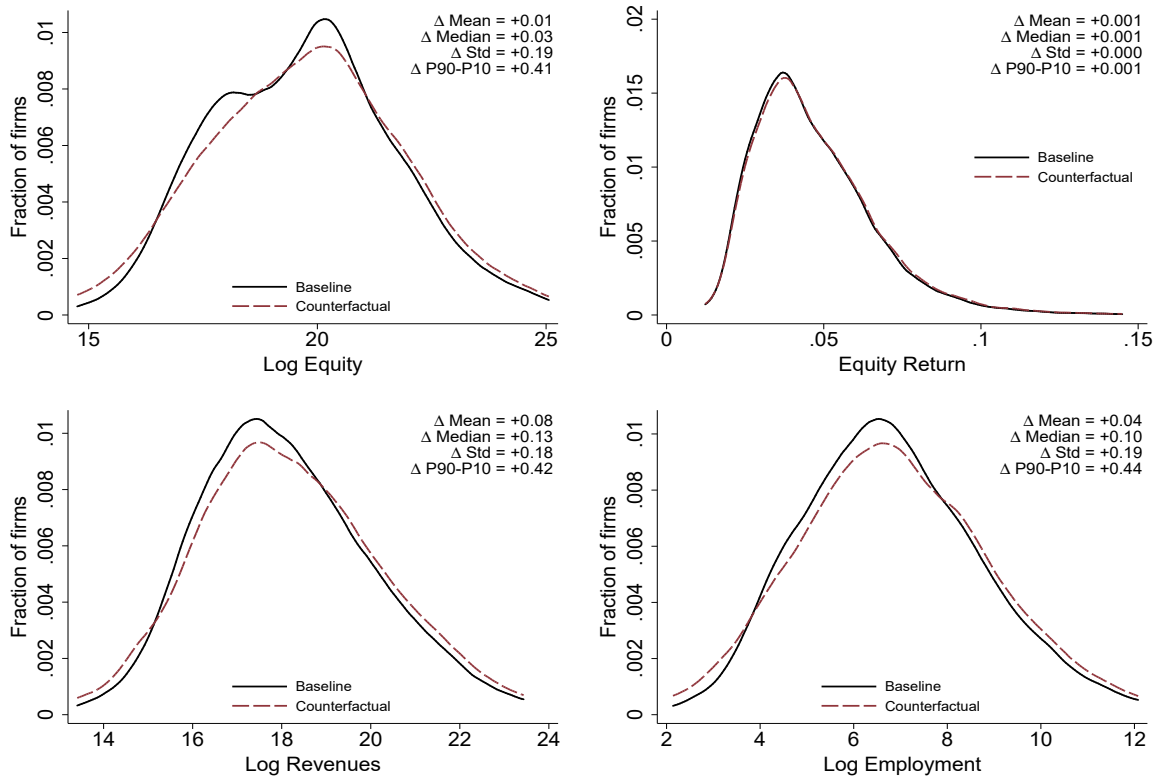
trade cost, τ_i, computed from equations (27) and (28), evaluated at the baseline weights, P_i/P and $p_j q_{ji} / \sum_j p_j q_{ji}$, but using the new trade frictions, τ'_{ji}, that include only shipping costs. The production trade cost falls by roughly 15 percentage points in the United States and India, between 21 and 25 percentage points in most other advanced economies, and as much as 35 percentage points in Canada and Russia. The drop in consumption trade costs varies significantly more across countries than the drop in production trade costs. Consumption trade costs fall by as little as 2 percentage points in the United States to as much as 25 percentage points in Canada. The drop in consumption trade costs depends on the trade costs that countries impose in the baseline and on their baseline expenditure shares on foreign goods. Countries such as Brazil and Russia have larger initial trade costs related to tariffs and non-tariff measures, whereas countries such as Canada have both larger initial trade costs and import a significant share of their consumption expenditures.

5.3.1 Firm Outcomes

Figure 4 presents distributions of firm outcomes in the baseline economy and the counterfactual economy under trade liberalization. Beginning with the top left panel, as with financial liberalization, here we also observe a significant change in the dispersion of log equity across firms. The standard deviation of equity increases by 19 percentage points and the difference between the 90th and the 10th percentile increases by 41 percentage points. The difference between trade and financial liberalization is that mean and median equity do not change in the former case as significantly as they do in the latter case. Intuitively, trade liberalization redistributes equity across firms but does not affect the split of global wealth between equity and the risk-free asset as much. As a result, in the upper right panel, the distribution of returns does not change significantly.

The lower left panel shows the distribution of revenues. Similar to financial liberalization, here revenues also become more dispersed, with the standard deviation increasing by 18 percentage points and the difference between the 90th and the 10th percentile of the distribution increasing by 42 percentage points. The difference with financial liberalization is that mean and median revenues increase substantially under trade liberalization. This difference reflects the different margins of adjustment. The demand for global firms' products increases under trade liberalization, whereas the supply of products increases under financial liberalization. Both liberalizations, however, generate a significant increase in the dispersion across firms, including

Figure 4: Cross Section of Firms: Trade Liberalization



Notes. Kernel densities of firm-level outcomes across the universe of global firms, in the baseline economy and in the counterfactual economy under trade liberalization (the tariff and non-tariff-measure components of τ_{ji} are eliminated). Top-left: log equity, $\log e_j$. Top-right: expected equity return, μ_j. Bottom-left: log revenue, $\log p_j q_j$. Bottom-right: log employment, $\log \ell_j$. Each panel reports in its upper-right corner the changes in moments between the two distributions. Kernel density and moment changes are estimated on the full data, but the x-axis is trimmed between the 1st and 99th percentile to improve visibility.

the dispersion of labor hired by global firms as shown in the lower right panel.

5.3.2 Aggregate Outcomes

Table 10 reports changes at the country level following a trade liberalization. Firm output expands in every country, from 6 percent in India and 8 percent in Brazil to almost 25 percent in Russia and Canada. Producer prices rise modestly in all countries. Since the drop in tariffs is larger in absolute value than the rise of prices, consumer prices fall in the counterfactual. For the largest countries shown in the table, the expansion of global firms' production is accommodated by a reallocation of investors' portfolios from risk-free assets to equity. GDP rises in all countries, but by less than the production of global firms since non-traded goods bear some of the adjustment to trade liberalization. Different from the case of financial liberalization, equity

Table 10: From the Baseline to Trade Liberalization

	(100× log changes)				(p.p. changes)			(percent, labor income)			
	q	p	e	GDP	μ	s_e^1	s_{pq}^1	U	U_q	U_r	U(Var)
USA	10.0	2.5	6.3	3.5	0.1	1.2	1.4	1.7	-0.1	1.7	-0.8
CHN	17.5	1.0	8.6	1.9	0.1	3.7	3.7	1.7	1.5	0.2	-0.1
JPN	14.5	1.3	10.8	3.6	0.0	2.3	2.6	1.1	0.4	0.6	-0.3
DEU	22.7	1.7	16.8	4.5	0.1	1.3	1.2	2.5	1.9	0.3	-0.2
FRA	22.7	1.9	19.2	5.6	0.1	-0.3	-0.5	2.4	1.5	0.6	-0.3
GBR	18.0	2.0	15.9	5.9	0.1	1.9	0.8	5.2	3.0	0.9	-0.4
CAN	24.9	2.4	18.4	7.9	0.1	1.5	1.3	22.4	19.7	1.3	-0.6
CHE	19.5	2.1	18.7	9.6	0.1	1.4	0.2	6.5	4.5	1.4	-0.7
IND	6.1	0.8	3.1	0.3	0.0	3.1	4.2	4.7	4.7	0.0	0.0
KOR	11.5	0.9	3.9	2.6	0.1	6.0	2.5	1.9	1.4	0.4	-0.2
BRA	7.5	0.9	4.7	0.7	0.1	1.0	0.5	7.8	7.7	0.1	-0.1
RUS	23.6	0.4	15.8	1.3	0.0	1.0	1.5	4.2	4.1	0.0	0.0

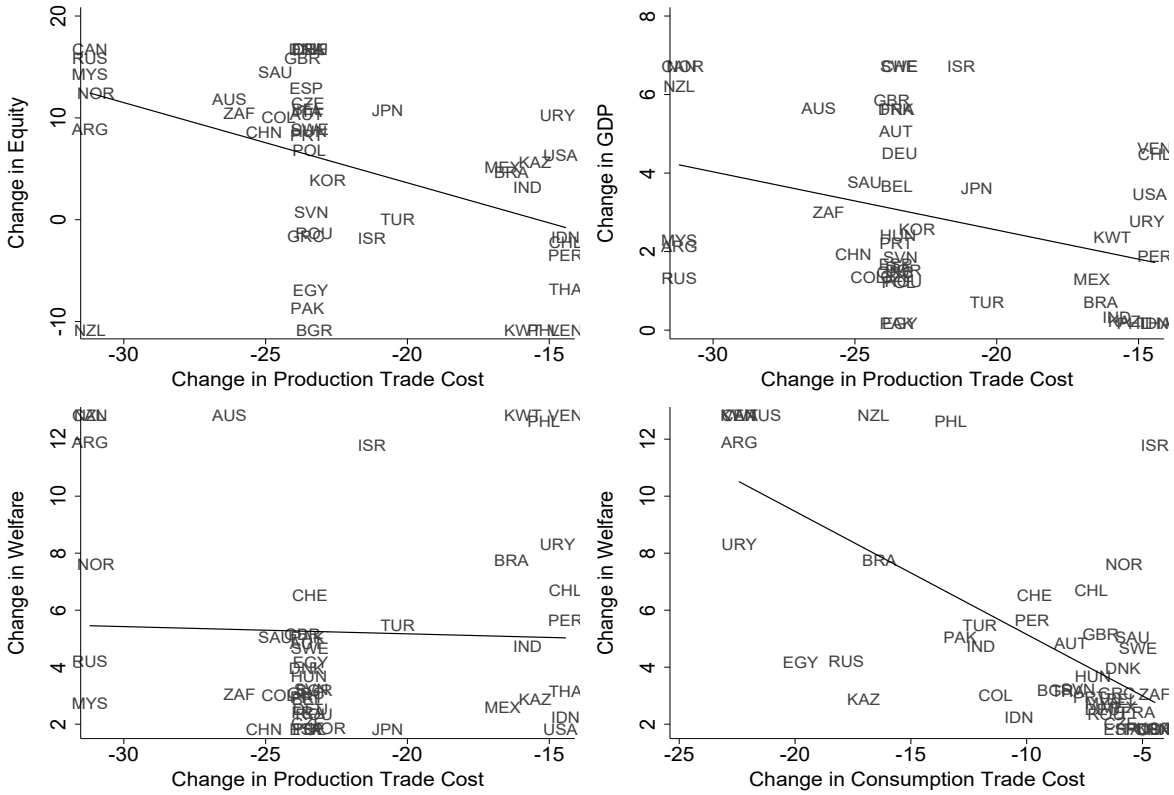
Notes. Counterfactual changes when moving from the baseline economy to an economy in which tariff and non-tariff-measure components of the bilateral trade costs τ_{ji} are eliminated. Columns are defined as in Table 7.

returns barely change. The within-country share of equity and revenues accruing to the top 1 percent of firms typically increases, but by magnitudes that are significantly smaller than in the case of financial liberalization.

Appendix Figure A.1 presents the distribution of welfare gains for all countries in our sample, with a mean gain of 6.7 percent and a median gain of 3.8 percent. The last four columns of Table 10 present the welfare gains for the larger countries in our sample. The welfare gains vary quite a bit across countries. The United States gains almost 2 percent of baseline labor income, while Canada gains 22 percent, Brazil gains 8 percent, and Switzerland and the United Kingdom gain roughly 5 to 6 percent. With the notable exception of the United States, most of the welfare gains come from an improvement in the surplus from consuming the global firms' products, U_q. The component related to capital returns, U_r, contributes positively to welfare, whereas the component related to the variance of returns, U(Var), typically contributes negatively, but the variance contribution is small in magnitude.[38]

[38]Country portfolio shares between own equity, foreign equity, and risk-free assets are presented in Table A.10. Foreign equity shares rise modestly across the board, reflecting the partial substitution between product and asset market openness rather than the much larger reallocation seen under financial liberalization. The full welfare decomposition including U_n, U_ℓ, and U_π is presented in Table A.11. We highlight that, similar to standard trade models, the component of welfare related to higher wages, U_ℓ, contributes significantly to the welfare gains in most countries and especially in the United States. We show statistics of the distribution

Figure 5: Cross Section of Countries: Trade Liberalization



Notes. Cross section of country-level changes when moving from the baseline economy to the counterfactual economy under trade liberalization in which the tariff and non-tariff-measure components of τ_{ji} are eliminated. Top-left: change in equity (percent) against the change in the production trade cost, τ_j, defined in equation (27). Top-right: change in GDP per capita (percent) against the change in τ_j. Bottom-left: change in welfare in percent of baseline labor income, against the change in τ_j. Bottom-right: change in welfare against the change in the consumption trade cost, τ_i, defined in equation (28). All variables are winsorized at the 10 percent level to improve visibility.

To better understand the cross-country patterns following a trade liberalization, Figure 5 plots the cross section of country-level changes in equity, GDP, and welfare against the changes in production, τ_j, and consumption trade costs, τ_i, induced by trade liberalization. We differentiate between these two measures of trade frictions, because the former matters most for production whereas the latter matters most for consumption. Beginning with the top panels, we observe that countries that experience larger declines in their production trade costs tend to experience larger increases in their equity inflows and GDP. However, there is a substantial dispersion of equity flows for countries around the middle of the distribution of

of changes in U_ℓ and changes in wages in Appendix Figures A.4 and A.7. Changes in external balances are presented in Table A.12. Countries with lower initial tariffs, such as the United States, Germany, and France, increase their exports by more than their imports, and countries with higher initial tariffs, such as India, Brazil, and Russia, increase their imports by more than their exports.

production trade costs. Some countries with declines of between 20 to 25 percent experience equity inflows, whereas others experience equity outflows. This observation helps to reconcile the apparent inconsistency between the top left panel of Figure 4, that shows an insignificant change in mean firm equity, and the equity column in Table 10, that shows significant equity gains for most of the largest economies. The world economy as a whole does not change significantly its global allocation between risk-free assets and equity. Rather, following a trade liberalization, there is a reallocation of equity across firms, with larger firms gaining equity and smaller firms losing equity. Since larger firms tend to be located in the largest countries shown in Table 10, these countries gain equity flows following a trade liberalization.

The bottom panels show how the welfare gains vary with both the change in production and the change in consumption trade costs. The latter is significantly more important for welfare changes. Countries with larger declines in consumption trade costs tend to experience larger welfare gains, because households increase their consumption of imported varieties.

How do our welfare gains compare to the welfare gains generated by other trade models? A useful starting point is the literature that builds on the formula of Arkolakis, Costinot, and Rodríguez-Clare (2012) that expresses welfare gains as a function of the change in the domestic share of expenditures and the trade elasticity. Costinot and Rodríguez-Clare (2014) present estimates of welfare gains using this formula, with the estimates varying between roughly 2 percent for the United States to 4 percent for the world when moving from autarky to the observed equilibrium. While these estimates appear in the ballpark of our welfare gains, there is an important conceptual difference between our counterfactual and the counterfactuals that use the Arkolakis, Costinot, and Rodríguez-Clare (2012) formula. In our counterfactual, we remove the part of the trade friction that is associated with tariff and non-tariff policies. Using the Arkolakis, Costinot, and Rodríguez-Clare (2012) formula approximates this experiment only to the extent that the change in the domestic share due to changes in trade frictions is the same between the two models.[39]

A more direct comparison to standard trade models is to estimate the trade elasticity in our model that underlies the welfare gains from trade liberalization in Table 10. We estimate the trade elasticity by running the regression

$$\ln X_{ik} \;=\; d_i + d_k + (\text{trade elasticity}) \times \ln(1+\tau_{ik}) + \text{error}_{ik}, \tag{43}$$

[39]Closer to the spirit of our exercise, Caliendo and Parro (2015) report modest gains from the elimination of NAFTA tariffs. The welfare gains are 1.3 percent for Mexico and close to zero for the United States and Canada.

where X_{ik} is total exports from country k to country i, d_i and d_k are importer and exporter fixed effects, and τ_{ik} is the bilateral trade friction between the two countries. We obtain a point estimate for the trade elasticity equal to -4.29, with a standard error clustered at the pair level equal to 0.47. We also run the regression in changes by taking differences between the model with trade liberalization, which eliminates tariffs and non-tariff measures from τ_{ik}, and the baseline model, which includes these frictions. The point estimate for the trade elasticity falls to -3.58, with a clustered standard error of 0.14.[40] Our trade elasticity estimate of around -4 falls in the lower end of the range of estimates reported by the literature.[41]

5.4 The Importance of Modeling Trade and Finance Frictions Jointly

In this section we evaluate the joint role of international trade and financial market frictions. In the first step, we consider two nested versions of the baseline model, one for the case in which financial frictions are absent, $\delta_{ji} = 0$, and the other for the case in which trade costs are absent, $\tau_{ji} = 0$.[42] We then perform a trade liberalization experiment, as in Section 5.3, in the model without financial frictions and a financial liberalization experiment, as in Section 5.1, in the model without trade costs.

Table 11 compares the welfare gains from trade and financial liberalization in the baseline model to the nested models in which one type of friction is absent. The first column of the table presents statistics of the welfare gains from trade liberalization in the baseline model. The second column presents the same statistics from trade liberalization in the model without financial frictions, $\delta_{ji} = 0$. The welfare gains from trade liberalization are larger in a model with financial frictions than in a model without. The difference in welfare gains is relatively small at the bottom of the baseline welfare-gain distribution and for countries with higher than

[40] For the specification that compares the trade liberalization to the baseline, fixed effects are differenced out from equation (43). Our estimate of the trade elasticity does not change when we add fixed effects to the differenced equation, because the change in the trade cost is essentially uncorrelated with these fixed effects.

[41] For example, Costinot and Rodríguez-Clare (2014) adopt a value of -5 as their baseline estimate. However, Simonovska and Waugh (2014) use a simulated-method-of-moments estimator to estimate a value of -4 using price dispersion across countries and Boehm, Levchenko, and Pandalai-Nayar (2023) use tariff shocks and estimate long-run elasticities of around -2. One reason our elasticity estimate might be on the lower end of the range reported by the literature is that, while there is reallocation of activity across products within a country, we do not have other long-run adjustment margins such as entry and exit of products. In that sense, in our model the variation across countries is mostly driven by product-level variation and our estimate is relatively comparable to the median estimate in Broda and Weinstein (2006), who examine substitution among narrowly defined goods rather than between aggregate national bundles.

