The Globalization Risk Premium[†]

Jean-Noël Barrot   Erik Loualiche   Julien Sauvagnat

January 2016

Abstract

We investigate how globalization is reflected in asset prices. We use shipping costs to measure U.S. firms' exposure to globalization. Firms in low shipping cost industries carry a 7.8 percent risk premium, suggesting that their cash-flows covary negatively with U.S. investors' marginal utility. To understand the origins of this globalization risk premium, we develop a dynamic general equilibrium model of trade and asset prices. We find that the premium emanates from the risk of displacement of least efficient firms triggered by import competition. This suggest that foreign productivity shocks are associated with times when consumption is dear for U.S. investors.

[†]This paper was previously circulated under the title "Import Competition and the Cost of Capital". Jean-Noël Barrot is with MIT Sloan School of Management and CEPR. Contact: jnbarrot@mit.edu. Erik Loualiche is with MIT Sloan School of Management. Contact: erikl@mit.edu. Julien Sauvagnat is with Bocconi University. Contact: julien.sauvagnat@unibocconi.it. We are grateful to Nick Bloom, Maria Cecilia Bustamante (discussant), Bernard Dumas (discussant), Pierre-Olivier Gourinchas, Christian Julliard, Jonathan Parker, Carolin Pflueger, Thomas Philippon, Nick Roussanov (discussant), Chris Telmer (discussant), Michael Weber (discussant) and seminar participants at MIT Sloan, SED annual meetings 2015, 2015 China International Conference in Finance, 2015 European Economic Association annual meetings, 2016 ASSA meetings, Spring 2016 NBER International Trade and Investment meeting, Spring 2016 NBER International Finance and Macroeconomics meeting, 2016 NYU Stern Macrofinance conference, 2016 Duke-UNC Asset Pricing Conference, Spring 2016 Macro-Finance Society Meeting for their valuable inputs. Julien Sauvagnat gratefully acknowledges financial support from the Agence Nationale de la Recherche - Investissements d'Avenir (ANR-11-IDEX-0003/Labex Ecodec/ANR-11-LABX-0047). We would like to thank Vincent Tjeng for outstanding research assistance.

1 Introduction

A defining feature of the past three decades is the dramatic increase in international trade flows. Commonly referred to as "globalization", this process has attracted a lot of scrutiny but its implications are still debated. Among the benefits are the availability of more product variety at lower prices (Broda and Weinstein, 2006), cheaper intermediate goods (Goldberg et al., 2010; De Loecker et al., 2012), and the access for U.S. firms to foreign markets (Lileeva and Trefler, 2010). On the other hand, foreign competition by low wage countries, including China especially after its entry in World Trade Organization, have been shown to threaten U.S. manufacturing employment and wages (Pierce and Schott, 2012; Autor et al., 2013; Acemoglu et al., 2014). In summary, globalization exposes domestic economies to foreign productivity shocks with heterogeneous effects on households (Goldberg and Pavcnik, 2007) and firms (Melitz and Redding, 2014a) that complicate the analysis of its overall impact.

This paper studies how globalization is reflected in asset prices, and therefore how U.S. investors perceive the domestic consequences of foreign productivity shocks. The intuition is as follows: if the performance of firms more exposed to globalization covaries negatively with U.S. investors' marginal utility, these firms will command a risk premium. Consistent with this idea, we find that exposed firms command a risk premium. This premium can be driven by either a positive or negative joint reaction of U.S. firms' performance and households' consumption to foreign productivity shocks. We provide evidence in favor of the latter: states of the world where firms suffer from increased import competition are also states where consumption is dear. Our results thus indicate that foreign productivity shocks are perceived as bad news for the marginal U.S. investor.

We use shipping costs (SC) to measure firms' exposure to globalization. More precisely, we follow Bernard et al. (2006b) and exploit import data which allows us to compute the various costs associated to shipments, called Cost-Insurance-Freight as a percentage of the price paid by the importer. We document substantial cross-sectional variation and time-series persistence in SC, consistent with the idea that this proxy captures structural and slow-moving barriers to trade. We also show that SC are tightly linked to the weight-to-value ratio of shipments, and find that both measures correlate negatively with firms' propensity to import and export, namely, with their exposure to globalization.

We then build portfolios based on quintiles of SC and analyze their returns from 1974 to 2013. We find that the zero cost portfolio that is long high shipping costs industries and short low shipping costs industries has average annual excess returns of -7.8 percent and a Sharpe ratio of 42 percent. We then explore the possibility that our results reflect loadings on well-known risk factors, and estimate the residual of industry excess returns from the classic three factor model of Fama and French (1993). We find that the low SC portfolio has abnormal returns of 63 basis points per month, and that high minus low shipping costs portfolio generates negative excess returns of 79 basis points per month (9.5 percent in annualized terms). We conclude that the performance of firms exposed to foreign productivity shocks covaries negatively with U.S. investors' marginal utility. There are two possible interpretation for this finding: a positive response of consumption and cash-flows to foreign productivity shocks through higher exports or more efficient sourcing of intermediate inputs; or a negative response of consumption and cash-flows to these shocks through displacement of domestic firms by import competition.

To disentangle these two interpretations and determine the sign of the price of risk, we build a standard two-country dynamic general equilibrium model of trade (Melitz, 2003). We first derive the elasticity of domestic and foreign profits to foreign productivity shocks. The elasticity of domestic profits is typically negative due to price effects, and amplified if demand elasticity is high. The elasticity of foreign profits is typically positive due to increased demand in the foreign country, although this effect is dampened by the intensity of competition on the foreign market. We then characterize the elasticity of domestic households' utility to foreign productivity shocks. Within our limited risk-sharing framework,[1] the elasticity trades off two competing effects: a positive price effect where the price of the final consumption index decreases as import competition intensifies; a negative income effect due to the decrease in households' wealth since the value of the domestic portfolio drops after an increase in import competition. The sum of both effects on utility is ambiguous.

We derive additional predictions from the model that allow us to identify the sign of the price of foreign productivity risk in the cross-section of equity returns. First, we show that the price of risk is negative if the difference in excess returns between high and low SC industries is higher for small and less productive firms. The intuition is that these firms are hit the hardest by the entry of foreign competitors, and are also less likely to benefit from improved exporting opportunities. Moreover, we show that if the difference in excess returns between high and low SC industries is higher in high demand elasticity industries, then the price of risk is negative, namely, the globalization risk premium is driven by the displacement of domestic firms by import competition. The idea is that the propensity of consumers to substitute across products facilitates the entry of foreign firms, but does not improve the ability of domestic firms to compete in the foreign country. Finally, we find the price of risk to be negative if risk premia are concentrated in industries whose firm distribution has a high Pareto tail parameter, namely, where production is spread out among less productive

[1] For evidence of home bias in U.S. investors' portfolio, see Coval and Moskowitz (1999); Ivković and Weisbenner (2005); Rauh (2006); Brown et al. (2009); Baik et al. (2010); Bernile et al. (2015).

firms, who are therefore less likely to benefit and more likely to suffer from international trade flows.

We go back to the data to test these predictions. We estimate the globalization risk premium using double-sorted portfolios and find that the risk premium is concentrated among small firms and low return-on-assets firms – namely, firms that are likely to suffer from import penetration, but unlikely to greatly benefit from increased export opportunities. We also split the sample into high and low demand elasticity industries, and high and low Pareto tail parameter industries. Excess returns are overall larger in high demand elasticity and high Pareto tail industries, consistent with the idea that displacement risk is the key driver of the globalization risk premium. These findings indicate that the price of risk is negative, which suggests that the representative U.S. investor perceives foreign productivity shocks as bad news for her marginal utility.

To further uncover the mechanism through which globalization affects asset prices, we calibrate the model using standard parameter values and analyze impulse responses of cash-flows, valuations and consumption to foreign productivity shocks. Again consistent with import competition displacing domestic firms, we find that exposed firms experience lower cash-flows and valuations, especially smaller ones. Importantly, we find that domestic consumption drops. These results corroborate our finding that the globalization risk premium is driven by the fact that domestic firms are displaced by import competition, and that the marginal investor in the U.S. perceives foreign productivity shocks as being associated with a rise in marginal utility due to a drop in consumption.