[42] Different from the trade liberalization experiment, this nested version of the model removes all trade costs, including shipping costs. The reason is that our intention here is approximating a model without costs of shipping goods, as opposed to asking what are the effects of removing policies that impede trade across countries.

Table 11: Joint Role of Trade and Financial Frictions

	Trade Liberalization		Financial Liberalization	
Welfare changes	Baseline	$\delta_{ji} = 0$	Baseline	$\tau_{ji} = 0$
10th percentile	1.8	1.5	3.4	3.0
25th percentile	2.6	1.9	4.3	3.5
50th percentile	3.8	2.9	5.5	4.8
75th percentile	6.6	6.0	7.9	6.5
90th percentile	12.8	11.0	11.3	9.9
Rich, Median	3.0	2.8	4.5	4.1
Poor, Median	4.5	3.1	7.4	5.8

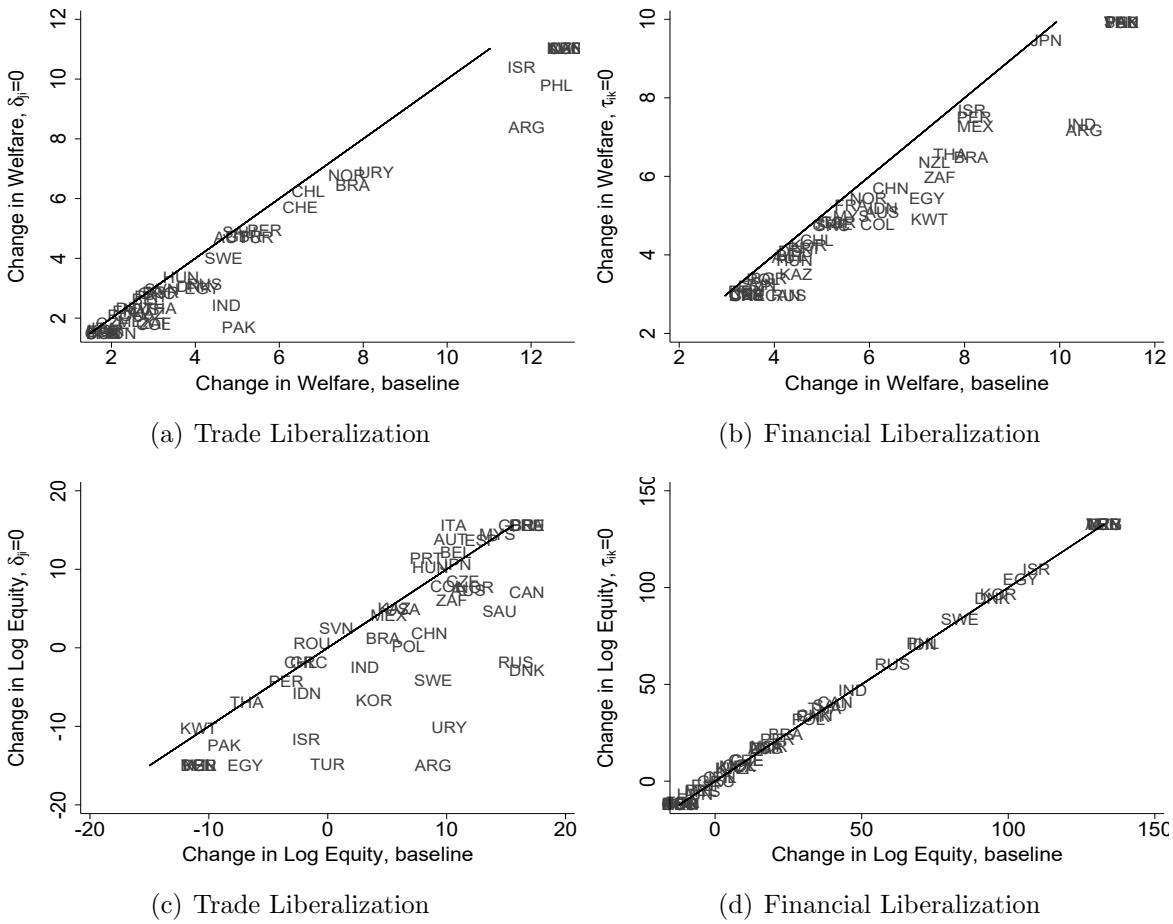
Notes. Welfare changes in percent of baseline labor income. The baseline columns report statistics of the welfare changes under trade liberalization and financial liberalization in the baseline model. The $\delta_{ji} = 0$ column reports the welfare changes under trade liberalization but in a model without international financial frictions. The $\tau_{ji} = 0$ column reports the welfare changes under financial liberalization but in a model without trade costs. The last two rows report the median welfare change among rich (above-median-wage) and poor (below-median-wage) countries. Each row reports marginal percentiles of the respective distribution. The paired country-by-country comparison is shown in Figure 6.

median wages (labeled "Rich" in the table). For example, among rich countries, the median welfare gain decreases by roughly 7 percent in the absence of financial frictions. The difference in welfare gains becomes significantly larger for poorer countries. Among poor countries, the median welfare gain is roughly 45 percent larger in the presence than in the absence of financial frictions, falling from 4.5 to 3.1 percent when $\delta_{ji} = 0$.

A symmetric pattern holds when comparing column 3 to 4, which removes trade costs by setting $\tau_{ji} = 0$. The welfare gains from financial liberalization are larger in the presence than in the absence of trade costs, with the gap again being substantially larger for poor countries. Among poor countries, the median welfare gain is almost 30 percent larger with trade costs present, falling from 7.4 percent in the baseline economy to 5.8 percent in the absence of trade costs.

A key message of our analysis is that it is important to model international impediments to both product and asset trade, even if a researcher is interested in quantifying the welfare effects of liberalization in only one market. Trade and financial market liberalizations are substitutes in our model, because some of the welfare gains under trade liberalization are absent when financial markets are frictionless and some of the welfare gains under financial liberalization are absent without trade frictions. Equivalently, the two frictions amplify each other. Our model generates a joint role for both frictions because both trade and finance serve important roles

Figure 6: Cross Section of Countries: Joint Frictions



(a) Trade Liberalization

(b) Financial Liberalization

(c) Trade Liberalization

(d) Financial Liberalization

Notes. Cross section of country-level changes from liberalization in the baseline model and in the nested models that remove the other friction. The top panels plot the change in household welfare (in percent of baseline labor income) and the bottom panels plot the change in country equity (in percent). The left panels report trade liberalization, with the change in the baseline model on the horizontal axis and the change in the model without financial frictions, $\delta_{ji} = 0$, on the vertical axis. The right panels report financial liberalization, with the change in the baseline model on the horizontal axis and the change in the model without trade costs, $\tau_{ji} = 0$, on the vertical axis. Each marker is a country and the solid line is the 45-degree line. All variables are winsorized at the 10 percent level to improve visibility.

in the utility from consuming goods. Trade frictions raise the price of imports and reduce the surplus from consuming imported varieties. Financial frictions reduce the flow of capital to exporters of goods, which in turn raises the price of imports and again reduces the surplus from consuming imported varieties.

The top panels of Figure 6 plot, for trade liberalization (left) and financial liberalization (right), each country's welfare gain in the baseline model against its welfare gain in the nested model. When an observation lies below the solid 45-degree line, the welfare gains from a

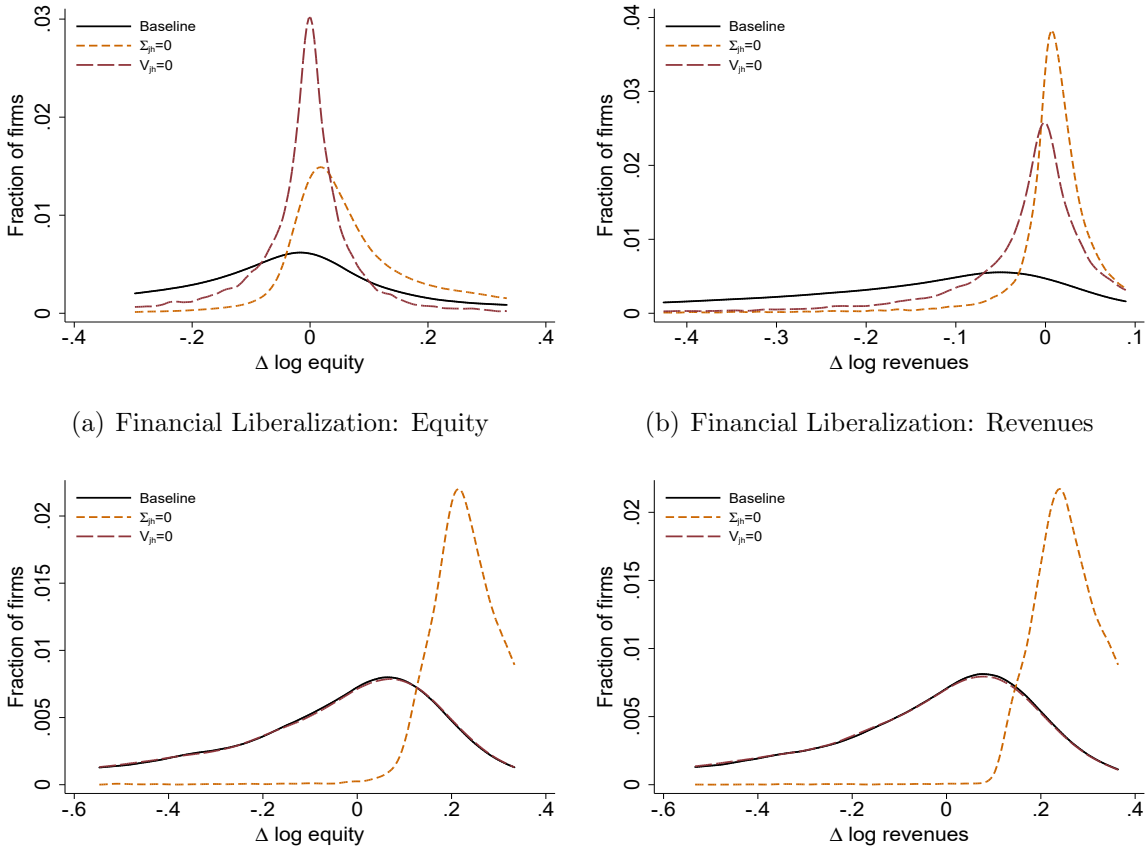
liberalization in one market are larger in the baseline than in the nested model that removes frictions from the other market. To give an example, in the baseline, Argentina experiences roughly 12 percent welfare gain under trade liberalization and 11 percent welfare gain under financial liberalization. Removing financial frictions reduces Argentina's welfare gain under trade liberalization to 8 percent and removing trade costs reduces Argentina's welfare gain under financial liberalization to 7 percent. The bottom panels present the difference in equity flows to countries. In the bottom right panel, we do not observe an important role for trade frictions when liberalizing financial markets, because most observations lie close to the 45-degree line. However, in the bottom left panel, we observe a significant role for financial frictions when liberalizing goods markets. To continue our example, Argentina experiences a 9 percent increase in its equity inflows in the baseline model under trade liberalization. Removing financial frictions reverses the direction of equity flows, with Argentinean firms experiencing a decline of around 15 percent in their equity.

5.5 The Importance of Modeling Firm Substitution and Correlation

How important are product-market substitution and capital-market correlation, as encoded into the two matrices $\mathbf{\Sigma}$ and $\mathbf{V}$, for our results? We consider two nested model environments. The first one has $\mathbf{\Sigma}_{jh} = 0$ and so it removes product substitution. The second one sets the off-diagonal covariances to zero, $\mathbf{V}_{jh} = 0$, and so it removes asset correlation. In both environments, we follow the same process described in Section 3.2 to fully recalibrate our model. We then perform a financial liberalization counterfactual, as in Section 5.1, and a trade liberalization counterfactual, as in Section 5.3.

Figure 7 plots the cross-firm distribution of the change in log equity and log revenues under financial and trade liberalization, comparing the baseline calibration to the two nested model environments. The channels through the $\mathbf{\Sigma}$ and $\mathbf{V}$ matrices are different between the two counterfactuals. Under financial liberalization, setting $\mathbf{V}_{jh} = 0$ eliminates a large part of the dispersion of equity and revenues across firms. However, setting $\mathbf{V}_{jh} = 0$ barely changes the distributions of equity and revenues under trade liberalization relative to the baseline. Setting $\mathbf{\Sigma}_{jh} = 0$ eliminates nearly all the negative equity and revenue changes under trade liberalization and substantially reduces the fraction of negative changes under financial liberalization. Thus, product-market substitution is crucial in generating both winners and losers when liberalizing both markets. By contrast, asset-market correlation is crucial in generating larger firm-level

Figure 7: Cross Section of Firms: The Importance of $\mathbf{\Sigma}$ and $\mathbf{V}$



(a) Financial Liberalization: Equity

(b) Financial Liberalization: Revenues

(c) Trade Liberalization: Equity

(d) Trade Liberalization: Revenues

Notes. Each panel plots the kernel density of firm-level $\Delta \log e_j$ (panels (a) and (c)) or $\Delta \log p_j q_j$ (panels (b) and (d)) under the indicated counterfactual. Within each panel, three kernel densities are shown: the baseline calibration (solid black), the $\mathbf{\Sigma}_{jh} = 0$ environment (dashed orange), and the $\mathbf{V}_{jh} = 0$ environment (dashed maroon). Kernel density is estimated on the full data, but the x-axis is trimmed between the 10th and 90th percentile to improve visibility.

dispersion in outcomes following a financial liberalization only.

Table 12 reports the within-country change in the top one percent shares following a financial liberalization under the three model environments. The increase in the top one percent share of equity and revenues is substantially smaller under the $\mathbf{V}_{jh} = 0$ model environment relative to the baseline. Referring back to Figure 7, we observe that the $\mathbf{\Sigma}_{jh} = 0$ environment generates a heavier right tail of changes. However, most firms gain under financial liberalization, so concentration does not rise as much as in the baseline.

Table 13 reports the within-country change in the top one percent shares following a trade liberalization under the three model environments. The share of equity and revenues accruing

to the top one percent of firms does not change significantly between the baseline and the $\mathbf{V}_{jh} = 0$ model environment. Under the $\mathbf{\Sigma}_{jh} = 0$ environment, we observe either smaller increases in concentration or declines in concentration. The logic is that removing product-market substitution does not allow the model to generate any losers.

Moving to the welfare consequences of financial and trade liberalization, Table 14 presents statistics of the welfare gains in the baseline and the two nested environments. The most striking result is that the welfare gains from financial liberalization almost disappear under the $\mathbf{V}_{jh} = 0$ environment. Without asset correlation, the inferred international financial frictions are much smaller and so the gains of removing them are smaller.[43] Under the $\mathbf{\Sigma}_{jh} = 0$ environment, we obtain larger welfare gains from both financial and trade liberalization. This is consistent with the firm-level analyses above that show that, without product market substitution, almost all firms expand their economic activity in the counterfactuals with liberalization.

5.6 Additional Counterfactuals and Sensitivity Checks

In this section we briefly describe some additional counterfactual experiments and sensitivity checks presented in more detail in the appendix. Appendix Tables A.13 and A.14 study a global trade war that raises all bilateral trade costs by 15 percentage points. Developed economies lose more than emerging markets because they rely more on imports to finance their consumption. For example, welfare decreases by around 3 percent in the United States, by between 5 and 6 percent in the United Kingdom, Canada, and Switzerland, but by only around 1 to 2 percent in China and in other emerging markets, with India roughly unchanged. Appendix Table A.15 examines the effects of productivity growth.[44] Productivity growth is significantly larger in emerging markets than in developed economies. Countries such as China and India experience welfare changes above 100 percent and GDP changes of around 60 percent, whereas welfare and GDP in the United States, Japan, Germany, and Canada change by less than 10 percent. Appendix Table A.16 examines the effects of changes in the risk-free rate, by raising r_0 from 2 percent in the baseline to 3 percent in the counterfactual. Welfare in the baseline is lower

[43] Most of the off-diagonal entries in $\mathbf{V}$ are positive, which according to equations (31) and (32) allows the model to generate higher expected returns and international financial frictions than when we shut off the positive correlation of assets.

[44] We consider productivity changes in the fifteen-year period leading to the last year of coverage in the PWT. We perturb all c_{ji}'s for firms domiciled in a country by the country's change in employment to real GDP from the PWT and all z_j's for firms domiciled in a country by the country's change in real GDP to capital stock. We also change domestic goods productivity, z_{ni}, by plugging updated values of wages and non-traded goods prices in equation (36).

Table 12: Changes in Firm Concentration: Financial Liberalization

Changes in top 1% share	Baseline		$\mathbf{\Sigma}_{jh} = 0$		$\mathbf{V}_{jh} = 0$	
(percentage points)	e	pq	e	pq	e	pq
USA	2.0	0.8	0.9	-0.1	1.8	0.3
CHN	5.3	6.2	0.3	1.5	0.6	0.1
JPN	2.5	0.8	1.4	-0.1	0.3	0.0
DEU	11.7	1.0	11.5	0.7	0.1	0.1
FRA	6.0	0.5	5.2	0.4	2.1	0.2
GBR	4.3	0.5	4.1	0.3	-0.1	0.0
CAN	18.5	1.0	16.1	0.2	2.8	0.1
CHE	0.4	0.1	0.0	-0.4	0.7	0.1
IND	14.1	4.7	11.2	2.1	0.3	0.4
KOR	17.8	17.6	13.6	10.4	6.7	0.3
BRA	9.5	1.4	7.9	0.4	5.7	0.3
RUS	23.7	2.6	22.9	1.7	6.6	0.3

Table 13: Changes in Firm Concentration: Trade Liberalization

Changes in top 1% share	Baseline		$\mathbf{\Sigma}_{jh} = 0$		$\mathbf{V}_{jh} = 0$	
(percentage points)	e	pq	e	pq	e	pq
USA	1.2	1.4	-0.6	-0.2	1.2	1.5
CHN	3.7	3.7	-0.7	-0.1	3.7	3.7
JPN	2.3	2.6	-0.5	0.1	2.3	2.7
DEU	1.3	1.2	0.3	-0.3	0.5	1.2
FRA	-0.3	-0.5	-1.7	-1.2	-0.2	-0.5
GBR	1.9	0.8	-0.1	-0.9	1.3	0.8
CAN	1.5	1.3	0.5	-0.2	1.2	1.4
CHE	1.4	0.2	0.0	-1.0	1.3	0.2
IND	3.1	4.2	0.3	0.5	3.6	4.2
KOR	6.0	2.5	0.9	-0.7	4.7	2.5
BRA	1.0	0.5	-0.2	-0.7	0.8	0.5
RUS	1.0	1.5	-0.1	0.6	0.9	1.5

Notes. Changes (in percentage points) in the share of country revenue, $\sum_{j(i)} p_j q_j$, and equity market capitalization $\sum_{j(i)} e_j$ accounted for by the top one percent of firms, when moving from the baseline economy to either financial or trade liberalization. The Baseline columns use the calibrated economy; the $\mathbf{\Sigma}_{jh} = 0$ columns set product substitution to zero; the $\mathbf{V}_{jh} = 0$ columns set the off-diagonal return covariances to zero. Baseline concentration shares are reported in the last four columns of Table 5.