We contribute to the literature, which starting with Melitz (2003) and Bernard et al. (2003), has taken into account firm heterogeneity to analyze the gains from trade.[2] A common prediction of these models is that international trade elevates productivity through the contraction and exit of low-productivity firms and the expansion and entry into export markets of high-productivity firms. In this framework, globalization generates both winners and losers within an industry, as better-performing firms expand into foreign markets, while worse-performing firms contract in the face of foreign competition. Consistent with this idea, Pavcnik (2002) finds that roughly two-thirds of the 19 percent increase in aggregate productivity following Chile's trade liberalization of the late 1970s and early 1980s is due to the relatively greater survival and growth of high-productivity plants. Bernard and Jensen (2004) find that almost half of all U.S. manufacturing productivity growth during 1983-1992 is explained by the reallocation of resources towards exporters. Trefler (2004) shows that 12 percent of the workers in low-productivity firms lost their jobs after the Canada-U.S. free

[2]For recent reviews, see Bernard et al. (2007), Melitz and Trefler (2012), Melitz and Redding (2014b).

trade agreement.[3]

We also build on recent work that highlights the displacement risk associated with imports. Bernard et al. (2006a) find that exposure to low-wage country imports is negatively associated with plant survival and employment growth, and Bernard et al. (2006b) find that the probability of plant death is higher in industries experiencing declining trade costs. Our results also relate to recent studies of the effect on the labor market of the acceleration of Chinese import penetration (Pierce and Schott, 2012; Autor et al., 2013; Acemoglu et al., 2014; Autor et al., 2014), or of trade shocks more generally (Artuç et al., 2010; Ebenstein et al., 2014). Hsieh and Ossa (2011) and di Giovanni et al. (2014) assess the global welfare effect of China's trade integration. Some early work by Grossman and Levinsohn (1989) emphasized the link between import competition and contemporaneous stock returns. Our contribution is to show that displacement risk is reflected in the cost of capital, which suggests that the marginal utility of U.S. investors covaries positively with this risk factor.

Finally, there are few papers considering the role of international trade for asset pricing, see for example Fillat and Garetto (2015). However we add to the growing literature in finance that focuses on the implications of product market dynamics, including international trade for asset pricing. Recent contributions include Hou and Robinson (2006), Tian (2011), Loualiche (2015), Ready et al. (2013) and Bustamante and Donangelo (2015). A common result in these papers is that the threat of entry tends to be priced in the cross-section of expected returns.[4] In relation to these papers, we show that the mere threat of import competition has an effect on firms through their higher cost of capital.

The remainder of the paper is organized as follows. In Section 2, we present our measure of shipping costs and our baseline estimates of the globalization risk premium. In Section 3, we lay out the theoretical framework. We identify the sign of the price of risk in the cross-section of equity returns in Section 4. In Section 5 we calibrate the model. Section 6 concludes.

[3]Also related to this paper are Hsieh and Ossa (2011) and di Giovanni et al. (2014) who assess the global effect of China's trade integration.

[4]In addition, a series of papers have used tariff cuts to instrument for import competition and have found that it affects firms capital budgeting decisions (Bloom et al., 2011; Fresard and Valta, 2014), and capital structure (Xu, 2012; Valta, 2012). Firms have also been found to suffer less from import competition if they have larger cash holdings (Fresard, 2010) and R&D expenses (Hombert and Matray, 2014).

2 Measuring the globalization risk premium

2.1 Shipping costs

We start by sorting firms with respect to their exposure to globalization. We hypothesize that firms are less exposed to international trade flows if the shipping costs (SC) incurred to replace their products with imported ones are larger.[5] We measure these costs using the actual shipping cost paid by importers. We consider ad valorem freight rate from underlying product-level U.S. import data. We obtain these data at the four-digit SIC codes level from Feenstra (1996) for 1974 to 1988, and from Peter Schott's website for 1989 to 2012. Freight costs – our proxy for shipping costs – is the markup of the Cost-Insurance-Freight value over the Free-on-Board value.

Building on prior work, we argue that SC is a structural characteristic rooted in the nature of the output produced by any given industry.[6] According to Hummels (2007), SC depends on the weight-to-value ratio: the mark-up is larger for goods that are heavy relative to their value. From 1989 onwards, we construct industry-year weight-to-value ratios, measured as the ratio of kilograms shipped to the value of the shipment, as alternative measure for shipping costs.

We check that SC are widely dispersed across industries, that they are persistent and that they are indeed related to trade flows. We start by documenting substantial hetereogeneity in SC across industries. Table 1 presents summary statistics for our industry-year sample that covers 439 unique manufacturing industries (with 4-digit SIC codes between 2000 and 3999). We find the average SC to be 5.9% of the price of shipments, with a 1^{st} percentile of 0.2% and a 99^{th} percentile of 22.7%.[7] Weight-to-value ratios also vary significantly around their mean of 0.67, with the 1^{st} and 99^{th} percentiles of 0.002 and 9.0, respectively.

To check whether SC is indeed persistent, we sort sectors by quintiles of SC each year, and look at the transition across quintiles over time. We present this analysis in Table 2. The first panel highlights the transition from year $t-1$ to year t, while the second panel shows the transition from year $t-5$ to year t. For sectors in the top or bottom quintiles of

[5] Hummels et al. (2014) also uses transportation costs as an instrument for the propensity of Danish firms to offshore tasks.

[6] The main limitation of SC is that it does not take into account unobserved shipping costs – for instance time to ship (Hummels et al., 2013) or information barriers and contract enforcement costs, holding costs for the goods in transit, inventory costs due to buffering the variability of delivery dates, or preparation costs associated with shipment size (Anderson and van Wincoop, 2004). Unless these costs are correlated in systematic ways with SC, they are likely to introduce noise in our measure of the sectoral exposure to displacement risk, which should generate an attenuation bias in our results. For recent contributions to the literature that adopts a structural approach to measure trade costs and estimate their effect on trade, see for instance Hummels and Skiba (2004), Das et al. (2007), or Irarrazabal et al. (2013).

[7] The distribution of SC across 2-digit industries is presented in Appendix Table B.3.

SC, the probability of being in the same quintile in the next year (respectively in five years) is above 85% (respectively 75%).

Next we confirm SC is a relevant proxy for the exposure to the displacement risk associated to globalization. To analyze the differential trade flows in high and low SC industries, we consider imports, exports and net imports normalized by total domestic shipments plus imports at the industry-year level. We measure imports and exports as well as tariffs using U.S. data obtained from Peter Schott's website, and shipment data from the NBER-CES Manufacturing Industry Database, which also provides annual industry-level information on employment, value added and total factor productivity from 1958 to 2009.

Table 3 presents industry-year OLS panel regressions of trade flows on our proxies for shipping costs as well as log employment, log value added, log shipments, and total factor productivity. All specifications include year fixed effects. In Panel A, the main explanatory variable is SC, namely, the markup of the Cost-Insurance-Freight value over the Free-on-Board value. SC is negatively associated with imports and exports. A one standard deviation increase in SC is associated with a 4% decrease in imports (Column 2) and a 4.7% decrease in exports (Column 5). When included with controls in the regression (Column 8), SC are uncorrelated with net imports, which illustrates the dual dimension of exposure to globalization: the costs in terms of higher import penetration, and the benefits in terms of higher exports. When we introduce industry fixed effects and effectively consider changes in shippings costs (Columns 3 and 6), the coefficient on SC remains negative but drops sixfold and becomes insignificantly different from zero. This is consistent with the finding in Table 2 that SC are persistent, and that within-industry variations in SC do not predict variations in trade flows.[8] A very similar picture emerges when we consider the weight-to-value ratio instead of SC (Panel B). Overall, the evidence confirms that shipping costs are a good proxy for differences across industries in their exposure to international trade flows.

2.2 Portfolio returns

We then explore whether and how globalization is reflected in asset prices, by comparing the average excess returns of firms with high and low exposure to globalization. To do so, we form equally-weighted stock portfolios based on quintiles of SC in the previous year. Table 4 presents excess returns, volatilities and Sharpe ratios for the five portfolios, as well as for a portfolio, referred to as "Hi-Lo", long in the highest SC portfolio and short in the lowest SC portfolio. We find that firms in industries with low SC have average returns that are 7.8 percent higher (annually) than average returns in the high SC industry. The Sharpe

[8]Note that contrary to within-industry changes in SC, within-industry changes in tariffs are negatively associated with imports.

ratio of the long-short portfolio (column 6) is 42 percent. A similar picture emerges when we consider portfolios sorted on weight-to-value ratios: annualized returns are 9.8 percent higher on average in low weight-to-value ratio industries, and the Sharpe ratio is 43 percent.

The difference in returns between high and low SC industries in our sample could be due to the differential composition of these industries, irrespective of their actual exposure to international trade flows. We next estimate abormal excess returns from the three factor model of Fama and French (1993). We confirm the risk premium we capture is not subsumed by loadings on classic risk factors, namely market, size and value. As evidenced in Panel A of Table 5, we find that the long-short portfolio alpha is 0.79 percent (9.9 percent annually). We note that our five portfolios load in a similar fashion on the market factor. However, low SC industries have a lower loading on the size and a higher loading on the value factor than high SC industries.

Portfolios returns are value-weighted in Panel B. In that case, while the low SC portfolio has monthly excess returns of 0.35 percent, the difference between the high and low SC portfolios returns are not statistically different from zero. The discrepancy between the equally- and value-weighted returns are due to the role of larger firms, a topic that we address in the next section. We also check and find in Appendix Table B.4, that we obtain similar results when we construct our portfolios based on quintiles of the sum of SC and tariffs, another impediment to trade.

In Table 6 we find similar, if anything stronger, results when we sort stocks into quintiles of their industry weight-to-value ratio. Here, the excess returns on the long-short portfolios exceed 0.9 percent monthly (10.8 percent annually). As in Table 5, when portfolios returns are value-weighted, the lowest weight-to-value portfolio delivers positive excess returns, but the difference with the highest weight-to-value portfolio is not statistically different from zero.

The results thus indicate that firms more exposed to globalization command a robust and substantial risk premium. This suggests that their performance covaries negatively with U.S. investors' marginal utility. While this is an unexpected finding in itself, it calls for further exploration. This premium can be driven by either a positive or negative joint reaction of U.S. firms' performance and households' consumption to foreign productivity shocks. In other terms, the price of risk can either be positive or negative depending on the underlying economic mechanism.

3 Model

To understand the origins of the risk premium estimated in the previous section, we write a dynamic model with trade flows and asset prices. We start with the observation of Section 2 that there is a large heterogeneity in the exposure of industries to globalization. We then explore its role, qualitatively and quantitatively, for firms in these industries. Finally, we derive predictions to identify the sign of the price of risk.

3.1 Setup

In this section, we spell out the structure of the model and define the equilibrium. Most derivations are left in Appendix A. In our model there are two countries as in Ghironi and Melitz (2005); however to capture industry heterogeneity we introduce two types of industries operating in each country. We focus on quantities on the domestic country and denote all foreign variables with an asterisk ($\star$). There is a continuum of households in each country supplying labor inelastically. The model is real but as price indices in each country change over time, we introduce nominal prices in each country as a convenient mean of account. We note nominal variables with a tilde, and take the price of the aggregate consumption good as the numeraire in each country.

Demand Side — As households are homogeneous, we consider the representative agent's intertemporal utility:

$$\mathcal{U}_0 = \mathbf{E}_0 \sum_{t=0}^{\infty} \beta^t \frac{C_t^{1-\psi}}{1-\psi},$$

where C_t represents their intratemporal utility, β the subjective discount factor and ψ the coefficient of relative risk aversion. Aggregate consumption stems from goods of both industry 1 and 2:

$$C = \left(\eta_1^{\frac{1}{\theta}} \mathcal{C}_1^{\frac{\theta-1}{\theta}} + \eta_2^{\frac{1}{\theta}} \mathcal{C}_2^{\frac{\theta-1}{\theta}} \right)^{\frac{\theta}{\theta-1}},$$

where $\mathcal{C}_1$ and $\mathcal{C}_2$ represent composite consumption of varieties from industry 1 and 2 respectively, and θ is the elasticity of substitution across industries.[9] The weights (η_1, η_2) determine households' taste for goods between industry. The composite good in each industry is given

[9] In the appendix we introduce a composite good representing the non-tradable sector, $\mathcal{C}_0$. Since our focus is on industries exposed to trade, we assume the non-tradable sector is perfectly competitive with a

by:

$$\mathcal{C}_J = \left[M_J \int_{\Omega_J} c_J(\omega)^{\frac{\sigma_J - 1}{\sigma_J}} d\omega \right]^{\frac{\sigma_J}{\sigma_J - 1}}$$

where $c_J(\omega)$ is households' consumption of variety ω in industry J, σ_J the elasticity of substitution across varieties within industry J. M_J is the mass of firms producing in an industry and Ω_J is the set of producing firms for consumers in the domestic country in industry J, it includes foreign and domestic firms.

Finally households supply labor inelastically in quantity L and own all firms in their own country. Their budget constraint reads (in nominal terms):

$$\sum_J \int_{\Omega_J} p_J(\omega) c_J(\omega) \mathrm{d}\omega \leq wL + \sum_J \int_{\Omega_J^{\mathcal{D}}} \pi_J(\omega) \mathrm{d}\omega,$$

where $p_J(\omega)$ is the price charged by firm ω for variety ω in industry J, $\Omega_J^{\mathcal{D}}$ is the set of firms in the domestic country in industry J and $\pi_J(\omega)$ their profit from producing for both the domestic and export market.

Supply Side — Each firm produces a differentiated variety ω in quantity $y_J(\omega)$, using one single factor, labor, in quantity $l_J(\omega)$. Firms are heterogeneous and they produce each variety with different technologies indexed by φ, their idiosyncratic productivity. We index aggregate labor productivity by A_t. Hence a domestic firms with idiosyncratic productivity φ, produces $A_t\varphi$ units of variety ω per unit of labor. Firms are uniquely identified through either the variety they produce or their idiosyncratic productivity; from now on, we use φ as identifier of a firm, standing for both a unique variety and an idiosyncratic productivity. We are most interested on productivity shock in the foreign country $A^\star$, as we explore the impact on domestic firms of shocks to the foreign productivity process. We assume productivities both follow an AR(1) in logarithm:

$$\log A_t = \rho_A \log A_{t-1} + \varepsilon_t^A$$
$$\log A_t^\star = \rho_{A^\star} \log A_{t-1}^\star + \varepsilon_t^{A^\star}$$

linear technology in labor and unit productivity. We model the final consumption index as

$$C = \left(\eta_1^{\frac{1}{\theta}} \mathcal{C}_1^{\frac{\theta-1}{\theta}} + \eta_2^{\frac{1}{\theta}} \mathcal{C}_2^{\frac{\theta-1}{\theta}} \right)^{\frac{\theta}{\theta-1} a_0} \cdot \mathcal{C}_0^{1-a_0},$$

where a_0 represents the weight of the tradable sector relative to the non-tradable one.

Later we derive most of the model partial equilibrium elasticities with respect to changes in $A^\star$.

There is no entry or exit in and out of an industry, such as the set of firms located in a given country, that is $\Omega_J^{\mathcal{D}}$, is fixed.[10] Idiosyncratic productivity is fixed over time but randomly assigned across firms. The distribution of idiosyncratic productivity is Pareto with tail parameter γ_J: the probability of a firm productivity falling below a given level φ is:

$$\Pr\{\tilde{\varphi} < \varphi\} = G_J(\varphi) = 1 - \left(\frac{\varphi}{\underline{\varphi}_J}\right)^{-\gamma_J}$$

where a greater γ_J corresponds to a more homogenous industry, in the sense that more output is concentrated among the smallest and least productive firms. Firms operate on both their domestic market and the export market. To export, a firm needs to pay a variable iceberg trade cost $\tau_J \geq 1$ and a fixed cost $f_J^{\mathcal{X}}$ (measured in labor efficiency units). The fixed cost is a flow cost paid every period.

Firms operate in a monopolistic competition market structure. They set their prices at a markup over marginal cost. Firms face isoelastic demand curves in each industry, with elasticity σ_J, hence they set their real prices $p_J(\varphi)$, at a markup $\sigma_J/(\sigma_J - 1)$ over their marginal costs. In that case we write both real prices on the domestic and export market as:

$$\begin{aligned} p_J(\varphi) &= \frac{\tilde{p}(\varphi)}{P} = \frac{\sigma_J}{\sigma_J - 1} \cdot \frac{w}{A\varphi} \\ p_J^{\mathcal{X}}(\varphi) &= \frac{\tilde{p}_J^{\mathcal{X}}(\varphi)}{P^\star} = \mathbf{F}^{-1}\ \tau_J \cdot p_J(\varphi), \end{aligned}$$

where P is the aggregate price index of the final composite consumption good C and $\tilde{p}_J$ denote nominal prices. We reduce these nominal expressions to real expressions introducing the nominal exchange rate $\mathbf{F}$ as the ratio of both price indexes in the foreign and home country respectively: $\mathbf{F} := P^\star/P$.

Firm profits also depend on their status as an exporter. If productivity is too low, a firm might not find it optimal to export and pay the flow fixed costs $f_J^{\mathcal{X}}$. Firm profit is increasing in their idiosyncratic productivity, hence there exists a productivity cutoff in each industry under which a firm decides not to export: $\varphi^{\mathcal{X}} = \min_\varphi\{\varphi | \varphi \text{ is an exporter}\}$. In that case real

[10] We abstract from modeling entry and exit of firms domestically to focus on the other extensive margin in the model, firms getting in and out of the export market. With this assumption each domestic economy is an endowment economy which simplifies greatly the analysis. Relaxing this assumption, firms will enter and exit industries depending on their profitability which would add another layer to the response of valuations to productivity shocks.

profits at the firm level are:

$$\pi_J^{\mathcal{D}}(\varphi) = \frac{\eta_J}{\sigma_J}\,(p_J(\varphi))^{1-\sigma_J}\;\;\Gamma_J^{\sigma_J-\theta}C,$$
$$\pi_J^{\mathcal{X}}(\varphi) = \frac{\eta_J}{\sigma_J}\left(p_J^{\mathcal{X}}(\varphi)\right)^{1-\sigma_J}\;\;(\Gamma_J^{\star})^{\sigma_J-\theta}\;\;\mathcal{C}^{\star}\;F - \frac{w}{A}f^{\mathcal{X}},$$

where Γ_J is the industry price index for the composite good in industry J consumed in the domestic country. To find the industry price index we need to determine the mass of firms from the foreign country exporting in industry J: $M_J^{\mathcal{X}\star}$. Given the productivity cutoff for exporters from the foreign country, $\varphi_J^{\mathcal{X}\star}$, the fraction of exporters, denoted $\zeta_J^{\star}$ is simply:

$$\zeta_J^{\star} := \Pr\{\tilde{\varphi} > \varphi_J^{\mathcal{X}\star}\} = \left(\frac{\varphi_J^{\mathcal{X}\star}}{\underline{\varphi}_J^{\star}}\right)^{-\gamma_J}$$