Table 14: Change in Welfare: The Importance of $\mathbf{\Sigma}$ and $\mathbf{V}$

	Financial Liberalization			Trade Liberalization		
Welfare changes	Baseline	$\mathbf{\Sigma}_{jh} = 0$	$\mathbf{V}_{jh} = 0$	Baseline	$\mathbf{\Sigma}_{jh} = 0$	$\mathbf{V}_{jh} = 0$
10th percentile	3.4	3.6	0.6	1.8	1.8	1.9
25th percentile	4.3	4.5	0.8	2.6	2.7	2.7
50th percentile	5.5	5.9	1.2	3.8	4.5	3.7
75th percentile	7.9	8.4	1.9	6.6	8.3	6.5
90th percentile	11.3	12.0	3.5	12.8	17.7	13.1
Rich, Median	4.5	4.7	0.9	3.0	3.5	3.2
Poor, Median	7.4	8.0	1.9	4.5	6.0	4.6

Notes. Welfare changes in percent of baseline labor income. The Baseline columns report statistics of the welfare changes under financial liberalization and trade liberalization in the baseline model. The $\mathbf{\Sigma}_{jh} = 0$ columns report the corresponding welfare changes in a model environment that sets the product substitution matrix to zero. The $\mathbf{V}_{jh} = 0$ columns report the corresponding welfare changes in a model environment that sets the off-diagonal return covariances to zero. The last two rows report the median welfare change among rich (above-median-wage) and poor (below-median-wage) countries.

than in the counterfactual, because countries' returns on the safe technology decrease in the baseline, and GDP in the baseline is higher than in the counterfactual, because capital in the production of global firms expands in the baseline.

Appendix Figure A.9 examines the effects of changes in population shares across the world. Countries with larger population growth experience a larger inflow of equity, but smaller welfare gains because of the downward pressure on domestic wages. Appendix Figure A.10 examines the effects of changes in labor supply, by varying the preference shifter, $\bar{\ell}_i$, to match changes in employment over time. Countries with larger increases in their labor supply experience larger inflows of equity and larger welfare gain from the consumption of global products. Appendix Figure A.11 examines the effects of changes in real exchange rates, by varying the preference shifter, $\bar{n}_i$, to match changes in the prices of non-traded goods over time. We find that countries that experienced appreciations in their non-traded goods also experienced larger outflows of equity and larger welfare losses from the consumption of global products.

Appendix Table A.17 reports the sensitivity of the headline counterfactuals to alternative values of the domestic-good elasticity, ψ, and the coefficient of risk aversion, γ. With the exception of the counterfactual that changes the preference for domestic goods, $\bar{n}_i$, we find that the results are very stable under our baseline parameterization of $\psi = 1$ relative to the alternative of $\psi = 0.5$. Increasing the coefficient of relative risk aversion from $\gamma = 4$ in the baseline to $\gamma = 10$ substantially increases the welfare gains from financial liberalization, but

does not significantly affect the welfare gains from trade liberalization.

6 Conclusion

This paper develops and quantifies an integrated general-equilibrium model of the global economy in which heterogeneous firms compete in differentiated product markets and country-level investors allocate wealth across firms' equity and a risk-free asset. The economy is competitive and subject only to frictions when goods and assets cross borders. The model embeds a hedonic demand system on the goods side and a mean-variance portfolio system on the asset side, and it remains tractable enough to be taken to a cross section of roughly 23,000 listed firms in 48 countries. We measure most of the model's objects directly from a wide range of firm-level and country-level data, and recover the remaining objects, including expected equity returns, bilateral financial frictions, and firm- and country-level fundamentals, from the model's equilibrium conditions. The calibrated model matches the micro data exactly and rationalizes the observed home bias in both goods and asset markets.

We use the model to study the reallocation and welfare consequences of liberalizing trade and financial markets. The welfare gains from removing all remaining financial frictions from the baseline economy are substantially larger than the gains from moving from financial autarky to the baseline, because the baseline is already close to autarky. Removing tariffs and non-tariff measures generates modest gains in large advanced economies and larger gains in mid-sized open economies. Both liberalizations are accompanied by more concentrated distributions of economic activity toward larger firms. An important finding is that trade and financial frictions amplify each other, with the gain from liberalizing one market being larger when the other market remains distorted. Thus, studying either market in isolation understates the gains from openness. The magnitudes of the reallocation and welfare gains from openness are shaped by the joint cross section of demand elasticities, return variances and covariances, and bilateral frictions.

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A Model of Global Firms and Capital Markets

Online Appendix

Loukas Karabarbounis, Bruno Pellegrino, and Juliana Salomao

A Model Appendix

Appendix A collects various derivations and details related to the model.

A.1 Preferences over Characteristics

This appendix presents in more detail the microfoundation of the quadratic component of household preferences over global goods that appears in equation (1) of the main text. The derivation extends the quadratic specification of hedonic demand in Pellegrino (2025) to a setting with multiple countries.

Each global firm $j = 1, \ldots, J$ produces a single variety. Varieties offer one unit of idiosyncratic characteristic and a vector of K common product characteristics, where the common characteristics are summarized by the vector

$$\mathbf{a}_j \;=\; [a_{1j}, \ldots, a_{Kj}]', \qquad \sum_{k=1}^{K} a_{kj}^2 \;=\; 1 \quad \forall j. \tag{A.1}$$

The unit-norm restriction in equation (A.1) ensures that the diagonal of the matrix $\mathbf{A}'\mathbf{A}$ defined below consists of ones. This restriction implies that the own-substitution parameter is zero, $\sigma_{jj} = 0$, a property used later in the inference of the inverse elasticity of demand in Section 3.2. Household i's consumption of characteristic k when it purchases quantities $\{q_{ji}\}$ from all global firms is

$$x_{ki} \;=\; \sum_{j} a_{kj}\, q_{ji}. \tag{A.2}$$

Households have quadratic preferences over both the common characteristics and the idiosyncratic characteristics of varieties,

$$u_i^Q \;=\; P\left[\alpha \sum_{k} \left(b_{ki}^x\, x_{ki} - \tfrac{1}{2}\, x_{ki}^2\right) + (1-\alpha) \sum_{j} \left(b_{ji}^q\, q_{ji} - \tfrac{1}{2}\, q_{ji}^2\right)\right], \tag{A.3}$$

where b_{ki}^x and b_{ji}^q are country-specific preference shifters over common and idiosyncratic characteristics with sizes $K \times 1$ and $J \times 1$. Parameter $\alpha \in [0, 1]$ governs the relative weight on the two

components and thus is interpreted as the degree of horizontal differentiation. Preferences are scaled by total world population $P = \sum_i P_i$, which generates demand functions for products that do not scale with world population.

Substituting equation (A.2) into equation (A.3) and rearranging the expression, we obtain

$$u_i^Q \;=\; P \sum_j \left(b_{ji}\, q_{ji} - \tfrac{1}{2}\, q_{ji}^2 - \tfrac{1}{2} \sum_h \sigma_{jh}\, q_{ji}\, q_{hi} \right), \tag{A.4}$$

with

$$b_{ji} \;=\; \alpha \sum_k a_{kj}\, b_{ki}^x + (1-\alpha)\, b_{ji}^q, \qquad \sigma_{jh} \;=\; \alpha\big(\mathbf{a}_j'\mathbf{a}_h - \mathbb{I}_{j=h}\big). \tag{A.5}$$

Equation (A.4) is the quadratic-utility component of (1) in the main text, with the parameters in (A.5) emerging from the underlying microfoundation.

Let $\mathbf{A}$ be the $K \times J$ matrix whose j-th column is the vector of characteristics for firm j, $\mathbf{a}_j$. Equation (A.4) can be restated in matrix form,

$$u_i^Q \;=\; P\big(\mathbf{q}_i'\mathbf{b}_i \;-\; \tfrac{1}{2}\, \mathbf{q}_i' \big[\mathbf{I} + \alpha(\mathbf{A}'\mathbf{A} - \mathbf{I})\big]\, \mathbf{q}_i\big), \tag{A.6}$$

with $\mathbf{b}_i = \alpha\mathbf{A}'\mathbf{b}_i^x + (1-\alpha)\mathbf{b}_i^q$. The Gram matrix $\mathbf{A}'\mathbf{A}$ collects the *cosine similarities* $\mathbf{a}_j'\mathbf{a}_h$ between every pair of products. Two products with an independent set of common characteristics have $\mathbf{a}_j'\mathbf{a}_h = 0$ and therefore $\sigma_{jh} = 0$. Two products with identical set of common characteristics have $\mathbf{a}_j'\mathbf{a}_h = 1$ and $\sigma_{jh} = \alpha$. In our empirical implementation in Section 3.2, the vectors of characteristics $\mathbf{a}_j$ are constructed from TF-IDF vectors of business descriptions, which are non-negative, so $\mathbf{a}_j'\mathbf{a}_h \in [0,1]$ and $\sigma_{jh} \in [0,\alpha]$. The compact representation (A.6) gives the demand system in equation (4) of the main text, after taking the first-order conditions for household optimality and aggregating across households i.

A.2 Solving the Model

This appendix describes the algorithm that solves the equilibrium system of equations described in Section 2.5 in the main text. The algorithm reduces to solving for a vector of country wages $\mathbf{w}$ from a set of I domestic labor market clearing conditions.

Starting from the investors' first-order conditions, equation (17) of the main text expresses the aggregate equity invested in each global firm as

$$\mathbf{e} \;=\; (\gamma\mathbf{V})^{-1}\big(\boldsymbol{\mu}\mathbf{1}' + \boldsymbol{\Delta} - \mathbf{1}\mathbf{1}'r_0\big)\overline{\mathbf{e}}. \tag{A.7}$$

Using equation (12), we express the expected return on equity, $\boldsymbol{\mu}$, as a function of the physical return on capital, $\boldsymbol{\rho}$. Using the relationship between physical returns and prices in equation (10), we express equity returns as a function of prices:

$$\boldsymbol{\mu} \;=\; \boldsymbol{\chi} \circ \big(\boldsymbol{\rho} + \boldsymbol{\iota}\big) \;=\; \boldsymbol{\chi} \circ \big(\mathbf{z} \circ (\mathbf{p} - \mathbf{C}\mathbf{w}) + \boldsymbol{\iota}\big). \tag{A.8}$$

Next, we substitute equation (A.8) into equation (A.7) to express equity holdings, $\mathbf{e}$, as a function of prices, $\mathbf{p}$, and we substitute the resulting expression into the production function, $q_j = z_j\, k_j = z_j\, \chi_j\, e_j$, to obtain an equation that characterizes the supply of goods:

$$\begin{aligned}
\mathbf{q} \;&=\; \mathbf{z} \circ \mathbf{k} \;=\; \mathbf{z} \circ \boldsymbol{\chi} \circ \mathbf{e}, \\
\mathbf{q} \;&=\; \mathbf{z} \circ \boldsymbol{\chi} \circ \Big[(\gamma \mathbf{V})^{-1}\big(\boldsymbol{\mu}\mathbf{1}' + \boldsymbol{\Delta} - \mathbf{1}\mathbf{1}' r_0\big)\overline{\mathbf{e}}\Big], \\
\mathbf{q} \;&=\; \mathbf{z} \circ \boldsymbol{\chi} \circ \Big[(\gamma \mathbf{V})^{-1}\big(\boldsymbol{\chi} \circ (\boldsymbol{\rho} + \boldsymbol{\iota})\mathbf{1}' + \boldsymbol{\Delta} - \mathbf{1}\mathbf{1}' r_0\big)\overline{\mathbf{e}}\Big], \\
\mathbf{q} \;&=\; \mathbf{z} \circ \boldsymbol{\chi} \circ \Big[(\gamma \mathbf{V})^{-1}\big(\boldsymbol{\chi} \circ (\mathbf{z} \circ (\mathbf{p} - \mathbf{C}\mathbf{w}) + \boldsymbol{\iota})\mathbf{1}' + \boldsymbol{\Delta} - \mathbf{1}\mathbf{1}' r_0\big)\overline{\mathbf{e}}\Big].
\end{aligned} \tag{A.9}$$

Rearranging the last equation we obtain

$$\mathbf{q} \;=\; \bar{\mathbf{q}} + \boldsymbol{\Phi}\,(\mathbf{p} - \mathbf{C}\mathbf{w}), \tag{A.10}$$

with

$$\bar{\mathbf{q}} \;=\; \mathbf{z} \circ \boldsymbol{\chi} \circ \Big[(\gamma \mathbf{V})^{-1}\big((\boldsymbol{\chi} \circ \boldsymbol{\iota})\mathbf{1}' + \boldsymbol{\Delta} - \mathbf{1}\mathbf{1}' r_0\big)\overline{\mathbf{e}}\Big], \tag{A.11}$$

$$\boldsymbol{\Phi} \;=\; \Big[(\gamma \mathbf{V})^{-1} \circ (\boldsymbol{\chi}\boldsymbol{\chi}') \circ (\mathbf{z}\mathbf{z}')\Big](\mathbf{1}'\,\overline{\mathbf{e}}). \tag{A.12}$$

Inverting the demand system (4) for prices yields $\mathbf{p} \;=\; \mathbf{T}\big(\mathbf{b} - (\mathbf{I} + \boldsymbol{\Sigma})\mathbf{q}\big)$, where $\mathbf{T} = \text{diag}(1/(1+\boldsymbol{\tau}))$. Substituting this into the supply equation (A.10) and collecting the $\mathbf{q}$ terms on the left-hand side yields quantities as a closed-form function of wages,

$$\mathbf{q}(\mathbf{w}) \;=\; \big[\mathbf{I} + \boldsymbol{\Phi}\,\mathbf{T}\,(\mathbf{I} + \boldsymbol{\Sigma})\big]^{-1}\Big(\bar{\mathbf{q}} + \boldsymbol{\Phi}\,(\mathbf{T}\,\mathbf{b} - \mathbf{C}\,\mathbf{w})\Big), \tag{A.13}$$

with prices recovered from

$$\mathbf{p}(\mathbf{w}) \;=\; \mathbf{T}\,\big(\mathbf{b} - (\mathbf{I} + \boldsymbol{\Sigma})\,\mathbf{q}(\mathbf{w})\big). \tag{A.14}$$

We then use $\mathbf{q}(\mathbf{w})$ to solve for the vector of wages from I domestic labor market equilibrium conditions. Substituting household labor supply, $\ell_i = \bar{\ell}_i\, w_i^{\varepsilon}$, and the labor demand for the non-traded sector, $L_{ni}(w_i) = \big(P_i\,\theta_i\,\bar{n}_i^{\psi}\big)^{\frac{1}{\psi(1-\theta_i)+\theta_i}}\; z_{ni}^{\frac{\psi-1}{\psi(1-\theta_i)+\theta_i}}\; w_i^{-\frac{\psi}{\psi(1-\theta_i)+\theta_i}}$, we obtain

$$P_i\,\bar{\ell}_i\,w_i^{\varepsilon} \;=\; \sum_j c_{ji}\,q_j(\mathbf{w}) + \big(P_i\,\theta_i\,\bar{n}_i^{\psi}\big)^{\frac{1}{\psi(1-\theta_i)+\theta_i}}\; z_{ni}^{\frac{\psi-1}{\psi(1-\theta_i)+\theta_i}}\; w_i^{-\frac{\psi}{\psi(1-\theta_i)+\theta_i}}, \qquad i = 1, \ldots, I. \tag{A.15}$$

Once wages are solved for, the equilibrium values of all remaining objects follow in closed form. Global firm quantities and prices are recovered from the functions $\mathbf{q}(\mathbf{w})$ and $\mathbf{p}(\mathbf{w})$, physical capital is $k_j = q_j/z_j$, equity is $e_j = k_j/\chi_j$, and so on, using the equations presented in the main text for the remaining endogenous variables.

A.3 Comparative Statics for Equity Flows

This appendix discusses the closed-form solution for equity of global firms in the limiting case of a perfectly elastic labor supply, $\varepsilon \to \infty$, that is when wages w_i do not respond to changes in the primitives of the economy. Given the solution for firms' equity, all other firm-level endogenous variables can be determined using the equations presented in the main text.

We define the global endowment of wealth as $\bar{E} \equiv \sum_i \bar{E}_i$, the matrix of unit labor requirements as $\mathbf{C}$, and the diagonal matrices $\mathbf{X} = \text{diag}(\boldsymbol{\chi})$, $\mathbf{Z} = \text{diag}(\mathbf{z})$, and $\mathbf{T} = \text{diag}\big(1/(1+\boldsymbol{\tau})\big)$. To solve for equity, we first express the equity return in equation (18) as a function of the primitives of the model,

$$\begin{aligned}\boldsymbol{\mu} &= \boldsymbol{\chi} \circ (\boldsymbol{\iota} + \mathbf{z} \circ (\mathbf{p} - \mathbf{C}\mathbf{w})) \\ &= \mathbf{X}\left(\boldsymbol{\iota} + \mathbf{Z}(\mathbf{T}(\mathbf{b} - (\mathbf{I} + \boldsymbol{\Sigma})\mathbf{q}) - \mathbf{C}\mathbf{w})\right) \\ &= \mathbf{X}\boldsymbol{\iota} + \mathbf{X}\mathbf{Z}(\mathbf{T}\mathbf{b} - \mathbf{C}\mathbf{w}) - \mathbf{X}\mathbf{Z}\mathbf{T}(\mathbf{I} + \boldsymbol{\Sigma})\mathbf{Z}\mathbf{X}\mathbf{e},\end{aligned}$$

where in the second line we substitute the inverse demand function and in the last line we have expressed production as a function of equity, $\mathbf{q} = \mathbf{Z}\mathbf{X}\mathbf{e}$. Inserting the resulting expression for $\boldsymbol{\mu}$ into the equity supply equation in (18), using the identity $\mathbf{1}'\overline{\mathbf{e}} = \bar{E}$ where $\overline{\mathbf{e}} = (\bar{E}_1, ..., \bar{E}_I)'$ is the $I \times 1$ vector of country-level endowments, and collecting the $\mathbf{e}$ terms on the left-hand side yields the linear system of equations:

$$\big[\gamma\mathbf{V} + \bar{E}\,\mathbf{X}\mathbf{Z}\mathbf{T}(\mathbf{I} + \boldsymbol{\Sigma})\mathbf{Z}\mathbf{X}\big]\mathbf{e} \;=\; \bar{E}\big[\mathbf{X}\boldsymbol{\iota} + \mathbf{X}\mathbf{Z}(\mathbf{T}\mathbf{b} - \mathbf{C}\mathbf{w}) - \mathbf{1}\,r_0\big] + \boldsymbol{\Delta}\,\overline{\mathbf{e}}.$$

Pre-multiplying by $(1/\gamma)\boldsymbol{\Omega}$ yields the closed-form solution for equity as a function of wages only,

$$\mathbf{e} \;=\; \frac{1}{\gamma}\,\boldsymbol{\Omega}\left[\bar{E}\big(\mathbf{X}\boldsymbol{\iota} + \mathbf{X}\mathbf{Z}(\mathbf{T}\mathbf{b} - \mathbf{C}\mathbf{w}) - \mathbf{1}\,r_0\big) + \boldsymbol{\Delta}\,\overline{\mathbf{e}}\right], \tag{A.16}$$

where the transmission matrix $\boldsymbol{\Omega}$ is defined as

$$\boldsymbol{\Omega} \;\equiv\; \left[\mathbf{V} + \tfrac{\bar{E}}{\gamma}\,\mathbf{X}\mathbf{Z}\mathbf{T}(\mathbf{I} + \boldsymbol{\Sigma})\mathbf{Z}\mathbf{X}\right]^{-1}. \tag{A.17}$$

Entry by entry, equity invested in firm j is

$$e_j \;=\; \frac{1}{\gamma}\sum_{h=1}^{J}\omega_{jh}\left[\bar{E}\Big(\chi_h\,\iota_h+\chi_h\,z_h\big(\tfrac{b_h}{1+\tau_h}-w_h\big)-r_0\Big)+\sum_{i=1}^{I}\delta_{hi}\,\bar{E}_i\right], \tag{A.18}$$

where we define firm j's unit labor cost as $w_j \equiv \sum_i c_{ji}\,w_i$. By Cramer's rule we obtain

$$\omega_{jj} \;=\; \frac{\det\big((\boldsymbol{\Omega}^{-1})_{-j,-j}\big)}{\det(\boldsymbol{\Omega}^{-1})}, \qquad \omega_{jh} \;=\; \frac{(-1)^{h+j}\,\det\big((\boldsymbol{\Omega}^{-1})_{-h,-j}\big)}{\det(\boldsymbol{\Omega}^{-1})}, \tag{A.19}$$

where $(\boldsymbol{\Omega}^{-1})_{-j,-j}$ denotes the matrix obtained by deleting the j-th row and column. If $\boldsymbol{\Omega}^{-1}$ is positive definite, $\omega_{jj} > 0$ and equation (A.18) implies that e_j is increasing in firm j's other equity return, ι_j, in the demand shifter, b_j, and in the country-firm financial frictions, δ_{ji}, and is decreasing in firm j's unit labor cost, w_j. The response of e_j to firm-specific productivity, z_j, transformation factor, χ_j, and trade costs, τ_j, is in general ambiguous because these primitives also enter through ω_{jj}.

The cross terms ω_{jh} in equation (A.19) can be positive or negative, so equity flows to firm j can move in the same or opposite direction as the fundamentals of firm h. When $\omega_{jh} < 0$, firms are strategic substitutes in capital flows, and when $\omega_{jh} > 0$, then firms become strategic complements. The response of e_j to a global shift in the risk-free rate, r_0, depends on the row sum, $\sum_{h=1}^{J}\omega_{jh}$, and is therefore generally ambiguous.

Finally, the semi-elasticity in equation (37) of the main text is obtained by differentiating e_j in equation (A.18) with respect to r_0 and dividing the resulting expression by e_j. We rearrange this equation by inserting a negative and dividing by 100, so that we obtain the log change in equity with respect to a one percentage-point decrease in the risk-free rate. We note that a common unit increase in all financial frictions, $\Delta\delta_{ji} = 1$ for all ji, generates the same response in e_j as a unit decrease in r_0, a property used in the main text to guide intuition about the effects of financial liberalization.

A.4 National Income and Product Accounts Identities

In this appendix, we relate objects in national income and product accounts to model objects and discuss some conceptual issues related to how we treat the endowment of wealth.

Gross domestic product in terms of the numeraire good equals the market value of all goods produced domestically:

$$\text{GDP}_i = \sum_{j\in i} p_j q_j + p_{ni} N_i + (\text{wage adjustment})_i. \tag{A.20}$$

GDP in equation (A.20) is in basic prices, which means that trade costs that augment consumer prices are not included when valuing output. The wage adjustment term equals $w_i(P_i\ell_i - L_{ni}) - \sum_{j\in i}(p_j q_j - \pi_j)$ and thus GDP equals the sum of profits of global firms located domestically, profits of non-traded firms, and wage payments to workers that reside in the country:

$$\text{GDP}_i = \sum_{j\in i} \pi_j + \Pi_{ni} + w_i P_i \ell_i. \tag{A.21}$$

In our counterfactuals, we calculate GDP in constant base prices as follows,

$$\text{GDP}'_i = \sum_{j\in i} p_j q'_j + p_{ni} N'_i + (\text{wage adjustment})'_i, \tag{A.22}$$

where the wage adjustment term equals $w_i(P'_i\ell'_i - L'_{ni}) - (w_i/w'_i)\sum_{j\in i}(p'_j q'_j - \pi'_j)$. The formula uses the base period wages to value labor income produced by domestic firms as an approximation of an ideal base-wage valuation that is easy to implement in practice.

Domestic consumption in basic prices equals

$$C_i = P_i \left(\sum_j p_j q_{ji} + m_i + p_{ni} n_i \right). \tag{A.23}$$

Country i exports the difference between the production and the consumption of its own firms, $X_i = \sum_{j(i)} p_j (q_j - P_i q_{ji})$. Imports equal the sum of the outside traded good and the goods consumed from other countries, $M_i = P_i \left(m_i + \sum_{j\neq j(i)} p_j q_{ji} \right)$.

Net exports in basic prices are defined as the difference between exports and imports,

$$\begin{aligned} \text{NX}_i &= \text{GDP}_i - C_i \\ &= (\text{wage adjustment})_i + \underbrace{\sum_{j(i)} [\pi_j - E_{ji} r_{ji}]}_{\text{capital-income outflow}} - \underbrace{\sum_{j\neq j(i)} E_{ji} r_{ji}}_{\text{capital-income inflow}} - \bar{E}_i \\ &= \text{Net Foreign Income}_i^{\text{Labor}} - \text{Net Foreign Income}_i^{\text{Capital}} + \text{Change in Assets}, \end{aligned} \tag{A.24}$$

where the change in assets, $-\bar{E}_i$, is the current account, which is negative because the country starts with wealth $\bar{E}_i$ and consumes it entirely by the end of the period.

We define national income in terms of the numeraire good as:

$$Y_i = P_i \left(w_i \ell_i + \pi_{ni} + r_i \bar{e}_i \right). \tag{A.25}$$

Using the budget constraint (2), we write national income as the sum of consumption in equation (A.23) and the total resources spent on trade costs $T_i = P_i \sum_j \tau_{ji} p_j q_{ji}$ less the endowment of

wealth, that is $Y_i = C_i + T_i - \bar{E}_i$. The reason we subtract the endowment of wealth is that $\bar{E}_i$ only augments national income in equation (A.25) through the capital returns generated by the endowment, whereas $\bar{E}_i$ is consumed at the end of the period in equation (A.23). We note that this also implies that the sum of net exports across countries in equation (A.24) does not equal zero.

This static nature of our model raises the conceptual issue of how to treat the endowment of wealth when calculating welfare and external positions and the changes of these objects across counterfactuals. We choose to view our model as an approximation of a richer dynamic model and subtract the endowment of wealth from notions of consumption when calculating welfare and external positions. We have also experimented with alternative ad-hoc rules, such as adding the annuity value of the wealth endowment, with no significant difference in our quantitative results.

To operationalize our solution, we subtract the endowment of wealth from domestic consumption, $\widetilde{C}_i = C_i - \bar{E}_i$ and the consumption of the outside traded good from imports, $\widetilde{M}_i = M_i - P_i m_i$ and define net exports as:

$$\widetilde{NX}_i = X_i - \widetilde{M}_i = \text{GDP}_i - (\text{wage adjustment})_i - \widetilde{C}_i - \bar{E}_i + P_i m_i = \sum_{j \in i} p_j q_j - P_i \sum_j p_j q_{ji}. \quad \text{(A.26)}$$

This definition of net exports makes sense in our static model, because it subtracts the consumption of the global firms from the production of the global firms for each country, which implies that net exports across countries sum up to zero from market clearing. The value of imports of the outside good which is partly financed by the endowment of wealth is not accounted for in this formula. We also subtract the wage adjustment term from GDP, so that our definition of net exports captures only the balance of goods traded.

A.5 Solving the Model under Financial Autarky

This appendix derives the equity supply equation in the constrained version of the model under financial autarky described in Section 5.2. It also derives the analog of the solution algorithm for the baseline model presented in Appendix A.2.

Under financial autarky, investors hold only the equity of their own country's firms and the risk-free asset. Thus, the share s_{ji} that country i invests in firm j is zero whenever $j \notin i$, and the mean-variance problem (15) becomes a country-by-country restricted problem.

Define the $J \times I$ ownership-indicator matrix $\mathbf{\Gamma}$ with elements

$$\Gamma_{ji} \;=\; \begin{cases} 1 & \text{if firm } j \text{ is domiciled in country } i, \\ 0 & \text{otherwise.} \end{cases}$$

Using the matrix $\mathbf{\Gamma}$, we define the matrix $\tilde{\mathbf{V}} \equiv (\mathbf{\Gamma}\mathbf{\Gamma}') \circ \mathbf{V}$ as the block-diagonal version of the return-variance matrix that retains only within-country covariances. The product $\mathbf{\Gamma}\bar{\mathbf{e}}$ is the $J \times 1$ vector whose entry j equals the wealth $\bar{E}_{i(j)}$ of firm j's home country.

Restricting the investor first-order conditions to within-country pairs yields the autarky analog of equation (17):

$$\mathbf{e} = (\gamma\tilde{\mathbf{V}})^{-1}\,(\boldsymbol{\mu} - \mathbf{1}r_0) \circ (\mathbf{\Gamma}\bar{\mathbf{e}}), \quad \tilde{\mathbf{V}} = \begin{bmatrix} \mathbf{V}_1 & 0 & \ldots & 0 \\ \ldots & \ldots & \ldots & \ldots \\ 0 & 0 & \ldots & \mathbf{V}_I \end{bmatrix}. \tag{A.27}$$

Equivalently, the $J \times I$ matrix of country-firm shares is

$$\mathbf{S} \;=\; (\gamma\tilde{\mathbf{V}})^{-1}\big[\mathbf{\Gamma} \circ (\boldsymbol{\mu}\mathbf{1}' - \mathbf{1}\mathbf{1}'r_0)\big],$$

so that $S_{ji} = 0$ for $j \notin i$ and $\mathbf{e} = \mathbf{S}\bar{\mathbf{e}}$. The capital-demand condition (A.8) is unchanged, $\boldsymbol{\mu} = \boldsymbol{\chi} \circ \big(\mathbf{z} \circ (\mathbf{p} - \mathbf{C}\mathbf{w}) + \boldsymbol{\iota}\big)$.

Substituting (A.8) into (A.27) and using $\mathbf{q} = \mathbf{z} \circ \boldsymbol{\chi} \circ \mathbf{e}$, the supply of global goods becomes

$$\mathbf{q} \;=\; \mathbf{z} \circ \boldsymbol{\chi} \circ \Big[(\gamma\tilde{\mathbf{V}})^{-1}\big(\boldsymbol{\chi} \circ (\mathbf{z} \circ (\mathbf{p} - \mathbf{C}\mathbf{w}) + \boldsymbol{\iota}) - \mathbf{1}r_0\big) \circ (\mathbf{\Gamma}\bar{\mathbf{e}})\Big]. \tag{A.28}$$

Equating (A.28) to the demand system (4) of the main text and eliminating prices through $(\mathbf{1} + \boldsymbol{\tau}) \circ \mathbf{p} = \mathbf{b} - (\mathbf{I} + \mathbf{\Sigma})\mathbf{q}$, the supply of global goods can be rearranged into the same affine form as (A.10),

$$\mathbf{q} \;=\; \bar{\mathbf{q}}^{\text{aut}} + \mathbf{\Phi}^{\text{aut}}\,(\mathbf{p} - \mathbf{C}\mathbf{w}), \tag{A.29}$$

with

$$\bar{\mathbf{q}}^{\text{aut}} \;=\; \mathbf{z} \circ \boldsymbol{\chi} \circ \Big[(\gamma\tilde{\mathbf{V}})^{-1}\big(\mathbf{\Gamma} \circ ((\boldsymbol{\chi} \circ \boldsymbol{\iota})\mathbf{1}' - \mathbf{1}\mathbf{1}'r_0)\big)\bar{\mathbf{e}}\Big], \tag{A.30}$$

$$\mathbf{\Phi}^{\text{aut}} \;=\; \operatorname{diag}(\mathbf{z} \circ \boldsymbol{\chi})\,(\gamma\tilde{\mathbf{V}})^{-1}\operatorname{diag}\big(\mathbf{z} \circ \boldsymbol{\chi} \circ (\mathbf{\Gamma}\bar{\mathbf{e}})\big). \tag{A.31}$$

Equations (A.29)–(A.31) are the analogs for the case of financial autarky of the equations (A.10)–(A.12) for the baseline model. The remainder of the algorithm is the same as in Appendix A.2.

B Quantification Appendix

Appendix B presents more details on the data and the inference.

B.1 Measurement of Trade Costs

This appendix details the construction of the bilateral trade costs τ_{ik}, for a country i that imports from a country k, used in equation (26). The trade cost in this equation consists of a combination of tariffs, ad valorem-equivalent of non-tariff measures, and ad valorem shipping costs.

For tariffs we use the Global Tariff Database of Teti (2024). This dataset provides statutory tariff rates for over 200 importing countries and their trading partners from 1988 to 2021. The dataset includes both most-favored-nation (MFN) and preferential tariffs at a detailed product level. At the product level, the applied tariff is the minimum of the MFN and preferential rates. Product-level tariffs are then aggregated into bilateral measures using simple averages, which we adopt here so that contemporaneous trade flows do not bias the measure toward low-tariff products. We use the most recent available observation for each country pair, which is 2021 for most pairs. For a small number of pairs we use the latest preceding year.

For the shipping costs we use the OECD International Transport and Insurance Costs of Merchandise Trade (ITIC) dataset. This dataset combines observed CIF-FOB margins with model-based estimates and covers more than 200 reporting countries and 240 trading partners at the HS-code product level over 1995–2024. The CIF-FOB margin is defined as

$$m_{ik} \;=\; \frac{\mathrm{CIF}_{ik} - \mathrm{FOB}_{ik}}{\mathrm{CIF}_{ik}}, \tag{A.32}$$

which we convert into an ad valorem shipping cost on the producer price as

$$\mathrm{shipping}_{ik} \;=\; \frac{\mathrm{CIF}_{ik}}{\mathrm{FOB}_{ik}} - 1 \;=\; \frac{m_{ik}}{1 - m_{ik}}. \tag{A.33}$$

We average across products using simple averages and across the four most recent years 2020–2023 to reduce noise. A few observations are reported with zero shipping costs, which is unrealistic for cross-border trade. We treat these observations as missing and impute them, together with originally missing observations, using a regression on population-weighted bilateral distances (CEPII) and importer and exporter fixed effects.

For non-tariff measures (NTMs), we use data from the World Bank/UNCTAD TRAINS database. The data are already expressed in ad valorem equivalents. These measures are

based on TRAINS data collected between 2012 and 2016, covering 40 importing countries (plus the European Union) and roughly 200 exporting countries. The bilateral NTM measure is the sum of the ad valorem equivalents of technical and non-technical components, averaged across products using simple averages. For the European Union, we assume that all EU member countries face identical NTM frictions vis-à-vis a given external partner, and zero NTM frictions within the EU. For some country pairs, NTM data are missing on the country that imports goods from a particular exporter. In those cases, when available, we use the NTM data from the exporter side for the same bilateral observation. If not available, we use the exporter's average across all other destinations.

To adjust the 2012–2016 period NTMs to our sample period, we use the dataset from Kuenzel (2024), which reports the annual count of newly introduced NTMs between 1996 and 2020 for each category at the HS6 product level by importing country. We aggregate these counts within each country across products and compute cumulative sums up to 2016 and up to 2020. Our scaling factor for importer i is

$$\text{ratio}_i^{\text{NTM}} = \frac{\sum_{t\leq 2020} \text{newNTMs}_{i,t}}{\sum_{t\leq 2016} \text{newNTMs}_{i,t}}. \tag{A.34}$$

If the cumulative sum is missing for a given country, we interpolate using the closest available values below and above 2016; if both are missing, we assign the sample average. The dataset reports the EU as a single entity, and we assume the resulting scaling factor applies uniformly across all EU member countries. The ratio in equation (A.34) is applied uniformly to all countries k that country i imports from.

B.2 Inference Examples

We present a few simple examples that help guide intuition about the inference of expected equity returns, $\boldsymbol{\mu}$, and bilateral financial frictions, $\boldsymbol{\Delta}$, in equations (31) and (32). We consider a world with $J = 2$ firms and $I = 2$ countries, A and B, with risk aversion parameter $\gamma = 4$, risk-free rate $r_0 = 0.02$, and a return covariance matrix

$$\mathbf{V} = \begin{bmatrix} 0.04 & 0 \\ 0 & 0.04 \end{bmatrix}.$$

We vary the matrix of equity-holding shares $\mathbf{S}$ and report the implied $\boldsymbol{\mu}$ and $\boldsymbol{\Delta}$, where the rows of $\mathbf{S}$ index firms and the columns index investor countries.