Now the price index in industry J reflects the effect of an increase in competition from the foreign country leading to lower industry level prices:[11]

$$\Gamma_J = \left(M_J\int_{\Omega_J^{\mathcal{D}}} p_J(\varphi)^{1-\sigma_J}\mathrm{d}\varphi + \left(\zeta_J^{\mathcal{X}\star}M_J^{\star}\right)\int_{\Omega_J^{\mathcal{X}\star}} p_J^{\mathcal{X}\star}(\varphi)^{1-\sigma_J}\mathrm{d}\varphi\right)^{\frac{1}{1-\sigma_J}}$$

Given the exporters' profits, we derive the productivity cutoffs for exporters defined by: $\varphi_J^{\mathcal{X}} = \min\{\varphi|\pi_J^{\mathcal{X}}(\varphi) > 0\}$.

Aggregation of Supply — As in Melitz (2003), instead of keeping track of the distribution of production and prices, it is sufficient to focus on two average producers, first for the whole domestic market $\bar{\varphi}_J$ and second restricted to exporting firms $\bar{\varphi}_J^{\mathcal{X}}$. These quantities are sufficient to define the equilibrium of Section 3.2:

$$\bar{\varphi}_J := \left[\int_{\underline{\varphi}_J}^{\infty}\varphi^{\sigma_J-1}\mathrm{d}G_J(\varphi)\right]^{\frac{1}{\sigma_J-1}} = \nu_J\cdot\underline{\varphi}_J$$
$$\bar{\varphi}_J^{\mathcal{X}} := \left[\int_{\varphi_J^{\mathcal{X}}}^{\infty}\varphi^{\sigma_J-1}\mathrm{d}G_J(\varphi)\right]^{\frac{1}{\sigma_J-1}} = \nu_J\cdot\varphi_J^{\mathcal{X}},$$

where ν_J is defined depends solely on the elasticity of substitution and the tail parameter of the distribution.[12]

Hence average profits for domestic firms in industry J are: $\langle\pi_J^{\mathcal{D}}\rangle = \pi_J^{\mathcal{D}}(\bar{\varphi}_J)$, and for

[11] We leave all derivations to appendix (A).

[12] We can define ν_J as $\nu_J := (\gamma_J/(\gamma_J-(\sigma_J-1)))^{1/(\sigma_J-1)}$.

exporters $\langle \pi_J^{\mathcal{X}} \rangle = \pi_J^{\mathcal{X}}(\bar{\varphi}_J^{\mathcal{X}})$. Given the average profits, total profits for each industry are:

$$\Pi_J = M_j \cdot \langle \pi_J \rangle := M_J \left[\pi_J^{\mathcal{D}}(\bar{\varphi}_J) + \zeta_J \pi_J^{\mathcal{X}}(\bar{\varphi}_J^{\mathcal{X}}) \right] \tag{3.1}$$

Given the aggregation properties of the model, we rewrite the aggregate budget constraint. The representative household holds all domestic firms in equilibrium and receives dividends from these holdings. Moreover consumption of the final composite good C has a cost of C given our choice of the numeraire. Hence the simplified real budget constraint:

$$C \leq wL + \sum_J \Pi_J$$

Finally we close the model assuming balanced trade in every period: the value of exports equals the value of imports, adjusted for the exchange rate:

$$\mathbf{F} \cdot \sum_J \left[M_J \zeta_J \; (p_J^{\mathcal{X}})^{1-\sigma_J} (\Gamma_J)^{\sigma_J - \theta} \right] \cdot C^\star = \sum_J \left[M_J^\star \zeta_J^\star \; (p_J^{\mathcal{X}\star})^{1-\sigma_J} (\Gamma_J^\star)^{\sigma_J - \theta} \right] \cdot C$$

3.2 Equilibrium

We solve for an endowment economy, where the mass of firms in an industry is constant over time. Hence the only production adjustments are in and out of exporting. We define an equilibrium as a collection of real prices $(p_J, p_J^{\mathcal{X}})$, wage w, output $y_J(\omega)$, consumption $c_J(\omega)$, labor demand $l_J(\omega)$ such that: (a) each firm maximizes profit given consumer demand; (b) consumers maximize their intertemporal utility given prices; (c) markets for goods, and for labor clear; (d) each country runs a balanced trade.

Practically there are 7 endogenous variables in the model: the aggregate consumption level in each country, $(C, C^\star)$, the exchange rate $\mathbf{F}$ and four industry level export cutoffs: $(\varphi_J^{\mathcal{X}}, \varphi_J^{\mathcal{X}\star})$. Knowing these quantities is sufficient to solve for the equilibrium at each point in time.

3.3 Asset Prices

We are interested in asset prices of domestic firms across different industries. Since the representative household holds these firms, they are priced using her stochastic discount factor. We derive the Euler equation using the portfolio problems faced by the representative household. She maximizes her utility subject to her budget constraint, which includes investments $x_{J,t}(\varphi)$ in firms of industry J of variety φ at a price $v_{J,t}(\varphi)$, the firm valuation. Firms pay out dividends which are equal to profits, $\pi_{J,t}(\varphi)$, since there is no investment. The problem reads as follows:

$$
\begin{aligned}
&\max \mathbf{E}_0 \sum_{t=0}^{\infty} \beta^t \frac{C_t^{1-\psi}}{1-\psi} \\
\text{s.t} \quad & C_t + \sum_J \int_{\Omega_J^{\mathcal{D}}} x_{J,t+1}(\varphi) v_{J,t}(\varphi) \mathrm{d}\varphi \leq w_t L + \sum_J \int_{\Omega_J^{\mathcal{D}}} x_{J,t}(\varphi) \left(v_{J,t}(\varphi) + \pi_{J,t}(\varphi)\right) \mathrm{d}\varphi,
\end{aligned}
$$

We derive the Euler equation for pricing leading to the classic consumption-CAPM pricing equation:

$$
v_{J,t}(\varphi) = \mathbf{E}_t\{S_{t,t+1} \left(v_{J,t+1}(\varphi) + \pi_{J,t+1}(\varphi)\right)\},
$$

where $S_{t,t+1} = \beta(C_{t+1}/C_t)^{-\psi}$ is the one period ahead stochastic discount factor. To understand how investors price firms in our model, we need to understand how aggregate shocks affect their marginal utility and how cash-flows react to these shocks. We explore both sides in the next section.

3.4 Mechanism

We derive elasticities of both firms' output and the elasticity of aggregate demand to foreign productivity $A^{\star}$. Tracing out the response of both the supply and the demand side of the economy sheds light on the model and its interpretation: the joint response of cash-flows (and realized returns) and demand ultimately determine the risk across industries and how this risk is priced in the economy, giving rise to a risk premium that differs across industries.

Due to the general equilibrium nature of the model, some of our elasticity formulas are approximate as they do not account for second order effects on aggregate demand. We confirm the qualitative and quantitative validity of our approximation in our calibration exercise.

Cash-Flows — First we consider the effect of an increase in productivity in the foreign country on domestic firms. To understand these effects we decompose firm profits:

$$
\pi_J^{\mathcal{D}}(\varphi) = \underbrace{\frac{p_J(\varphi)}{\sigma_J}}_{\text{marked-up price}} \cdot \underbrace{\left(\frac{p_J(\varphi)}{\Gamma_J}\right)^{-\sigma_J}}_{\text{Local variety demand}} \cdot \underbrace{\eta_J \Gamma_J^{-\theta}}_{\text{industry demand}} \cdot \underbrace{C}_{\text{aggregate demand}}
$$

A shock to foreign labor productivity affects three quantities: local demand, industry demand and aggregate demand. Foreign competition lowers the industry price index, increasing industry demand. However relative local demand decreases as local goods are now more expensive relative to the industry average. As long as the elasticity of substitution is higher within industries than across ($\sigma_J > \theta$), the second effect dominates and demand for domestic goods decreases. From now on we will assume we lie in this region of parameter values. Finally foreign labor productivity also affects aggregate demand, through price effects as described but also through wealth effects. We discuss this channel below when we address the effects on marginal utility.