Suppose

$$\mathbf{S} = \begin{bmatrix} 0.4 & 0.1 \\ 0.3 & 0.3 \end{bmatrix}.$$

Equation (31) yields $\boldsymbol{\mu} = \mathrm{dom}\big(4\mathbf{VS} + \mathbf{1}\mathbf{1}'r_0\big) = (0.084,\, 0.068)'$, and equation (32) yields

$$\boldsymbol{\Delta} = \begin{bmatrix} 0 & -0.048 \\ 0 & 0 \end{bmatrix}.$$

The diagonal of $\boldsymbol{\Delta}$ has zeros by construction. Country B faces a friction of -4.8 percentage points to invest in firm 1 (whose home country is A), reflecting the fact that B under-weights foreign firm 1 relative to what its return-variance trade-off would imply at the inferred expected return $\mu_1 = 0.084$.

Suppose next that country B doubles the share of wealth invested in both domestic and foreign equity,

$$\mathbf{S} = \begin{bmatrix} 0.4 & 0.2 \\ 0.3 & 0.6 \end{bmatrix}.$$

Then, we obtain $\boldsymbol{\mu} = (0.084,\, 0.116)'$. The inferred expected return of firm 1 has not changed, but the inferred expected return of firm 2 has increased relative to the previous case. This rationalizes why country B would reallocate some of its wealth toward the domestic firm relative to the risk-free asset. For the matrix of bilateral frictions we obtain

$$\boldsymbol{\Delta} = \begin{bmatrix} 0 & -0.032 \\ -0.048 & 0 \end{bmatrix}.$$

The bilateral friction δ_{1B} increases toward zero relative to the previous example. This is because country B holds more of firm 1. The bilateral friction δ_{2A} becomes negative, whereas previously it was zero. This is because country A under-invests in firm 2 relative to its higher inferred expected return, where the inference is based on country B's high holdings of firm 2.

The final example changes the equity holdings matrix such that both countries hold less of firm 2 relative to the previous example:

$$\mathbf{S} = \begin{bmatrix} 0.4 & 0.2 \\ 0.1 & 0.2 \end{bmatrix}.$$

The inferred return of firm 2 declines, $\boldsymbol{\mu} = (0.084, 0.052)'$, because country B does not hold as much as previously of firm 2. The bilateral financial friction, δ_{2A} , that is now necessary to rationalize the holdings of firm 2 from country A also rises toward zero:

$$\boldsymbol{\Delta} = \begin{bmatrix} 0 & -0.032 \\ -0.016 & 0 \end{bmatrix}.$$

These examples illustrate that the cross-country pattern of $\mathbf{S}$ is the sole source of identification of $\boldsymbol{\mu}$ and $\boldsymbol{\Delta}$, given $\mathbf{V}$ and r_0. The same logic generalizes to the $J \approx 23{,}000$ firms and $I = 48$ countries in our quantitative implementation.

C Additional Results

This appendix collects additional results and counterfactual experiments that complement the headline experiments reported in Section 5.

- Table A.1 reports the coverage for all countries in our sample.
- Table A.2 reports for selected countries equity investments by destination. Table A.3 reports for selected countries the split between equity investments domestically, equity investment abroad, and risk-free assets, alongside the mean and standard deviation of their portfolio returns.
- Figure A.1 reports statistics of the welfare gains for the whole cross section of countries for four counterfactuals: financial liberalization, financial autarky, trade liberalization, trade war. Figures A.2, A.3, A.4, A.5, and A.6 report the same statistics for the various components of welfare changes. Figures A.7 and A.8 report statistics of the wage and GDP changes for the four counterfactuals.
- For the counterfactual of moving from the baseline to financial liberalization, Table A.4 shows country portfolio shares between own equity, foreign equity, and risk-free assets, Table A.5 reports the full welfare decomposition, and Table A.6 reports the implied changes in net exports as a share of GDP, evaluated both at current and at baseline prices, together with the $100\times$ log changes in global-firm production and consumption.
- For the counterfactual of moving from financial autarky to the baseline, Table A.7 shows country portfolio shares between own equity, foreign equity, and risk-free assets, Table

A.8 reports the full welfare decomposition, and Table A.9 reports the implied changes in net exports as a share of GDP, evaluated both at current and at baseline prices, together with the 100× log changes in global-firm production and consumption.

- For the trade liberalization counterfactual, Table A.10 shows country portfolio shares between own equity, foreign equity, and risk-free assets, Table A.11 reports the full welfare decomposition, and Table A.12 reports the implied changes in net exports, evaluated both at current and at baseline prices, as a share of GDP and the 100× log changes in global-firm production and consumption.

- Tables A.13 and A.14 study a global trade war that raises all bilateral trade costs by 15 percentage points.

- Table A.15 examines the effects of productivity growth. We consider productivity changes in the fifteen-year period leading to the last year of the PWT. We perturb all c_{ji}'s for firms domiciled in a country by the country's change in employment to real GDP from the PWT and all z_j's for firms domiciled in a country by the country's change in real GDP to capital stock. We also change domestic goods productivity, z_{ni}, by plugging updated values of wages and non-traded goods prices in equation (36).

- Table A.16 examines the effects of changes in the risk-free rate, by raising r_0 from 2 percent in the baseline to 3 percent in the counterfactual.

- Figure A.9 examines the effects of changes in population shares across the world.

- Figure A.10 examines the effects of changes in labor supply, by varying the preference shifter $\bar{\ell}_i$ to match changes in employment over time.

- Figure A.11 examines the effects of varying the preference shifter $\bar{n}_i$ to match the observed changes in the price of non-traded goods over time for each country.

- Table A.17 reports the sensitivity of the headline counterfactuals to alternative values of the domestic-good elasticity ψ and the coefficient of risk aversion γ.

Table A.1: Coverage Statistics for All Countries

		(millions)		(billions)
	Number of Firms	Population	Employment	Wealth
World	22,813	5,669	2,586	196,173
USA	3,085	337	169	83,631
CHN	4,690	1,411	745	20,692
JPN	3,439	125	67	17,468
FRA	429	68	29	8,398
GBR	570	68	34	8,133
DEU	372	83	43	7,008
SAU	166	34	15	6,116
CAN	572	40	21	5,390
IND	1,587	1,438	564	4,985
ITA	312	59	24	4,530
KOR	2,061	52	29	3,967
BRA	248	211	98	3,016
AUS	595	27	14	2,828
CHE	182	9	5	2,605
SWE	536	11	5	2,242
NOR	187	6	3	1,943
ESP	112	48	21	1,823
DNK	102	6	3	1,441
BEL	87	12	5	1,292
MEX	68	130	58	883
THA	650	72	40	815
RUS	100	144	72	748
AUT	42	9	5	700
IDN	404	281	137	685
MYS	561	35	17	614
ZAF	124	63	19	574
ISR	186	10	4	485
CHL	43	20	9	356
TUR	264	85	33	326
PRT	28	11	5	319
NZL	78	5	3	296
PHL	136	115	49	287
POL	270	37	19	278
GRC	86	10	4	191
COL	16	52	24	163
ARG	48	46	21	159
URY	3	3	2	126
PER	25	34	18	120
HUN	21	10	5	84
KWT	31	5	3	80
CZE	5	11	5	76
EGY	69	115	31	71
KAZ	6	20	10	69
ROU	39	19	8	63
PAK	155	248	77	39
SVN	8	2	1	38
BGR	14	6	3	17
VEN	1	28	10	0

Notes. Number of listed firms, total population (millions), employment (millions), and household wealth (billions of U.S. dollars) for the world and 48 countries. Countries are ranked by total wealth.

Table A.2: Country Equity Investments in the Baseline Economy

	Own	USA	CHN	JPN	DEU	FRA	GBR
USA	86	86	2	2	1	1	2
CHN	98	1	98	0	0	0	0
JPN	67	18	10	67	0	1	1
DEU	58	19	1	2	58	6	3
FRA	69	11	1	1	5	69	3
GBR	37	41	3	3	2	3	37
CAN	45	43	2	1	1	1	1
CHE	65	20	4	1	3	2	2
IND	100	0	0	0	0	0	0
KOR	82	13	1	1	0	0	0
BRA	96	2	0	0	0	0	0
RUS	99	0	0	0	0	0	0

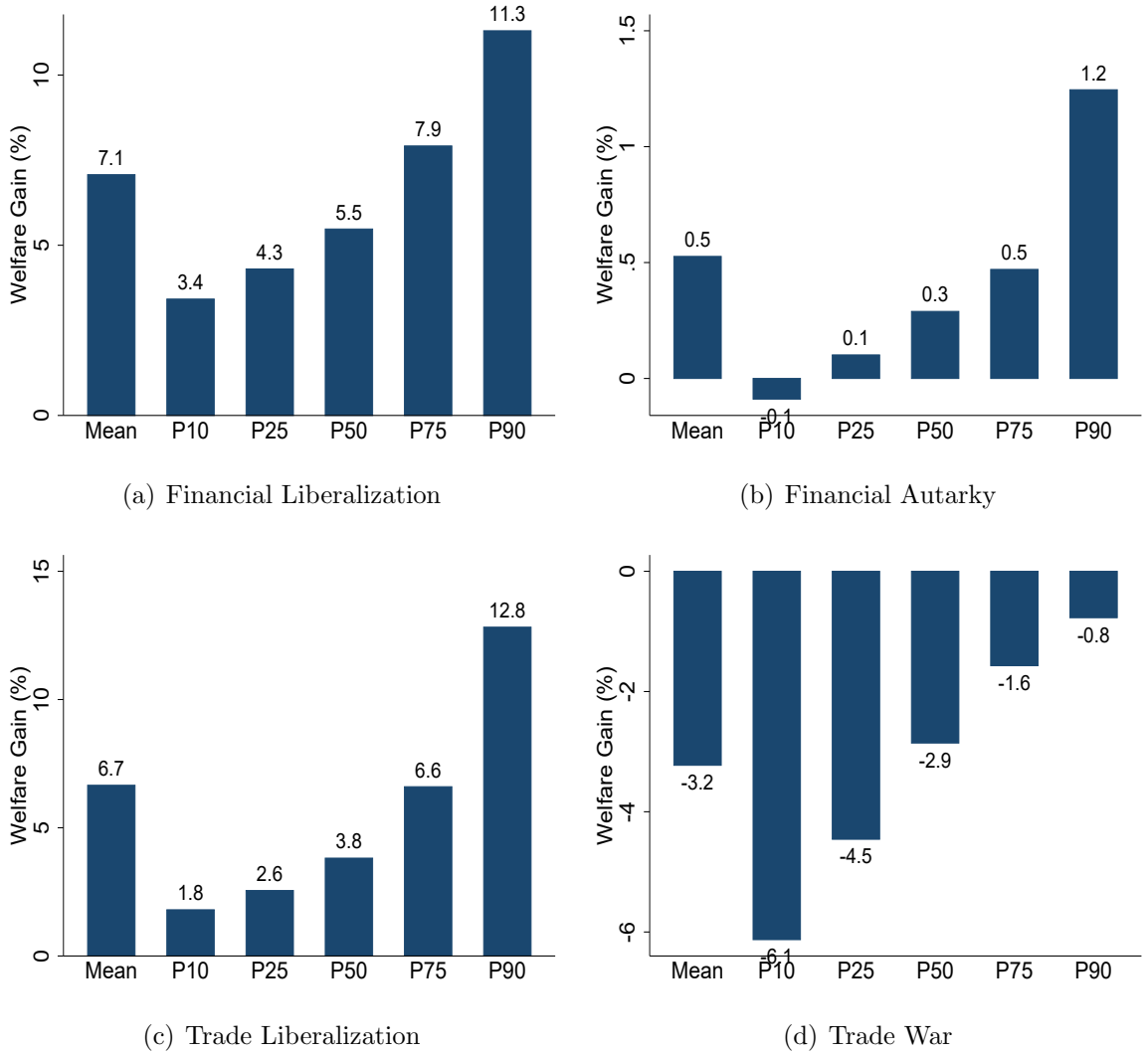
Notes. Each row reports the composition of a country's equity portfolio, in percent. The Own column is the share invested in domestic equity; the remaining columns report the share invested in the equity of the six largest investee countries. Shares are expressed relative to total equity holdings, and the residual is equity invested in the other countries.

Table A.3: Country Investments and Returns

(share/p.p.)	Own Equity	Other Equity	Risk-Free Assets	Mean Return	Std Return
USA	44.7	7.1	48.2	3.8	6.8
CHN	52.4	1.1	46.6	3.9	6.9
JPN	23.4	11.4	65.2	2.5	3.5
DEU	18.5	13.2	68.3	2.5	3.5
FRA	20.3	9.3	70.4	2.5	3.6
GBR	18.0	31.2	50.8	2.9	4.9
CAN	29.7	36.4	33.9	4.1	7.3
CHE	43.5	22.9	33.6	3.7	6.5
IND	49.1	0.0	50.8	2.9	4.7
KOR	37.3	8.0	54.6	3.6	6.4
BRA	27.7	1.1	71.2	3.1	5.1
RUS	62.5	0.5	37.0	5.6	9.5

Notes. Country portfolio composition and portfolio-return statistics in the baseline economy. Own Equity, Other Equity, and Risk-free assets report the share of country wealth (in percent) invested in domestic equity, foreign equity, and risk-free assets, respectively, summing to one hundred. Mean Return and Std Return report the expected value, $\mathbb{E}[r_i]$, and standard deviation, $\sqrt{\text{Var}(r_i)}$, of the country portfolio return (percentage points).

Figure A.1: Distribution of Welfare Changes



(a) Financial Liberalization

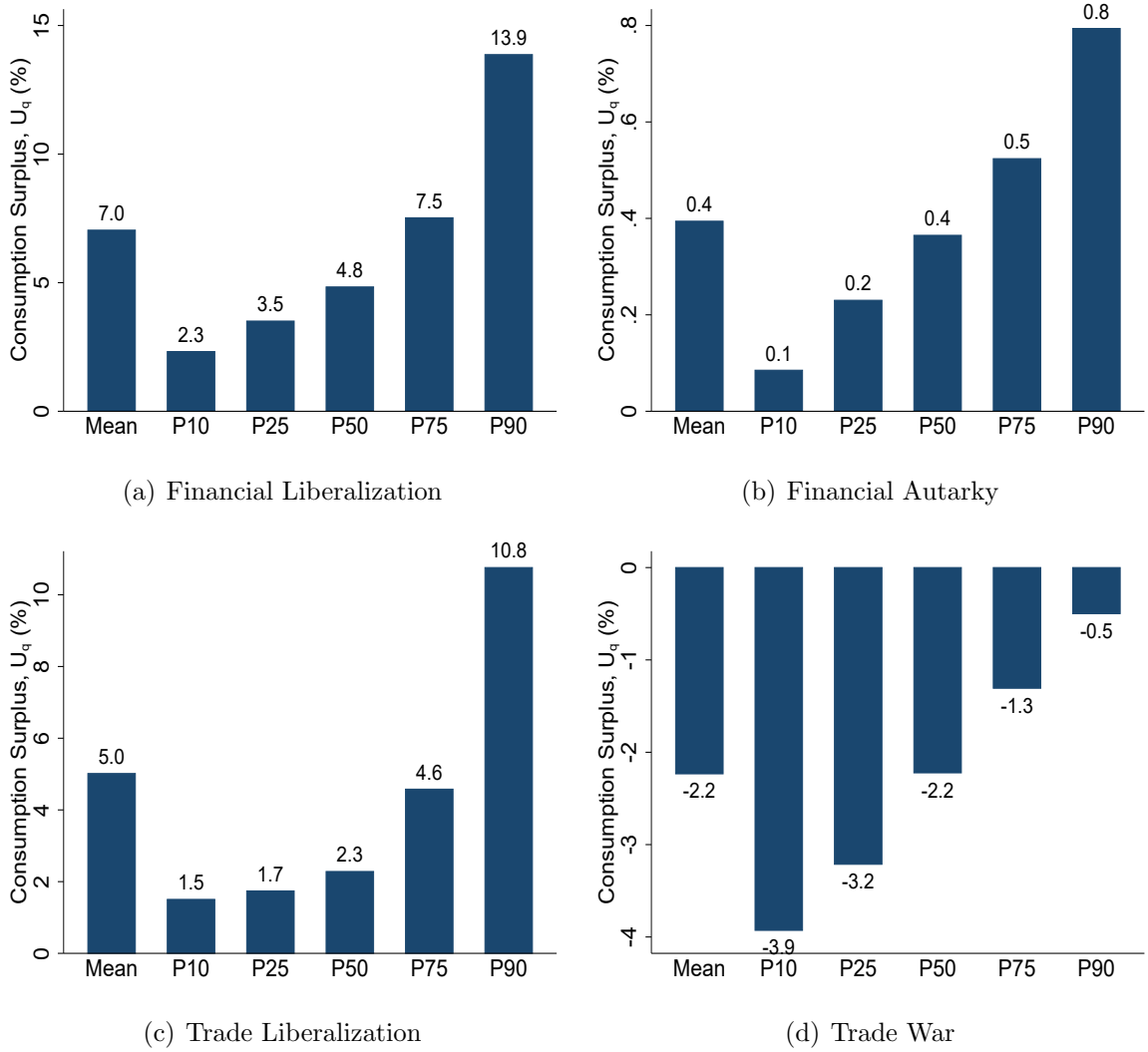
(b) Financial Autarky

(c) Trade Liberalization

(d) Trade War

Notes. Statistics of the welfare changes when moving from the baseline to financial liberalization, from financial autarky to the baseline, from the baseline to trade liberalization, and from the baseline to a trade war. All welfare changes are expressed as percent of baseline household labor income.

Figure A.2: Distribution of Welfare Changes, U_q Component



(a) Financial Liberalization

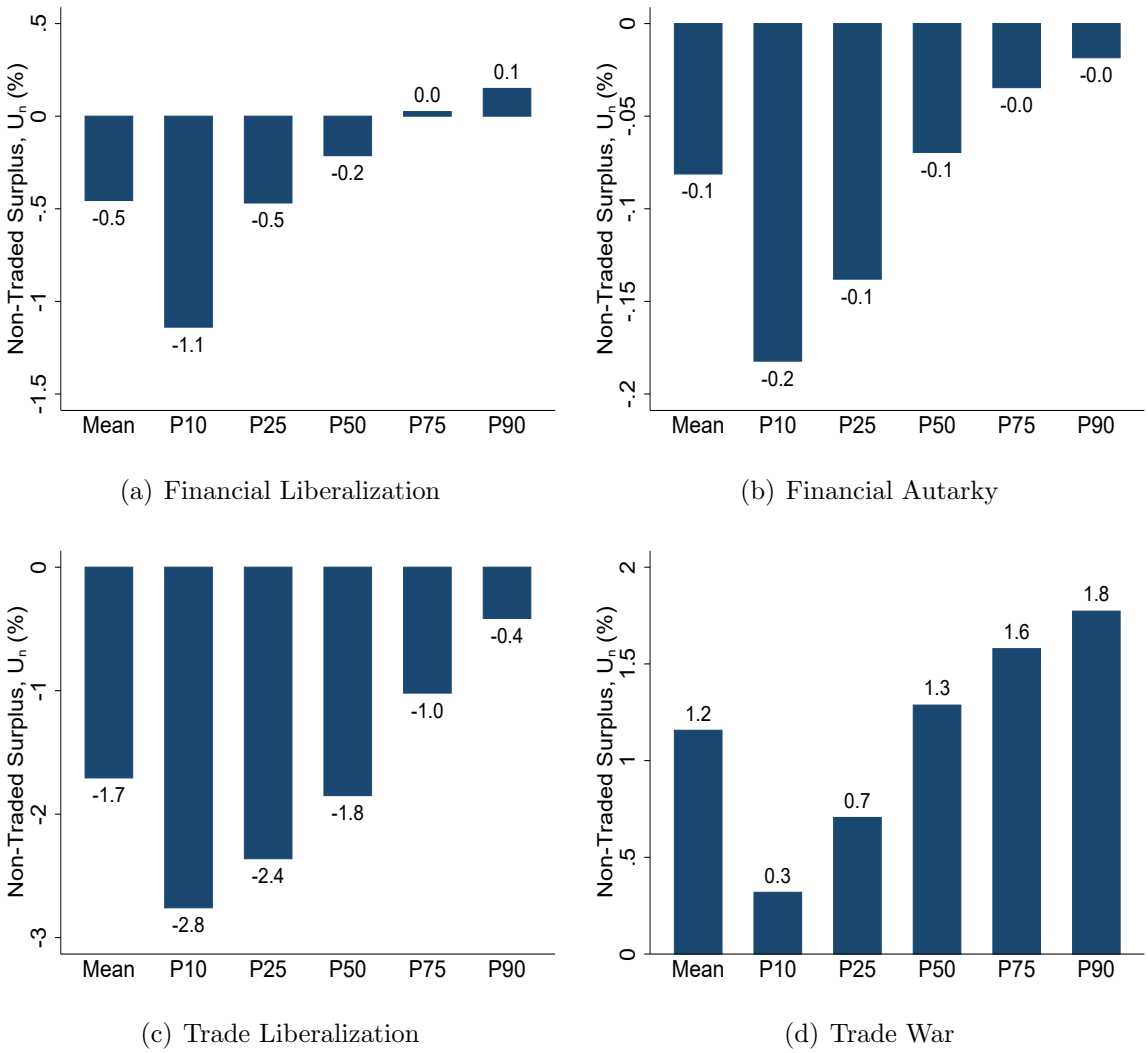
(b) Financial Autarky

(c) Trade Liberalization

(d) Trade War

Notes. Statistics of the welfare changes due to the U_q component when moving from the baseline to financial liberalization, from financial autarky to the baseline, from the baseline to trade liberalization, and from the baseline to a trade war. All welfare changes are expressed as percent of baseline household labor income.

Figure A.3: Distribution of Welfare Changes, U_n Component



(a) Financial Liberalization

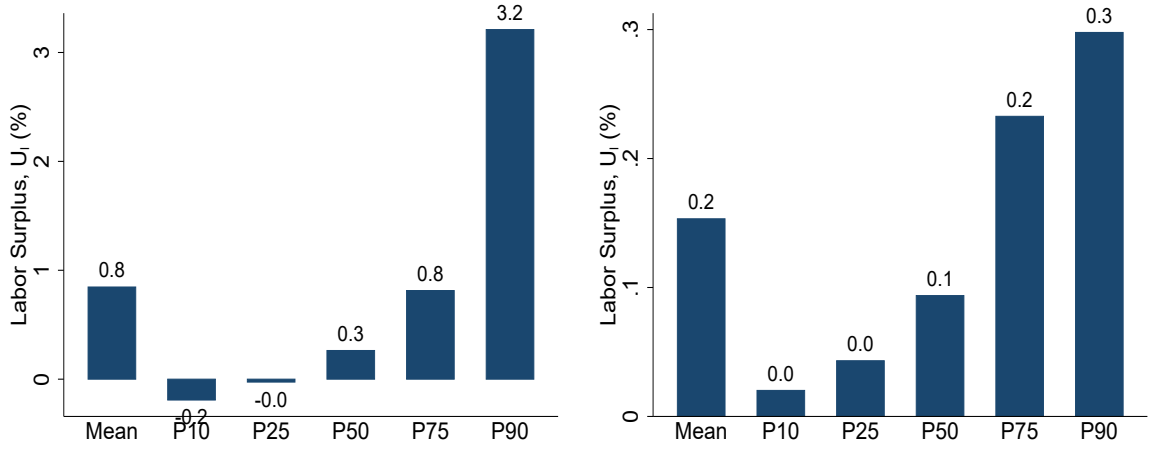
(b) Financial Autarky

(c) Trade Liberalization

(d) Trade War

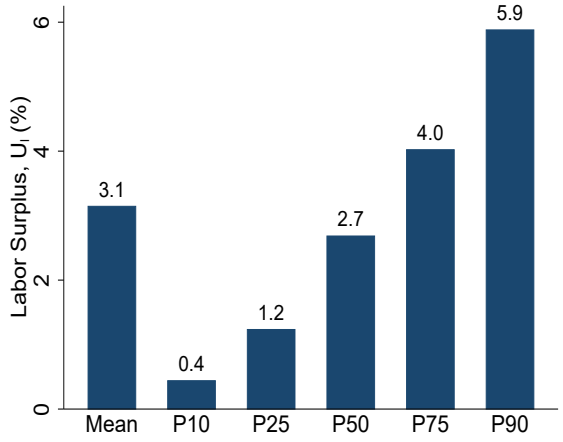
Notes. Statistics of the welfare changes due to the U_n component when moving from the baseline to financial liberalization, from financial autarky to the baseline, from the baseline to trade liberalization, and from the baseline to a trade war. All welfare changes are expressed as percent of baseline household labor income.

Figure A.4: Distribution of Welfare Changes, U_ℓ Component

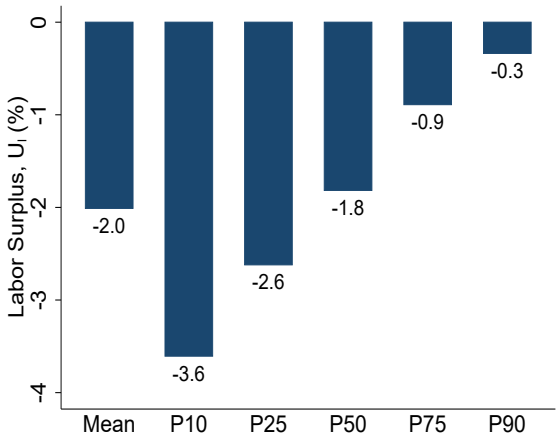


(a) Financial Liberalization

(b) Financial Autarky



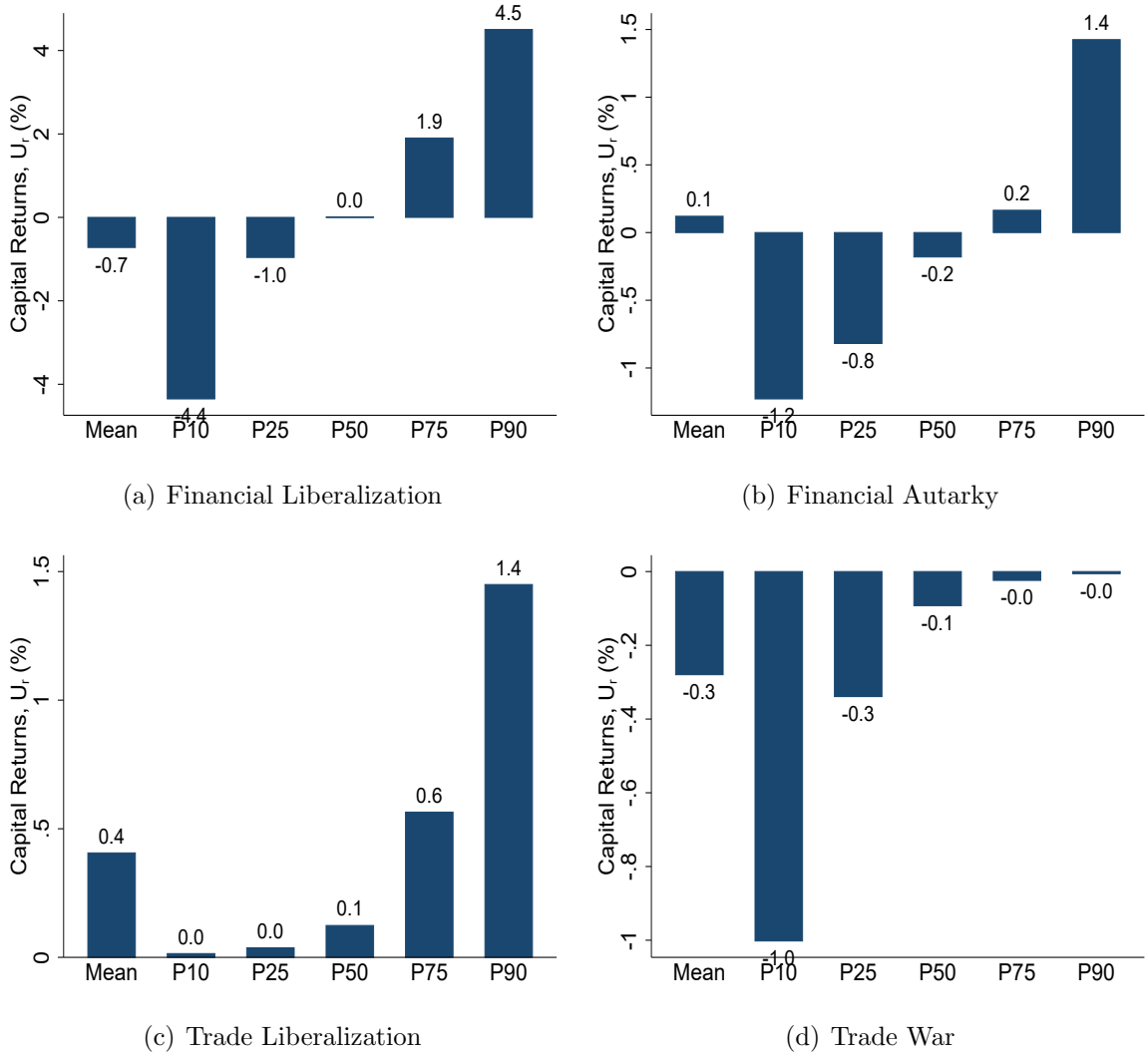
(c) Trade Liberalization



(d) Trade War

Notes. Statistics of the welfare changes due to the U_ℓ component when moving from the baseline to financial liberalization, from financial autarky to the baseline, from the baseline to trade liberalization, and from the baseline to a trade war. All welfare changes are expressed as percent of baseline household labor income.

Figure A.5: Distribution of Welfare Changes, U_r Component



(a) Financial Liberalization

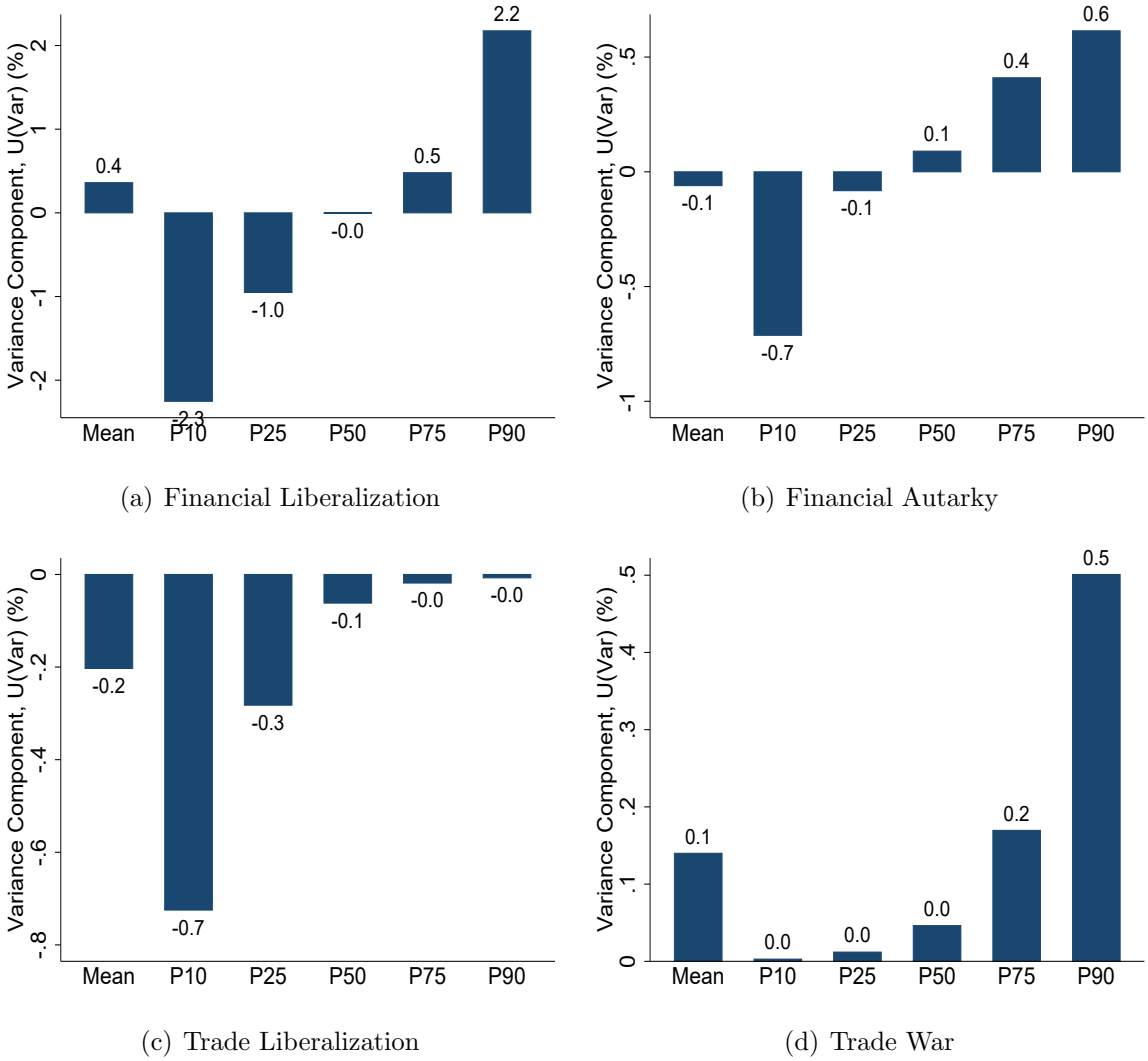
(b) Financial Autarky

(c) Trade Liberalization

(d) Trade War

Notes. Statistics of the welfare changes due to the U_r component when moving from the baseline to financial liberalization, from financial autarky to the baseline, from the baseline to trade liberalization, and from the baseline to a trade war. All welfare changes are expressed as percent of baseline household labor income.

Figure A.6: Distribution of Welfare Changes, $U(\text{Var})$ Component



(a) Financial Liberalization

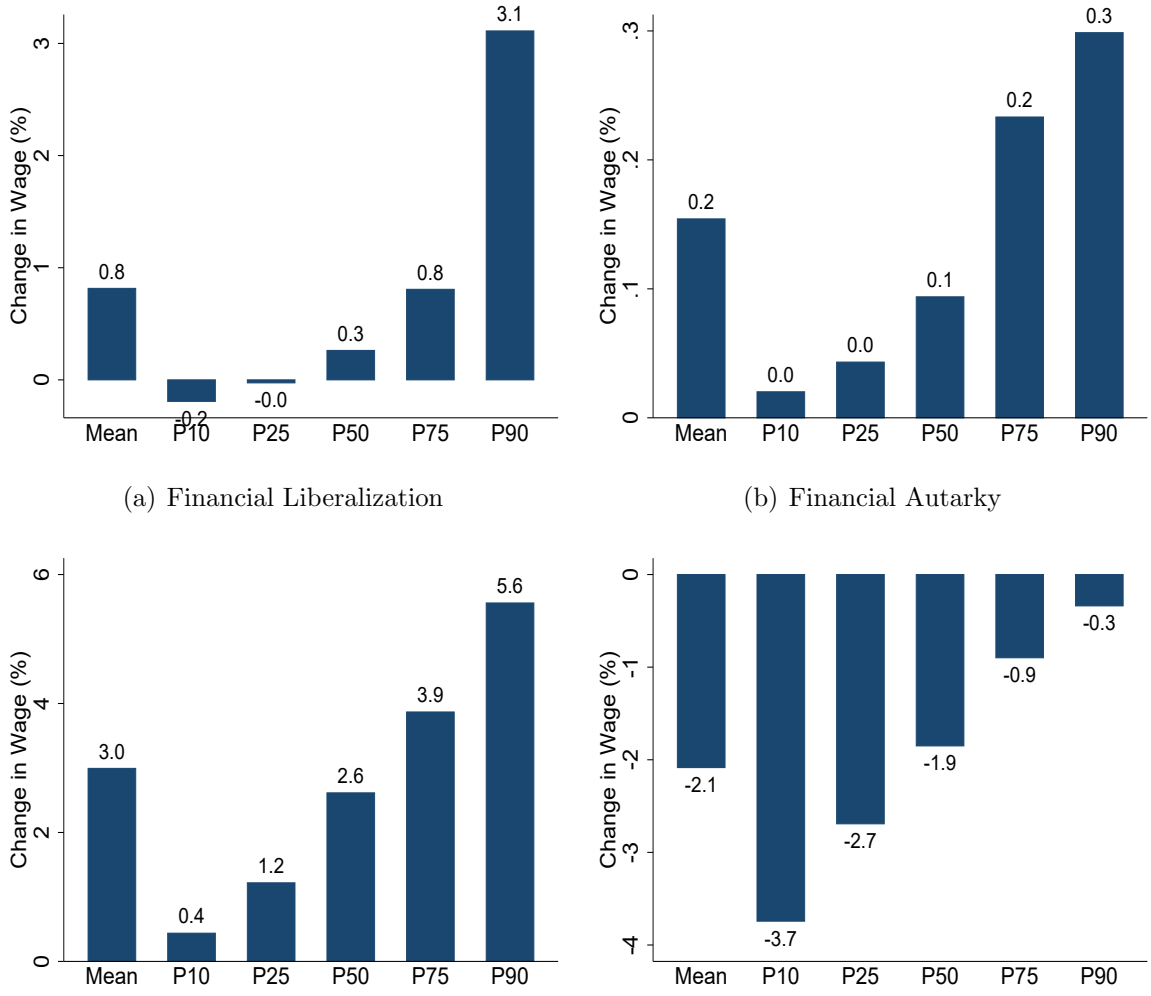
(b) Financial Autarky

(c) Trade Liberalization

(d) Trade War

Notes. Statistics of the welfare changes due to the $U(\text{Var})$ component when moving from the baseline to financial liberalization, from financial autarky to the baseline, from the baseline to trade liberalization, and from the baseline to a trade war. All welfare changes are expressed as percent of baseline household labor income.