Lemma 3.1. *Keeping aggregate demand effects constant, the elasticity of domestic profits to foreign labor productivity is:*

$$
\begin{aligned}
\frac{\partial \log \pi_J^{\mathcal{D}}(\varphi)}{\partial \log A^\star} &= -(\sigma_J - \theta) \cdot \left(- \frac{\partial \log \Gamma_J}{\partial \log A^\star} \right) \\
&= \underbrace{\frac{(M_J^\star \zeta_J^\star) p^{\mathcal{X}\star}(\bar{\varphi}^{\mathcal{X}\star})}{\Gamma_J^{1-\sigma_J}}}_{\textit{import penetration: } \mathcal{I}_J} \cdot \\
&\qquad \underbrace{(\sigma_J - \theta)}_{\textit{demand elasticity}} \cdot \left(\underbrace{-1}_{\textit{price effect}} + \underbrace{\left(1 - \frac{\gamma_J}{\sigma_J - 1}\right) \cdot \left(- \frac{\partial \log \varphi_J^{\mathcal{X}\star}}{\partial \log A^\star} \right)}_{\textit{extensive margin}} + \underbrace{\frac{\partial \log \mathbf{F}}{\partial \log A^\star}}_{\textit{fx adjustment}} \right)
\end{aligned}
$$

The elasticity summarizing the displacement of domestic profits comports 5 parts: (a) the level of import penetration determines the impact of foreign shocks on domestic firms in an industry; (b) industry (through demand elasticity) and (c) firm structure (through their distribution) affect how demand responds to competition; (d) productivity directly affects prices due to the linear technology; (e) the extensive margin of foreign exporters dampens the price effect, though the love for variety does affect their impact; (f) finally exchange rates dampen these effects as the exchange rate depreciates after a shock to foreign productivity. Last we assume aggregate demand stays constant to illustrate the partial equilibrium effects of a change in foreign productivity. When we solve the model, the elasticity of cash-flows does also depend on aggregate demand. However even with these general equilibrium effects, the partial equilibrium is still central for the model.

If on the one hand foreign competition harms domestic firms on their local markets, it may also expand demand in foreign country. We characterize this effect and the increase in competition in the foreign market due to a foreign productivity shock, and how it impacts the profitability of exporters:

Lemma 3.2. *If a firm with productivity φ does export, its elasticity of exporting profits to foreign productivity is:*

$$\frac{\partial \log \pi_J^{\mathcal{X}}(\varphi)}{\partial \log A^\star} = \left(\underbrace{\sigma \cdot \frac{\partial \log \mathbf{F}}{\partial \log A^\star}}_{\textit{fx adjustment}} + \underbrace{\frac{\partial \log \mathbf{C}^\star}{\partial \log A^\star}}_{\textit{demand increase}} - \underbrace{(\sigma_J - \theta) \cdot \left(-\frac{\partial \log \Gamma_J^\star}{\partial \log A^\star} \right)}_{\textit{competition}} \right) \cdot \underbrace{(1 + \ell(\varphi))}_{\textit{leverage}}.$$

The sign for the elasticity of export profits is ambiguous as it is the product of two forces. Exchange rate appreciates and demand increases in reaction to an increase in foreign productivity, these two forces increase firms export profits. However competition becomes more fierce in the foreign country, leading to a concomitant decline in profitability. $\ell(\varphi)$ captures operating leverage: as firms face fixed costs of exporting, changes in productivity will have a stronger effect the closest it is to the cutoff.[13] As firms become closer to the productivity export cutoff $\varphi_J^{\mathcal{X}}$, leverage amplifies their elasticity to foreign productivity shocks. In Appendix A.3 we also derive a sharper characterization of this elasticity and consider how it varies across industries.

We gather both claims and evaluate the total effect of a foreign productivity shock on an industry's average profit $\langle \pi_J \rangle$ that we separate in average domestic and average export profits with their respective shares:

Lemma 3.3. *Given the definition of the average profit level of an industry in equation (3.1), the elasticity of total profits to the foreign productivity shock is:*

$$\frac{\partial \log \langle \pi_J \rangle}{\partial \log A^\star} = \frac{\langle \pi_J^{\mathcal{D}} \rangle}{\langle \pi_J \rangle} \cdot \frac{\partial \log \langle \pi_J^{\mathcal{D}} \rangle}{\partial \log A^\star} + \frac{\zeta_J \langle \pi_J^{\mathcal{X}} \rangle}{\langle \pi_J \rangle} \cdot \left(\frac{\partial \log \langle \pi_J^{\mathcal{X}} \rangle}{\partial \log A^\star} + \frac{\partial \log \zeta_J^{\mathcal{X}}}{\partial \log A^\star} \right).$$

As emphasized above in lemmas (3.1) and (3.2), the first term, domestic profits, is negative while the second, export profits, is positive.[14] Thus the average effect on an industry's cash flows depends on the relative magnitudes of effects both on domestic and export profits and their relative contributions to average industry profits.

In industries with low impediments to trade, for e.g. when shipping costs are low, import penetration is high. While this means domestic profits are exposed to trade risk, an increase

[13] Operating leverage is defined as

$$\ell(\varphi) = \frac{1}{\left(\frac{\varphi}{\varphi^{\mathcal{X}}}\right) - 1},$$

which is monotonous and decreasing in φ.

[14] For exposition we describe the model around our calibration. For example it is possible that the elasticities of export profits becomes negative whenever competition effects are stronger than demand effects. However this case happens for a range of parameters outside of reasonable calibrations, e.g. for very high demand elasticities σ_J.

in foreign demand compensates exporting firms by increasing their profits. To disentangle both channels, exposure to trade risk through imports, and hedging through exports, we zoom-in at the firm level and separate our analysis between small non-exporters firms and large exporter firms. Isolating the import risk channel for the smaller firms sharpens our characterization of trade risk exposure across industries. We explore these implications in comparative statics analysis at the industry and firm level in the following proposition:

Proposition 3.4. *Consider two industries (J_1, J_2) in the same country, both affected by the same shock to foreign productivity $A^\star$.*

(a) If industries have different variable trade costs such that $\tau_1 > \tau_2$, then:
   (i) Import penetration is greater in industry J_2 than J_1: $\mathcal{I}_2 > \mathcal{I}_1$.
   (ii) The elasticity of profit to a shock to foreign productivity for small (non-exporter) firms is greater (more negative) in industry J_2.
   (iii) The difference in the elasticity of profits between large and small firms to a shock to foreign productivity is greater in industry J_2.

(b) If industries have different price elasticity of demand such that $\sigma_1 > \sigma_2$, then: the elasticity of profit to a shock to foreign productivity is lower algebraically in industry J_1.

(c) If industries have different firm distribution, i.e. their Pareto tail is such that $\gamma_1 > \gamma_2$ and γ is sufficiently large, then: the elasticity of average profit to a shock to foreign productivity is greater in J_1 than in J_2.

The first result follows from the definition of import penetration, as the marginal impact of foreign firms on domestic industry prices. The second statement is specific to small firms. Lower shipping costs go with higher import penetration but also with greater exports. The effects restricted to domestic profits, or here to small firms follows from Lemma 3.1. The results hold more generally at the level of average profits $\langle \pi_J \rangle$, if the overall impact of foreign productivity lowers average profits, *i.e.* export profits do not make up for the loss in domestic profits. Import penetration scales up the loss leading to the result. We find that case to be the relevant one in our calibration exposed in Section 5. Our second comparative static exercise focuses on the elasticity of substitution at the industry level, σ_J. The effect is larger when consumer demand is more elastic as an increase in competition has a larger effect on prices.[15] Finally, in industries where the distribution of firms has a high tail parameter

[15]Note that we have assumed $\sigma_J - \theta > 0$. This assumption states that industries group firms producing close (with respect to demand) products.

γ, productivity is concentrated among smaller, less productive firms. For a given export productivity cutoff, the mass of firms exporting is smaller, decreasing the compensating effect of an increase in exports. Thus the import channel has more bite in these industries and the elasticity of average profits is more negative.

Marginal Utility of Consumption — To assess how shocks to foreign productivity affect domestic firms, we explore the risk channel, *i.e.* how marginal investors apprehend these shocks. Changes in their marginal utility captures the price of risk they demand. It is easiest to first look at the elasticity of consumption.

Lemma 3.5. *The elasticity of consumption to foreign productivity is:*

$$\begin{aligned}\frac{\partial \log C}{\partial \log A^\star} &= \frac{\partial \log Y}{\partial \log A^\star} - \frac{\partial \log P}{\partial \log A^\star} \\ &= \underbrace{\sum_J \left(\frac{\Pi_J^{\mathcal{D}}}{\Pi_J} \cdot \frac{\partial \log \Pi_J^{\mathcal{D}}}{\partial \log A^\star} + \frac{\Pi_J^{\mathcal{X}}}{\Pi_J} \cdot \left(\frac{\partial \log \zeta_J}{\partial \log A^\star} + \frac{\partial \log \Pi_J^{\mathcal{X}}}{\partial \log A^\star} \right) \right)}_{\textit{wealth effect}} \\ &\quad + \underbrace{\left(\sum_K \eta_K \Gamma_K^{1-\theta} \right)^{-1} \sum_J \eta_J \Gamma_J^{1-\theta} \frac{\partial \log \Gamma_J}{\partial \log A^\star}}_{\textit{price effect}} .\end{aligned} \tag{3.2}$$

Both effects of trade compete in their role on aggregate consumption: (a) a classic price effect where import competition lowers monopoly power in each industry, increase variety and lower prices; (b) a wealth effect, since total household expenditures depend on the dividends received from domestic firms. We showed in Lemma 3.3 that the sign of the wealth effect is ambiguous.[16] In our calibration we find it is negative, *i.e* increase demand in the foreign country does not lift exports enough to compensate for lower domestic profits.