Figure A.7: Distribution of Wage Changes



(a) Financial Liberalization

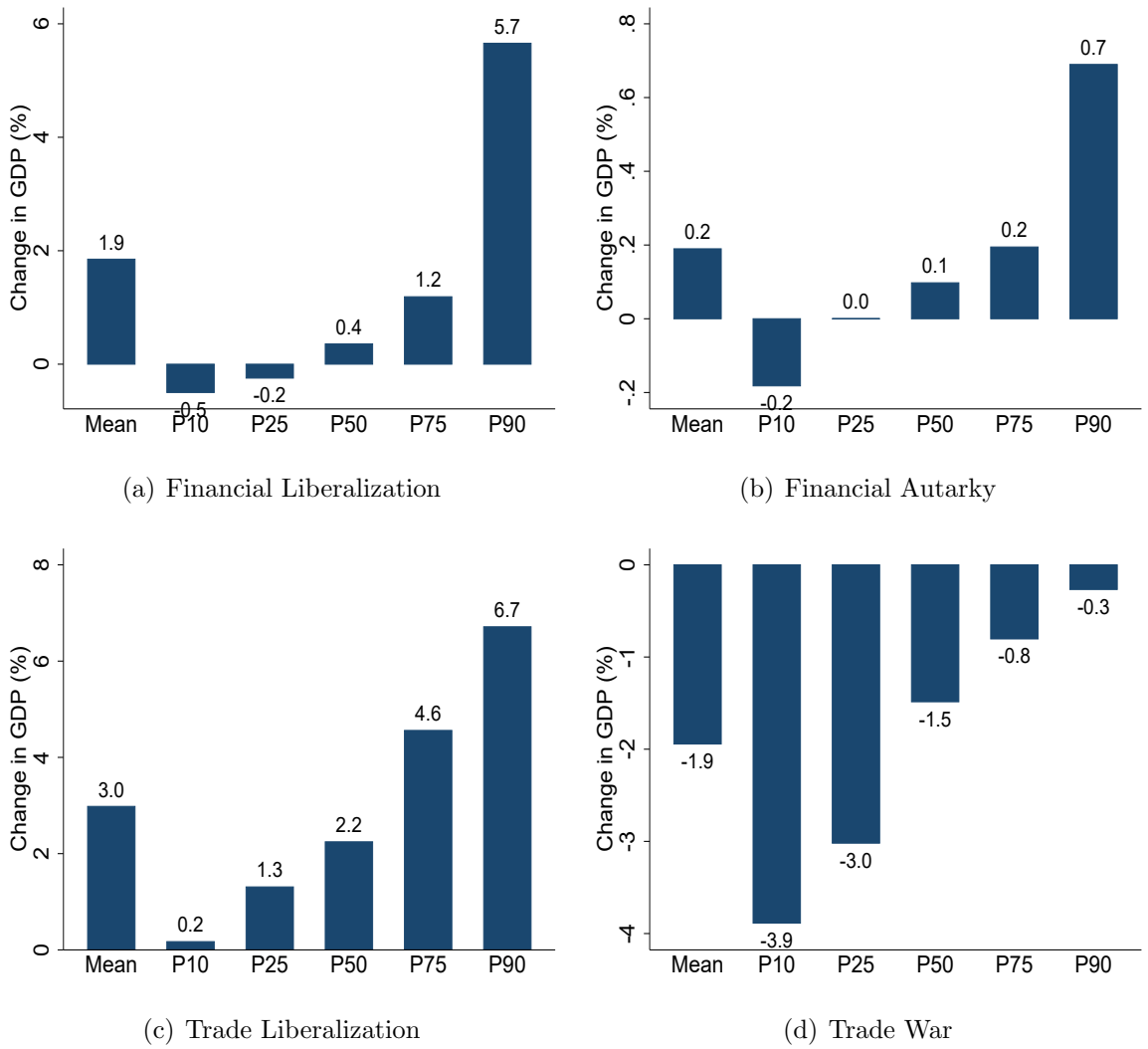
(b) Financial Autarky

(c) Trade Liberalization

(d) Trade War

Notes. Statistics of the wage changes when moving from the baseline to financial liberalization, from financial autarky to the baseline, from the baseline to trade liberalization, and from the baseline to a trade war. Changes are in percent.

Figure A.8: Distribution of GDP Changes



(a) Financial Liberalization

(b) Financial Autarky

(c) Trade Liberalization

(d) Trade War

Notes. Statistics of the GDP changes when moving from the baseline to financial liberalization, from financial autarky to the baseline, from the baseline to trade liberalization, and from the baseline to a trade war. Changes are in percent.

Table A.4: Country Portfolio Shares: Baseline to Financial Liberalization

	Baseline			Financial Liberalization		
(percent)	Own Eq.	Foreign Eq.	Risk-free	Own Eq.	Foreign Eq.	Risk-free
USA	44.7	7.1	48.2	27.7	36.1	36.2
CHN	52.4	1.1	46.6	9.2	54.6	36.2
JPN	23.4	11.4	65.2	2.7	61.0	36.2
DEU	18.5	13.2	68.3	0.7	63.0	36.2
FRA	20.3	9.3	70.4	1.3	62.4	36.2
GBR	18.0	31.2	50.8	1.2	62.5	36.2
CAN	29.7	36.4	33.9	1.7	62.1	36.2
CHE	43.5	22.9	33.6	1.2	62.6	36.2
IND	49.1	0.0	50.8	2.4	61.4	36.2
KOR	37.3	8.0	54.6	2.5	61.3	36.2
BRA	27.7	1.1	71.2	0.6	63.1	36.2
RUS	62.5	0.5	37.0	0.5	63.2	36.2

Notes. Country portfolio shares (in percent) across own-country equity, foreign equity, and risk-free assets, in the baseline economy and in the financial liberalization counterfactual ($\boldsymbol{\Delta} = \mathbf{0}$).

Table A.5: Full Welfare Decomposition: Baseline to Financial Liberalization

(percent, labor income)	U	U_q	U_n	U_ℓ	U_r	U_π	U(Var)
USA	3.1	4.6	-0.4	0.6	-3.4	0.0	1.7
CHN	6.4	6.8	-0.4	0.4	-0.9	0.0	0.4
JPN	9.7	4.1	0.1	-0.1	11.2	0.0	-5.6
DEU	4.5	2.3	0.3	-0.3	4.5	0.0	-2.3
FRA	5.6	2.1	0.1	-0.2	7.0	0.0	-3.5
GBR	5.3	3.1	0.0	0.0	4.4	0.0	-2.2
CAN	4.2	6.1	-0.4	0.6	-4.4	0.0	2.2
CHE	3.4	3.9	-0.5	0.7	-1.4	0.0	0.7
IND	10.5	10.1	-0.1	0.1	0.8	0.0	-0.4
KOR	4.7	4.8	-0.6	0.8	-0.4	0.0	0.2
BRA	8.1	7.5	-0.2	0.3	1.2	0.0	-0.6
RUS	4.3	4.8	-0.2	0.3	-1.0	0.0	0.5

Notes. Full decomposition of the welfare change from the baseline to financial liberalization ($\boldsymbol{\Delta} = \mathbf{0}$), in percent of baseline labor income. U is the total welfare change, decomposed into the surplus from consuming global-firm output (U_q), the surplus from non-traded goods (U_n), the labor-supply surplus (U_ℓ), capital returns on the endowment (U_r), domestic non-traded firm profits (U_π), and the variance penalty (U(Var)).

Table A.6: External Balances: Baseline to Financial Liberalization

	(p.p.)		(100× log changes)	
	$\widetilde{NX}_{\text{cur}}$/GDP	$\widetilde{NX}_{\text{base}}$/GDP	Production q	Consumption q
USA	1.6	1.5	4.0	0.7
CHN	1.7	-0.1	7.4	6.8
JPN	0.7	-0.3	0.3	1.4
DEU	-0.3	-1.7	-4.6	2.0
FRA	-0.1	-1.4	-2.7	2.0
GBR	0.3	-1.3	-2.3	1.4
CAN	1.3	0.3	2.1	1.2
CHE	2.2	5.0	6.7	0.8
IND	4.5	-2.8	5.5	38.4
KOR	-5.6	1.5	7.5	1.8
BRA	2.8	-0.8	5.4	8.2
RUS	0.9	0.1	13.7	8.2

Notes. Changes in external balances and in production/consumption of global firms from the baseline to financial liberalization. The first two columns report the change in net exports as a share of GDP, in percentage points, evaluated at current prices ($\widetilde{NX}_{\text{cur}}$/GDP) and at baseline prices ($\widetilde{NX}_{\text{base}}$/GDP); see Appendix A.4 for the definition of $\widetilde{NX}_i$. The last two columns report the 100× log changes in the production and consumption of the global firms.

Table A.7: Country Portfolio Shares: Financial Autarky to Baseline

	Baseline			Financial Autarky		
(percent)	Own Eq.	Foreign Eq.	Risk-free	Own Eq.	Foreign Eq.	Risk-free
USA	44.7	7.1	48.2	51.0	0.0	49.0
CHN	52.4	1.1	46.6	58.6	0.0	41.4
JPN	23.4	11.4	65.2	29.5	0.0	70.5
DEU	18.5	13.2	68.3	31.1	0.0	68.9
FRA	20.3	9.3	70.4	31.3	0.0	68.7
GBR	18.0	31.2	50.8	35.1	0.0	64.9
CAN	29.7	36.4	33.9	45.5	0.0	54.5
CHE	43.5	22.9	33.6	73.8	0.0	26.2
IND	49.1	0.0	50.8	56.1	0.0	43.9
KOR	37.3	8.0	54.6	43.2	0.0	56.8
BRA	27.7	1.1	71.2	31.4	0.0	68.6
RUS	62.5	0.5	37.0	70.4	0.0	29.6

Notes. Country portfolio shares (in percent) across own-country equity, foreign equity, and risk-free assets, in the baseline economy and in the financial autarky counterfactual. Foreign equity holdings are zero by construction in the autarky counterfactual.

Table A.8: Full Welfare Decomposition: Financial Autarky to Baseline

(percent, labor income)	U	U_q	U_n	U_ℓ	U_r	U_π	U(Var)
USA	-0.1	1.0	-0.2	0.3	-2.4	0.0	1.2
CHN	0.2	0.6	-0.1	0.1	-0.8	0.0	0.4
JPN	0.3	0.8	0.0	0.1	-1.1	0.0	0.5
DEU	0.2	0.4	-0.1	0.1	-0.4	0.0	0.2
FRA	-0.4	0.4	-0.2	0.2	-1.7	0.0	0.9
GBR	1.6	0.3	0.0	0.0	2.7	0.0	-1.3
CAN	3.6	0.1	0.3	-0.5	7.4	0.0	-3.7
CHE	-2.6	1.0	-0.4	0.6	-7.6	0.0	3.8
IND	0.0	0.1	0.0	0.0	-0.3	0.0	0.1
KOR	0.1	0.6	-0.1	0.1	-1.0	0.0	0.5
BRA	0.2	0.4	0.0	0.0	-0.5	0.0	0.2
RUS	0.1	0.3	-0.1	0.1	-0.5	0.0	0.2

Notes. Full decomposition of the welfare change from financial autarky to the baseline economy, in percent of baseline labor income. U is the total welfare change, decomposed into the surplus from consuming global-firm output (U_q), the surplus from non-traded goods (U_n), the labor-supply surplus (U_ℓ), capital returns on the endowment (U_r), domestic non-traded firm profits (U_π), and the variance penalty (U(Var)).

Table A.9: External Balances: Financial Autarky to Baseline

	(p.p.)		(100× log changes)	
	$\widetilde{NX}_{\text{cur}}$/GDP	$\widetilde{NX}_{\text{base}}$/GDP	Production q	Consumption q
USA	0.7	0.8	2.1	0.2
CHN	-0.1	-0.1	1.2	1.8
JPN	0.1	0.2	0.7	0.4
DEU	0.1	0.0	0.5	0.5
FRA	0.4	0.7	2.3	0.5
GBR	-0.2	-0.5	-1.0	0.4
CAN	-1.2	-2.3	-5.5	0.3
CHE	2.5	4.3	6.0	0.2
IND	-0.8	-0.7	1.4	12.4
KOR	0.1	0.1	0.9	0.4
BRA	-0.2	-0.2	1.3	2.2
RUS	-0.1	-0.1	2.3	2.2

Notes. Changes in external balances and in production/consumption of global firms from financial autarky to the baseline economy. The first two columns report the change in net exports as a share of GDP, in percentage points, evaluated at current prices ($\widetilde{NX}_{\text{cur}}$/GDP) and at baseline prices ($\widetilde{NX}_{\text{base}}$/GDP); see Appendix A.4 for the definition of $\widetilde{NX}_i$. The last two columns report the 100× log changes in the production and consumption of the global firms.

Table A.10: Country Portfolio Shares: Baseline and Trade Liberalization

	Baseline			Trade Liberalization		
(percent)	Own Eq.	Foreign Eq.	Risk-free	Own Eq.	Foreign Eq.	Risk-free
USA	44.7	7.1	48.2	46.3	9.9	43.8
CHN	52.4	1.1	46.6	52.9	4.8	42.2
JPN	23.4	11.4	65.2	23.7	15.4	60.9
DEU	18.5	13.2	68.3	18.7	17.3	63.9
FRA	20.3	9.3	70.4	20.6	13.4	66.1
GBR	18.0	31.2	50.8	18.2	35.3	46.5
CAN	29.7	36.4	33.9	29.9	40.5	29.6
CHE	43.5	22.9	33.6	43.7	27.1	29.2
IND	49.1	0.0	50.8	49.2	4.3	46.5
KOR	37.3	8.0	54.6	37.4	12.3	50.3
BRA	27.7	1.1	71.2	27.8	5.4	66.9
RUS	62.5	0.5	37.0	62.5	4.8	32.6

Notes. Country portfolio shares (in percent) across own-country equity, foreign equity, and risk-free assets, in the baseline economy and in the trade liberalization counterfactual that eliminates the tariff and non-tariff-measure components of τ_{ji}, holding the financial frictions $\mathbf{\Delta}$ at their baseline values.

Table A.11: Full Welfare Decomposition: From Baseline to Trade Liberalization

(percent, labor income)	U	U_q	U_n	U_ℓ	U_r	U_π	U(Var)
USA	1.7	-0.1	-1.9	2.9	1.7	0.0	-0.8
CHN	1.7	1.5	-1.1	1.2	0.2	0.0	-0.1
JPN	1.1	0.4	-1.2	1.6	0.6	0.0	-0.3
DEU	2.5	1.9	-1.8	2.3	0.3	0.0	-0.2
FRA	2.4	1.5	-2.0	2.7	0.6	0.0	-0.3
GBR	5.2	3.0	-2.5	4.2	0.9	0.0	-0.4
CAN	22.4	19.7	-3.0	5.1	1.3	0.0	-0.6
CHE	6.5	4.5	-2.3	3.6	1.4	0.0	-0.7
IND	4.7	4.7	-0.3	0.3	0.0	0.0	0.0
KOR	1.9	1.4	-1.1	1.4	0.4	0.0	-0.2
BRA	7.8	7.7	-0.4	0.5	0.1	0.0	-0.1
RUS	4.2	4.1	-0.8	0.9	0.0	0.0	0.0

Notes. Full decomposition of the welfare change from the baseline economy to the trade liberalization counterfactual, in percent of baseline labor income. U is the total welfare change, decomposed into the surplus from consuming global-firm output (U_q), the surplus from non-traded goods (U_n), the labor-supply surplus (U_ℓ), capital returns on the endowment (U_r), domestic non-traded firm profits (U_π), and the variance penalty (U(Var)).

Table A.12: External Balances: Baseline to Trade Liberalization

	(p.p.)		(100× log changes)	
	$\widetilde{NX}_{\text{cur}}$/GDP	$\widetilde{NX}_{\text{base}}$/GDP	Production q	Consumption q
USA	4.7	4.4	10.0	0.4
CHN	-0.1	0.1	17.5	14.0
JPN	6.0	5.9	14.5	1.7
DEU	6.9	6.6	22.7	4.3
FRA	9.1	8.6	22.7	4.5
GBR	6.7	6.5	18.0	3.0
CAN	7.3	7.1	24.9	8.2
CHE	17.1	15.7	19.5	1.9
IND	-12.6	-12.3	6.1	106.6
KOR	2.2	2.3	11.5	3.1
BRA	-7.2	-6.9	7.5	37.6
RUS	-2.1	-2.0	23.6	35.1

Notes. Changes in external balances and in production/consumption of global firms from the baseline economy to the trade liberalization counterfactual. The first two columns report the change in net exports as a share of GDP, in percentage points, evaluated at current prices ($\widetilde{NX}_{\text{cur}}$/GDP) and at baseline prices ($\widetilde{NX}_{\text{base}}$/GDP); see Appendix A.4 for the definition of $\widetilde{NX}_i$. The last two columns report the 100× log changes in the production and consumption of the global firms.