The price of foreign competition risk solely depends on the relative magnitude of these two effects. Rather than decomposing the two forces to analyze their relative magnitudes, we stay agnostic about the sign of the price of risk for now. We will show how to infer directly from asset prices data how investors apprehend this risk (see Proposition 3.6 and Section 4). If the price of risk is positive, then firms in industry with greater profit elasticity command higher risk premium and lower valuation.

[16] Our framework does not allow for international risk sharing. If households were globally diversified, this would undo most of the wealth effect, and low SC industries would not command a risk premium. For evidence of home bias in U.S. investors' portfolio, see Coval and Moskowitz (1999); Ivković and Weisbenner (2005); Rauh (2006); Brown et al. (2009); Baik et al. (2010); Bernile et al. (2015).

3.5 Identifying the price of risk in the model

Equilibrium Returns — We focus on shocks to $A^\star$, foreign productivity, as the only shock of the economy in our model. Hence dynamics of consumption and cash-flows across industries follow these shocks to productivity. The representative household first order condition, her Euler equation, determines the industry asset prices:

$$\mathbf{E}_t\{S_{t,t+1}\mathbf{R}_{J,t+1}\} = 1 \tag{3.3}$$

The Euler equation delivers a consumption-CAPM model for prices, where expected returns are the price of consumption risk multiplied by the risk exposure of an industry. To hold stocks in industries with negative exposure to trade shocks ($\partial\pi_J/\partial A^\star < 0$), investors command a positive (negative) risk premium if the price of risk is negative (positive), so that industries with stronger negative exposure to foreign productivity shocks will have higher (lower) expected returns that industries with small exposure.

The results of Section 2 show the risk premium is substantial and statistically significant, however they are not informative about the price of foreign productivity risk. If the price of risk is positive, the risk premium is driven by the fact that firms in low shipping costs industries are positively affected by foreign productivity shocks, and therefore have strongly procyclical returns. The key idea to identify the sign of the price of risk is to analyze whether the difference in expected returns in high and low SC industries emanates from firms and industries that are more likely to benefit from foreign productivity shocks, or from those that are more likely to be hurt. We formulate three testable predictions to identify the sign of the price of risk given the cross-section of asset prices.

Proposition 3.6. *In the cross-section of equity returns, it is possible to identify the price of foreign productivity risk:*

(a) If for the fraction of exporters within industries, foreign demand effects dominate such that $\partial\pi_J^{\mathcal{X}}/\partial A^\star > 0$, then:
If the difference in expected returns between high and low shipping costs industries among the smallest (and least productive) firms is higher than the difference in expected returns between high and low shipping costs industries among the largest (and most productive) firms then the price of consumption risk is negative.

(b) If two sets of industries have different price elasticity of demand such that $\sigma_1 > \sigma_2$, then:
If the difference in expected returns between high and low shipping costs industries in the high elasticity of substitution set (σ_2) is higher than the difference in expected returns

between high and low shipping costs industries in the low elasticity of substitution set (σ_1) then the price of consumption risk is negative.

(c) *If two sets of industries have different firm distribution such that $\gamma_1 > \gamma_2$, and foreign demand effects dominate such that $\partial\pi_J^{\mathcal{X}}/\partial A^\star > 0$, then:*
If the difference in expected returns between high and low shipping costs industries in the high γ_1 industries is higher than the difference in expected returns between high and low shipping costs industries with low γ_2 then the price of consumption risk is negative.

These three predictions are intuitively connected to the mechanics of the model detailed in Proposition 3.4. Only large and productive firms export. Hence when exports profits increase with foreign productivity, small firms are more negatively affected than large firms by foreign productivity shocks. Whether the difference in expected returns between high and low shipping costs is more pronounced among small or large firms[17] allows to distinguish if the price of risk is positive or negative. The elasticity of substitution amplifies the competitive effects of a shock to foreign productivity. Hence greater elasticity of substitution leads to lower (algebraically) elasticity of cash-flows. Analyzing the expected returns of high-minus-low shipping costs portfolios in high and low demand elasticity industries allows us to determine if the risk premium is due to covariance with a factor that increases or decreases consumption growth. Finally when the distribution of firms has a high Pareto-tail parameter, production is spread out among less productive firms, and the industry includes less exporters. Hence more firms are negatively affected by the trade shock and these industries are more negatively exposed. Comparing the expected returns of high-minus-low shipping costs portfolios in high and low Pareto-tail parameter industries therefore allows us to recover the sign of the price of risk.

We note that predictions (a) and (c), which are related to the size-distribution of firms, are obtained only when export profits increase following a foreign productivity shocks, namely when foreign demand effects outweigh competitive effects in the foreign country. This assumption seems to hold for the U.S. where import growth is highly correlated with aggregate manufacturing productivity growth.[18] That being said, one concern may be that this assumption does not hold for every other country. Fortunately, prediction (b), which is related to the demand elasticity, does not depend on the behavior export profits, and therefore allows us to identify the sign of the price of risk.

[17] In the model, the assumption of a Pareto distribution for productivity induces a size distribution of firms that is also Pareto.

[18] Using import data and the NBER CES data from 1974 to 2009, we find this correlation to be 0.6.

4 The price of risk in the cross-section of equity returns

We take to the data the three hypotheses in Proposition 3.6 in order to determine the sign of the price of risk. For this, we form double-sorted portfolios based on shipping costs and either firm size and firm profitability. If the price of risk is negative, the risk premium should be concentrated on small and less productive firms. This methodology separates the positive effects of trade exposure, concentrated on larger more productive firms, from the negative effects, concentrated on smaller less productive firms.

We measure size using market capitalization and productivity using return-on-assets (ROA). We independently sort stocks into five portfolios based on either their industry shipping costs or weight-to-value ratio in the previous year (as in Section 2), and into three portfolios based on either their market capitalization (Size) or their return on assets (ROA) in year $t-2$. We present results for our double-sorted (3×5) portfolios in Table 7. We report the residual excess returns from the Fama-French three factor model for each of the five SC portfolios, as well as for the long-short portfolio. Hence we capture differences in risk premium not explained by known common risk factors. In the lowest size tercile, a portfolio that goes long high SC and short low SC has an alpha of -121 basis points monthly. This difference decreases to -50 basis point in the highest size tercile. We find the long-short portfolio alpha to be -107 basis points in the bottom ROA tercile while it falls to -56 basis point in the top ROA tercile. As shown in Columns 7 to 12, similar results are obtained for portfolios constructed based on the weight-to-value ratio: excess returns are strongly decreasing with firm size and profitability.

We test the robustness of these results in various ways. First, we find qualitatively similar results when double-sorted portfolios returns are value-weighted: we find in Appendix Table B.5 that high SC firms have significantly lower abnormal returns in the bottom tercile of firm size and in the bottom tercile of return-on-assets. We also perform the same test using quintiles of the sum of shipping costs and tariffs. The results in Appendix Table B.6 confirm that the globalization risk premium is sharply decreasing with size and ROA, and is therefore concentrated in firms that are more likely to be negatively affected by foreign productivity shocks, both because they are more likely to be displaced by foreign competitors, and because they are less likely to be productive enough to export.

The second model prediction regarding the sign of the price of risk is that risk premia should depend on the elasticity of demand. Intuitively, displacement risk will be lower in an industry where consumers are less sensitive to prices. To check whether this is indeed the case, we independently sort stocks into five portfolios based on either their industry shipping costs or weight-to-value ratio in the previous year, and into two portfolios based on their industry US trade elasticities (σ). US trade elasticities are estimated by Broda and Weinstein (2006) from 1990 to 2001 at the commodity level, and aggregated at the four-digit SIC based on total imports over 1990-2001. We present the results in Table 8. Whether portfolios are based on shipping costs or weight-to-value ratios, we find that the excess returns of exposed firms are concentrated in high demand elasticity industries, consistent with a negative price of risk. This pattern is however not robust when we consider value-weighted portfolios returns as shown in Appendix Table B.7.

The third model prediction is that the sign of risk is negative if the difference in expected returns between high and low SC industries is larger in industries whose firm distribution is characterized by a high Pareto tail parameter, namely whose output is spread out among less productive firms. The intuition is that these industries are more likely to be strongly affected by the entry of foreign competitors, and also less likely to be productive enough to export and therefore benefit from foreign productivity shocks. We form double-sorted (2×5) portfolios based on shipping costs and the Pareto tail parameter. We estimate the Pareto parameter separately for each industry-year as the estimated coefficient γ of the following OLS regression: $ln(SIZE) = -\gamma ln(Rank) + constant$, where for each year and 4-digit industries, firms are ranked in descending order according to their size meausred as total firm market value (defined as Compustat item CSHO $\times$ PRCC_F+AT-CEQ). Table 9 presents estimates of excess returns from a Fama-French three factor model for each SC or weight-to-value portfolios, separately for high and low Pareto tail parameter (γ) industries. The long-short portfolio has more negative excess returns in high γ industries. Moreover, as evidenced in Appendix Table B.8, the difference between low and high γ industries is more pronounced when portfolios returns are value-weighted.

Absent from the model is the fact that high and low SC industries might be differentially affected by foreign productivity shocks not only through import competition and expansion on foreign markets, but also through more efficient sourcing (Goldberg et al., 2010; De Loecker et al., 2012). If there is a lot of within-industry trade, then low SC industries might benefit from cheaper intermediate inputs than high SC industries. This mechanism is likely to boost the risk premium if it is driven by the export channel (i.e., if the price of risk is positive), and to dampen the risk premium if it is driven by the import competition channel (i.e, if the price of risk is negative). Empirically, our finding that the price of risk is negative suggests that the import competition mechanism dominates any positive sourcing effects. This could be related to the fact that low SC industries do not primarily source intermediate inputs within SC industries. Alternatively, small and less productive firms, that are most likely to be displaced by import competition and not to benefit from exporting opportunities, are also less likely to benefit from better sourcing opportunities (Bernard et al., 2007).

We further examine how the returns of the aforementioned portfolios covary with two factors that capture shocks to $A^{\star}$ in the model: (i) the returns to the factor mimicking portfolio, namely, the portfolio that is long high-shipping costs industries and short low-shipping costs industries, and (ii) the growth rate of Chinese import to the U.S. We present the average returns on industries sorted across shipping costs and one of the four characteristics considered above: size, ROA, demand elasticity and Pareto tail parameter in Panels (1a), (1b), (1c), (1d) of Figure 1, respectively. In each panel, we first plot the link between SC quintiles and average returns for each portfolio. This simple graph allows us to visualize the results estimated above: the slope between high and low shipping costs portfolios is highest in, for example, small firms or firms with low ROA. The second graph in each panel represents average returns as a function of the regression coefficient of portfolios returns on the factor mimicking portfolio. We confirm the slope is negative: portfolios that are more exposed to the factor mimicking portfolio, which proxies for foreign productivity shocks, earn higher returns. Moreover the difference in exposure differs across characteristics: the difference in exposure is larger in industries with high elasticity of substitution (1c) or Pareto tail parameter (1d). We finally obtain similar insights when when we use a real proxy for foreign productivity shocks in the model, namely, monthly import growth from China to the US. Not only do we find a negative relation between exposure and returns, as expected, but we also find the variance in exposure to be greater among small or low ROA firms and in industries with high σ or γ.

Taken together, these results clearly indicate that the price of risk is negative, and that the risk premium carried by firms exposed to globalization is driven by the risk of displacement by foreign competition. They also suggest the marginal investor in the U.S. perceives foreign productivity shocks as being associated with higher marginal utility.

5 Calibration

We calibrate the model to provide further qualitative and quantitative evidence of how globalization is reflected in asset prices, and to check that we also find a negative sign for the price of risk within a reasonable parameter range. Our parameter calibration and a summary of the moments we match are in Appendix Table A.1 and A.2 respectively. We use values in line with the asset pricing literature for preference parameters, the discount rate and the risk aversion coefficient, see Bansal and Yaron (2004). Regarding the elasticity of consumer demand we match estimates at the industry level from the work of Broda and

Weinstein (2006). Given these elasticities we calibrate the relative size of the foreign country and industries, $L^\star$ and $M^\star_J$, by matching the level of import penetration in each of the two industries.

We also explore the additional predictions discussed in our theoretical analysis. First, the model is able to replicate the results of Section 2 quantitatively: we not only find a strong reaction of the elasticity of profits, we also find that marginal investors do care about the foreign productivity shocks and are willing to pay for protection. The price of risk, their willingness to pay for hedging the risk, is albeit small for reasons we detail and attempt to overcome in an extension.

Moreover, we find that small firms are more exposed to foreign productivity shocks. In the model, small firms have lower productivity and earn most of the risk premium on $A^\star$ as they do not export. Larger firms do export and take advantage of growing demand abroad, an opportunity to hedge their domestic risk, which lowers their risk premium.

Finally we investigate if extending the model to account for a more realistic price of risk helps in pricing the risk quantitatively.

Cash-flow Mechanism — Much of our model focuses on capturing the granularity of the supply-side, differentiating industries and firms. The impulse-responses of cash-flows in Figure 2 perfectly illustrates the model mechanisms described above. In panel (2a), we show the response of two industries: the grey one with low import penetration, hence lower exposure, and the other, in black, with high import penetration. In our baseline calibration we find the elasticity of import penetration to foreign shocks is close to 0.2 for low shipping-costs industries while it is only 0.01 for high-shipping costs industries. The difference is not surprising, however it is smaller than our empirical measures.[19] To gain a better understanding of what drives the average profit response in an industry, we split industries further between the smaller and larger firms. In Panel (2b) and (2c) we separate the effect across industries on the smallest, least productive firms (2b) from the effect on the more productive firms (2c). We exposed in Proposition 3.4 that small firms do not export, a mechanical consequence of fixed export costs. Hence the effects of a foreign productivity shock on these small firms is negative overall. The import competition channel coupled with different level of import penetration across industries, leads to a large differential response across small firms. This result contrasts with Panel (2c) where the difference in response of large firms across industries is smaller relative to small firms. The reason is these firms do export, and the increase in demand in the foreign country compensates for the loss incurred

[19]In the Online Appendix, we estimate the elasticity of import penetration and cash-flows to changes in tariffs across industries with different shipping costs. We find the elasticities of import penetration to tariffs range from -0.1 to -0.7 for high and low shipping-costs industries respectively, see Appendix Table B.9.

in imports. The more exposed is an industry to import competition, the easier it is for the larger firms to export and take advantage of an increase in foreign demand.

Consumption Response — As shown in lemma (3.5) and equation (3.2), consumption moves in response to two forces: (a) a price effect whereby consumption becomes cheaper due to more productive varieties being imported from the foreign country; (b) a wealth effects, consequence of our hypothesis on financial autarky, where on average domestic firms do lose profit shares to the foreign firms.

In our calibration we do find the wealth effects dominate, and consumption falls after a shock to foreign productivity. The fall in consumption translates into valuations summarized by the Euler equation (3.3). Firms that do poorly in times of low consumption have lower valuations, leading to higher expected returns in equilibrium. We represent the impulse response on Figure 3.

Quantitatively our model generates a variance of consumption that is low, 0.09% in our baseline calibration. We now discuss the implications of low consumption variance for asset prices.

Valuations — After evaluating the response of cash-flows and consumption, we are able to answer our main questions: how do investors care about the risk of foreign productivity shocks and how much?

We are able to provide a clear answer to the first question from the model. As consumption declines when foreign productivity increases, consumption is dear exactly at times when firms cash-flows also tend to be negative. Investors seek protection to hedge from that source of systematic risk. Firms doing poorly when consumption is low trade at a discount to firms with high cash-flows in these states of the world. We conclude the price of risk is negative, as it is bad news for consumption.

To the second question, we might be tempted to answer "not very much". Consumption in our baseline model is not very volatile, as is mechanically the volatility of the stochastic discount factor. Indeed the risk premium earned by low SC industries compared to high SC industries is 0.02% annualized. This number falls short of our empirical result in Section 2.

As we have emphasized before, the mechanism centers around displacement risk. Enriching the demand side to account for a greater variability in consumption and in the stochastic discount factor falls outside of the scope of our paper. To precisely test the mechanism of displacement into prices we keep our calibrated model as is, and specify a stochastic discount factor from the data. To obtain an estimate of the price of risk from foreign productivity shocks empirically, we use the Sharpe ratio of the long-short portfolio from Table 4. Second we specify an exogenous discount factor to price assets in the model that takes the classic form of: $\log S_t = -r_f - \text{rp}\varepsilon^{A^\star}/\sigma_{A^\star}$. We find our exogenous SDF generates a risk premium of 2.5% annually and that risk is concentrated among small firms. Given this SDF we represent the firms' value response to a shock in foreign productivity in Figure 4. Again we find the valuations' response are different between low-shipping-costs (black line) and high-shipping-costs (grey line) industries. Most of the difference is concentrated among small firms, in Panel 4b.

6 Conclusion

This paper studies how globalization is reflected in asset prices, and therefore how U.S. investors perceive the domestic consequences of foreign productivity shocks. We use shipping costs to measure U.S. firms' exposure to globalization. We find that firms in low shipping cost industries carry a 7.8 precent risk premium, suggesting that their cash-flows covary negatively with the representative investor's marginal utility. This premium can be driven by either a positive or negative joint reaction of U.S. firms' performance and households' consumption to foreign productivity shocks. To understand the origins of this globalization risk premium, we develop a dynamic general equilibrium model of trade and asset prices. Guided by the model, we find that the premium emanates from the risk of displacement of least efficient firms triggered by import competition. These findings suggest that foreign productivity shocks are associated with times where consumption is dear for U.S. investors.