Table A.13: Trade War: Changes in Production and Consumption Trade Costs

(changes, p.p.)	Production trade cost τ_j	Consumption trade cost τ_i
USA	14.1	3.6
CHN	11.3	4.3
JPN	14.7	3.6
DEU	14.8	9.4
FRA	14.8	6.9
GBR	14.8	8.7
CAN	14.9	8.4
CHE	15.0	8.8
IND	11.2	6.8
KOR	14.9	5.2
BRA	14.4	7.7
RUS	14.6	8.3

Notes. Implied changes (in percentage points) in the population-weighted production trade cost τ_j in equation (27) and the expenditure-weighted consumption trade cost τ_i in equation (28) when bilateral trade costs, τ_{ji}, rise by 15 percentage points for all cross-border pairs.

Table A.14: From Baseline to Trade War

	(100× log changes)				(p.p. changes)			(percent, labor income)			
	q	p	e	GDP	μ	s_e^1	s_{pq}^1	U	U_q	U_r	U(Var)
USA	-12.8	-2.2	-7.9	-3.9	-0.1	-0.8	-1.2	-2.8	-1.3	-1.3	0.7
CHN	-7.7	-0.5	-2.7	-0.8	0.0	-1.8	-2.3	-0.8	-0.7	-0.1	0.0
JPN	-11.9	-0.9	-8.7	-2.7	0.0	-1.8	-2.2	-1.9	-1.5	-0.4	0.2
DEU	-16.2	-1.2	-9.2	-2.8	-0.1	-1.5	-1.2	-2.9	-2.6	-0.2	0.1
FRA	-16.3	-1.3	-12.3	-3.5	-0.1	0.1	0.5	-2.4	-1.9	-0.4	0.2
GBR	-11.3	-1.4	-8.2	-3.6	-0.1	-1.6	-0.6	-5.2	-3.9	-0.6	0.3
CAN	-7.2	-1.5	-1.9	-2.7	-0.1	-1.1	-1.0	-6.1	-4.8	-1.0	0.5
CHE	-13.7	-1.4	-12.7	-6.1	-0.1	-1.2	-0.3	-5.2	-4.0	-1.0	0.5
IND	-5.1	-0.5	-2.7	-0.3	0.0	-2.2	-3.0	0.1	0.1	0.0	0.0
KOR	-8.4	-0.7	-2.1	-1.8	0.0	-3.2	-1.9	-2.0	-1.8	-0.2	0.1
BRA	-9.6	-0.7	-6.3	-0.8	0.0	-0.8	-0.3	-1.6	-1.5	-0.1	0.0
RUS	-10.2	-0.2	-4.9	-0.5	0.0	-0.5	0.0	-1.0	-1.0	0.0	0.0

Notes. Counterfactual changes when bilateral trade costs, τ_{ji}, rise by 15 percentage points across all cross-border pairs. Columns are defined as in Table 7.

Table A.15: From Historical Productivity to the Baseline

	(100× log changes)				(p.p. changes)			(percent, labor income)			
	q	p	e	GDP	μ	s_e^1	s_{pq}^1	U	U_q	U_r	U(Var)
USA	15.6	-8.4	3.0	7.1	0.1	0.1	0.7	9.5	6.4	0.9	-0.4
CHN	5.8	9.1	59.0	56.2	0.2	-4.9	-2.3	115.4	0.0	0.5	-0.3
JPN	7.5	-5.4	1.3	0.0	0.1	1.0	1.5	-2.8	3.4	0.5	-0.3
DEU	5.8	-3.7	1.2	3.0	0.1	1.6	0.4	3.3	1.5	0.2	-0.1
FRA	4.9	-2.2	6.8	15.4	0.0	-1.4	-0.7	25.6	1.3	0.2	-0.1
GBR	0.4	-2.0	3.1	12.1	0.1	1.1	0.7	21.6	2.4	0.5	-0.2
CAN	-5.9	0.8	-0.5	1.2	0.1	-0.4	0.5	5.2	3.1	0.7	-0.3
CHE	4.3	-3.3	5.9	16.7	0.1	0.5	-0.1	26.8	2.3	0.8	-0.4
IND	47.9	-16.0	33.3	64.7	0.1	1.3	0.3	108.3	0.2	0.0	0.0
KOR	3.9	-3.4	0.2	21.6	0.1	-1.0	0.3	40.2	2.2	0.5	-0.2
BRA	-11.0	8.2	3.1	19.6	0.0	0.1	0.3	35.4	-1.3	0.0	0.0
RUS	6.9	-4.5	4.1	16.0	0.0	-0.1	-0.2	33.6	0.5	0.0	0.0

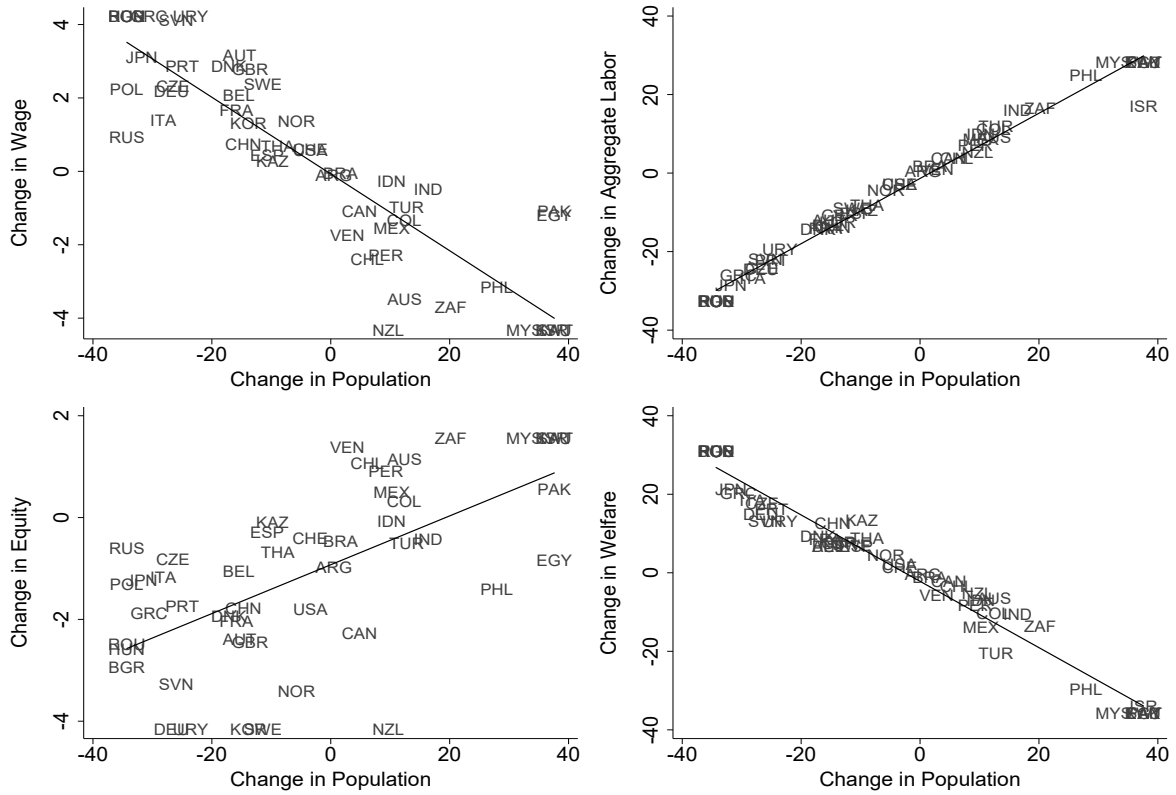
Notes. Counterfactual changes when productivity is perturbed to match country-level productivity changes over a fifteen-year period, constructed from the Penn World Tables. Columns are defined as in Table 7.

Table A.16: From $r_0 = 0.03$ to the Baseline $r_0 = 0.02$

	(100× log changes)				(p.p. changes)			(percent, labor income)			
	q	p	e	GDP	μ	s_e^1	s_{pq}^1	U	U_q	U_r	U(Var)
USA	4.8	-3.8	15.6	1.7	-0.6	2.1	0.5	-6.1	3.2	-7.8	-1.8
CHN	2.5	-4.1	15.2	0.3	-0.8	-0.8	0.8	-0.9	1.3	-2.0	-0.2
JPN	2.1	-2.8	9.6	0.6	-0.9	0.7	0.4	-7.7	2.4	-9.7	-0.5
DEU	1.8	-1.3	34.8	0.4	-0.8	-7.2	-0.1	-2.8	1.1	-3.7	-0.3
FRA	3.1	-1.9	25.0	0.8	-0.9	-2.8	0.0	-5.5	1.0	-6.2	-0.4
GBR	2.3	-2.2	25.8	0.7	-0.8	-6.6	0.0	-4.6	1.8	-5.8	-0.8
CAN	1.7	-0.3	206.3	0.8	-0.7	.	-0.4	-2.6	3.5	-5.1	-1.3
CHE	5.2	-3.6	9.0	2.5	-0.8	0.7	-0.1	-6.0	2.1	-7.2	-1.2
IND	5.9	8.1	.	0.3	-0.9	.	-5.0	-1.1	0.0	-1.1	0.0
KOR	1.7	-2.9	35.4	0.4	-0.8	-9.2	0.6	-2.7	1.6	-4.0	-0.4
BRA	1.8	-2.9	5.0	0.2	-0.8	-0.4	0.2	-1.4	0.8	-2.2	-0.1
RUS	1.7	-2.6	13.3	0.1	-1.0	-1.4	0.1	0.0	0.5	-0.5	0.0

Notes. Counterfactual changes when the world risk-free rate falls by one percentage point, from $r_0 = 0.03$ to $r_0 = 0.02$. Columns are defined as in Table 7. Dots denote changes that are not well defined.

Figure A.9: Population Distribution Changes



Notes. Cross section of country-level changes when country populations P_i are changed to match shifts in population shares across the world. Top row: $100\times$ log changes in the wage w_i (left) and employment $P_i\ell_i$ (right). Bottom row: $100\times$ log changes in country equity (left) and welfare changes (right). The horizontal axis in each panel is 100 times the log change in country population, P_i. All variables are winsorized at the 10 percent level to improve visibility.

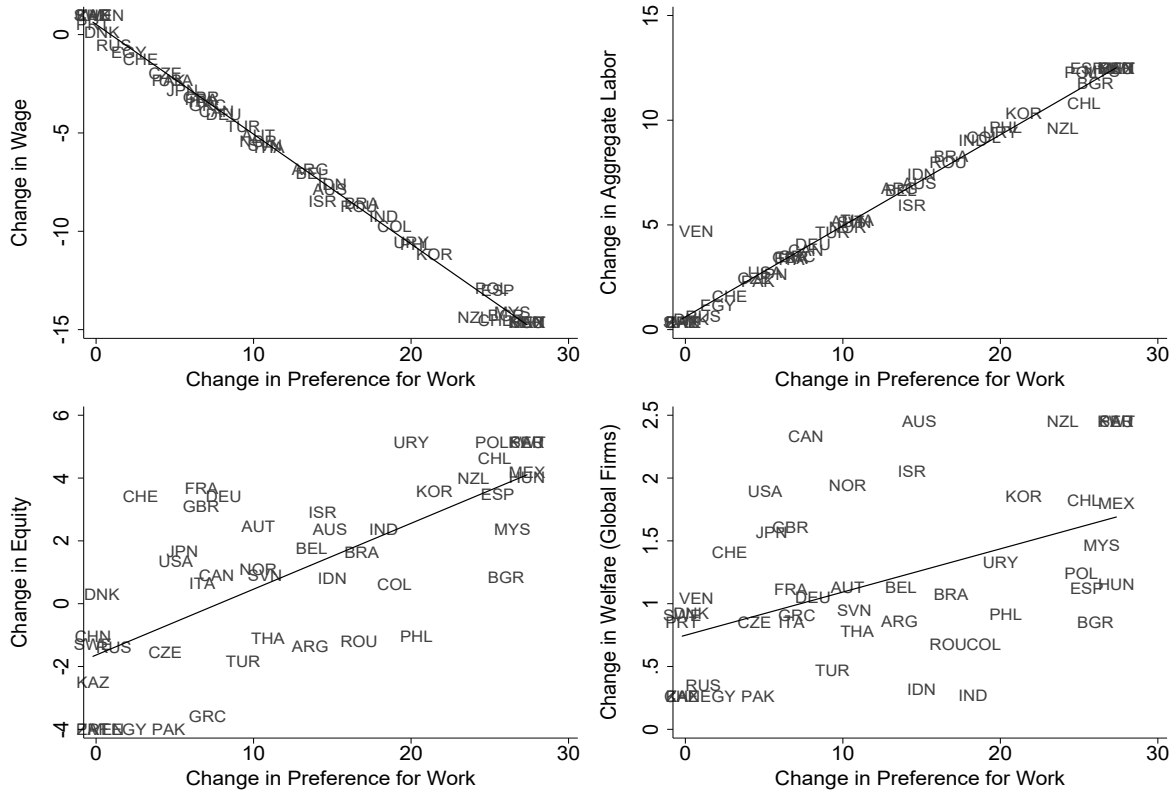
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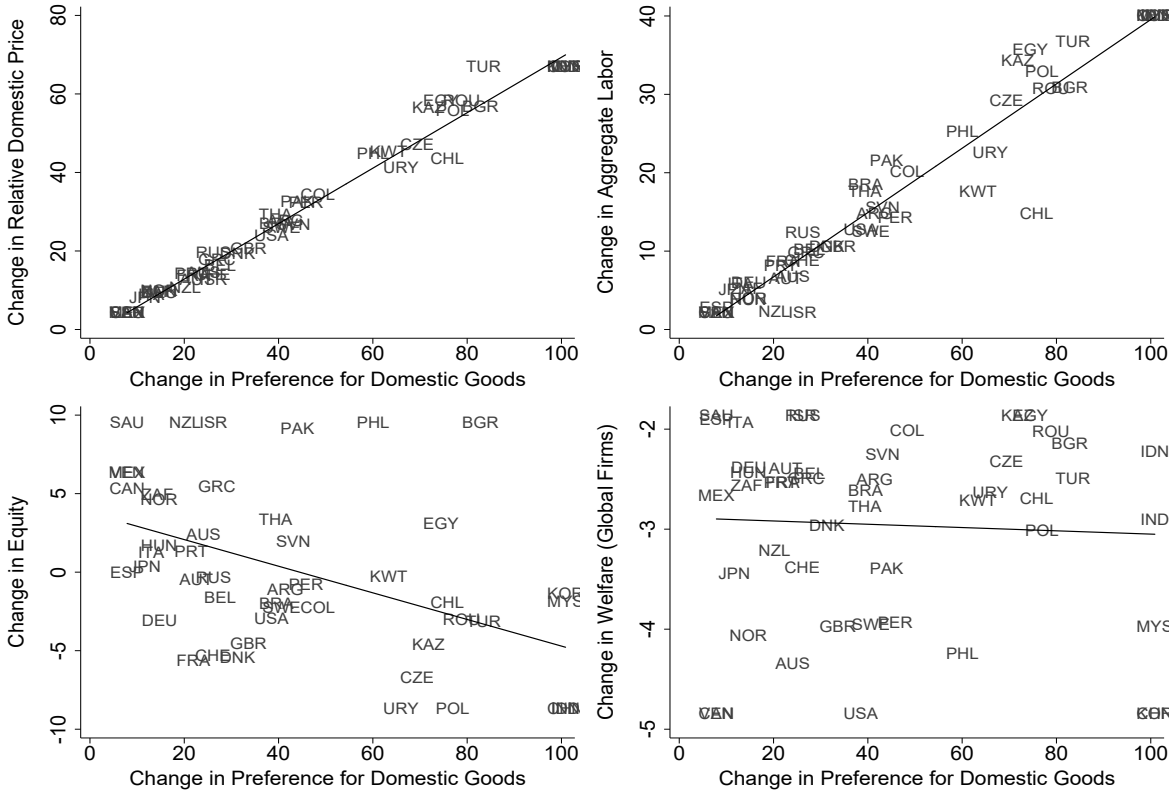
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Figure A.10: Preference for Work



Notes. Cross section of country-level changes when the preference shifter for work $\bar{\ell}_i$ is varied to match changes in employment over time. Top row: 100× log changes in the wage w_i (left) and employment $P_i\ell_i$ (right). Bottom row: 100× log changes in country equity (left) and the consumer-surplus component from global products U_q (right). The horizontal axis in each panel is 100 times the log change in country labor supply shifter, $\bar{\ell}_i$. All variables are winsorized at the 10 percent level to improve visibility.

Figure A.11: Preference for Domestic Goods



Notes. Cross section of country-level changes when the preference shifter for domestic goods $\bar{n}_i$ is varied to match changes in the prices of non-traded goods over time. Top row: $100\times$ log changes in the domestic-good price p_{ni} (left) and employment $P_i\ell_i$ (right). Bottom row: $100\times$ log changes in country equity (left) and the consumer-surplus component from global products U_q (right). The horizontal axis in each panel is 100 times the log change in country preference shifter, $\bar{n}_i$. All variables are winsorized at the 10 percent level to improve visibility.

Table A.17: Sensitivity to ψ and γ

	Change in e			Change in U		
	Base	$\psi = 0.5$	$\gamma = 10$	Base	$\psi = 0.5$	$\gamma = 10$
Financial Autarky	2.6	2.6	4.0	0.3	0.3	0.5
Financial Liberalization	17.3	17.3	30.5	5.5	5.5	20.9
Trade War	-4.3	-4.3	-4.2	-2.9	-2.8	-2.9
Trade Liberalization	8.4	8.4	6.1	3.8	3.9	3.8
Preference for Domestic Goods	-0.6	-2.3	-0.3	2.5	6.9	2.5
Preference for Work	1.2	1.3	1.0	0.2	0.1	0.2
Population Changes	-1.0	-0.7	-1.6	5.6	5.7	5.7
Lower Risk-Free Rate	8.8	8.8	7.9	-0.9	-0.9	-0.9
Productivity Changes	3.1	3.1	2.6	27.9	28.8	27.9

Notes. Sensitivity of the headline and additional counterfactual experiments to alternative parameter values. Change in e is the cross-country median percent change in firm equity; Change in U is the cross-country median welfare change in percent of labor income. The Base columns use the calibrated values $\psi = 1$ and $\gamma = 4$; the remaining columns set $\psi = 0.5$ or $\gamma = 10$.