References

Acemoglu, Daron, David Autor, David Dorn, Gordon H. Hanson, and Brendan Price, "Import Competition and the Great U.S. Employment Sag of the 2000s," *NBER Working Paper*, 2014.

Anderson, James E. and Eric van Wincoop, "Trade Costs," *Journal of Economic Literature*, 2004, *42* (3), 691–751.

Artuç, Erhan, Shubham Chaudhuri, and John McLaren, "Trade Shocks and Labor Adjustment: A Structural Empirical Approach," *American Economic Review*, 2010, *100* (3), 1008–1045.

Autor, David H., David Dorn, and Gordon H. Hanson, "The China Syndrome: Local Labor Market Effects of Import Competition in the United States," *American Economic Review*, 2013, *103* (6), 2121–68.

_ , _ , _ , and Jae Song, "Trade Adjustment: Worker Level Evidence," *Quarterly Journal of Economics*, 2014, *129* (4), 1799–1860.

Baik, Bok, Jun-Koo Kang, and Jin-Mo Kim, "Local Institutional Investors, Information Asymmetries, and Equity Returns," *Journal of Financial Economics*, 2010, *97* (1), 81–106.

Bansal, Ravi and Amir Yaron, "Risks for the Long Run: A Potential Resolution of Asset Pricing Puzzles," *Journal of Finance*, 2004, *59* (4), 1481–1509.

Bernard, Andrew B and J Bradford Jensen, "Exporting and Productivity in the USA," *Oxford Review of Economic Policy*, 2004, *20* (3), 343–357.

_ , _ , and Peter K Schott, "Survival of the Best Fit: Exposure to Low-wage Countries and the (uneven) Growth of US Manufacturing Plants," *Journal of International Economics*, 2006, *68* (1), 219–237.

_ , _ , and _ , "Trade Costs, Firms and Productivity," *Journal of Monetary Economics*, 2006, *53* (5), 917–937.

_ , _ , Jonathan Eaton, and Samuel Kortum, "Plants and Productivity in International Trade," *American Economic Review*, 2003, *93* (4), 1268–1290.

_ , _ , Stephen J Redding, and Peter K Schott, "Firms in International Trade," *Journal of Economic Perspectives*, 2007, *21* (3), 105–130.

Bernile, Gennaro, Alok Kumar, and Johan Sulaeman, "Home away from Home: Geography of Information and Local Investors," *Review of Financial Studies*, 2015, *28* (7), 2009–2049.

Bloom, Nicholas, Mirko Draca, and John Van Reenen, "Trade Induced Technical Change? The Impact of Chinese Imports on Innovation, IT and Productivity," *NBER Working Paper*, 2011.

Broda, Christian and David E Weinstein, "Globalization and the Gains From Variety," *Quarterly Journal of Economics*, 2006, *121* (2), 541–585.

Brown, Jeffrey, Joshua Pollet, and Scott Weisbenner, "The Investment Behavior of State Pension Plans," *NBER Working Paper*, 2009.

Bustamante, Maria Cecilia and Andres Donangelo, "Industry Concentration and Markup: Implications for Asset Pricing," *Working Paper*, 2015.

Coval, Joshua D and Tobias J Moskowitz, "Home Bias at Home: Local Equity Preference in Domestic Portfolios," *Journal of Finance*, 1999, *54* (6), 2045–2073.

Das, Sanghamitra, Mark J Roberts, and James R Tybout, "Market Entry Costs, Producer Heterogeneity, and Export Dynamics," *Econometrica*, 2007, *75* (3), 837–873.

di Giovanni, Julian, Andrei A. Levchenko, and Jing Zhang, "The Global Welfare Impact of China: Trade Integration and Technological Change," *American Economic Journal: Macroeconomics*, 2014, *6* (3), 153–83.

Ebenstein, Avraham, Ann Harrison, Margaret McMillan, and Shannon Phillips, "Estimating the Impact of Trade and Offshoring on American Workers using the Current Population Surveys," *Review of Economics and Statistics*, 2014, *96* (4), 581–595.

Fama, Eugene F. and Kenneth R. French, "Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics*, 1993, *33* (1), 3–56.

Feenstra, Robert C, "US imports, 1972-1994: Data and Concordances," *NBER Working Paper*, 1996.

Fillat, José L. and Stefania Garetto, "Risk, Returns, and Multinational Production," *The Quarterly Journal of Economics*, 2015, *130* (4), 2027–2073.

Fresard, Laurent, "Financial Strength and Product Market Behavior: The Real Effects of Corporate Cash Holdings," *Journal of Finance*, 2010, *65* (3), 1097–1122.

— **and Philip Valta**, "How Does Corporate Investment Respond to Increased Entry Threat?," *Working Paper*, 2014.

Ghironi, Fabio and Marc Melitz, "International Trade and Macroeconomics Dynamics with Heterogeneous Firms," *Quarterly Journal of Economics*, 2005, *120* (3), 865–915.

Goldberg, Pinelopi Koujianou, Amit Kumar Khandelwal, Nina Pavcnik, and Petia Topalova, "Imported Intermediate Inputs and Domestic Product Growth: Evidence from India," *Quarterly Journal of Economics*, 2010, *125* (4), 1727–1767.

— **and Nina Pavcnik**, "Distributional Effects of Globalization in Developing Countries," *Journal of Economic Literature*, 2007, *45*, 39–82.

Grossman, Gene M. and James A. Levinsohn, "Import Competition and the Stock Market Return to Capital," *American Economic Review*, 1989, *79* (5), 1065–1087.

Hombert, Johan and Adrien Matray, "Can Innovation Help US Manufacturing Firms Escape Import Competition from China?," *Working Paper*, 2014.

Hou, Kewei and David T Robinson, "Industry Concentration and Average Stock Returns," *Journal of Finance*, 2006, *61* (4), 1927–1956.

Hsieh, Chang-Tai and Ralph Ossa, "A global view of productivity growth in China," *Working Paper*, 2011.

Hummels, David, "Transportation Costs and International Trade in the Second Era of Globalization," *Journal of Economic Perspectives*, 2007, *21* (3), 131–154.

— **and Alexandre Skiba**, "Shipping the Good Apples Out? An Empirical Confirmation of the Alchian-Allen Conjecture," *Journal of Political Economy*, 2004, *112* (6), 1384–1402.

— **, Rasmus Jørgensen, Jakob Munch, and Chong Xiang**, "The Wage Effects of Offshoring: Evidence from Danish Matched Worker-Firm Data," *American Economic Review*, 2014, *104* (6), 1597–1629.

— **, — , Jakob R Munch, and Chong Xiang**, "The Wage Effects of Offshoring: Evidence from Danish Matched Worker-Firm Data," *American Economic Review*, 2013.

Irarrazabal, Alfonso, Andreas Moxnes, and Luca David Opromolla, "The Tip of the Iceberg: A Quantitative Framework for Estimating Trade Costs," *NBER Working Paper*, 2013.

Ivković, Zoran and Scott Weisbenner, "Local does as Local is: Information Content of the Geography of Individual Investors' Common Stock Investments," *Journal of Finance*, 2005, *60* (1), 267–306.

Lileeva, Alla and Daniel Trefler, "Improved Access to Foreign Markets Raises Plant-level Productivity… For Some Plants," *Quarterly Journal of Economics*, 2010, *125* (3), 1051–1099.

Loecker, Jan De, Pinelopi K Goldberg, Amit K Khandelwal, and Nina Pavcnik, "Prices, markups and trade reform," *Working Paper*, 2012.

Loualiche, Erik, "Asset Pricing with Entry and Imperfect Competition," *Working Paper*, 2015.

Melitz, Marc J, "The Impact of Trade on Intra-industry Reallocations and Aggregate Industry Productivity," *Econometrica*, 2003, *71* (6), 1695–1725.

_ **and Daniel Trefler**, "Gains from Trade when Firms Matter," *Journal of Economic Perspectives*, 2012, *26* (2), 91–118.

_ **and Stephen J Redding**, "Heterogeneous Firms and Trade," *Handbook of International Economics,*, 2014, *4*, 1–54.

_ **and** _ , "Heterogeneous Firms and Trade," *Handbook of International Economics, 4th ed*, 2014.

Pavcnik, Nina, "Trade Liberalization, Exit, and Productivity Improvements: Evidence from Chilean Plants," *Review of Economic Studies*, 2002, *69* (1), 245–276.

Pierce, Justin R. and Peter K. Schott, "The Surprisingly Swift Decline of U.S. Manufacturing Employment," *NBER Working Paper*, 2012.

Rauh, Joshua D, "Investment and Financing Constraints: Evidence from the Funding of Corporate Pension Plans," *Journal of Finance*, 2006, *61* (1), 33–71.

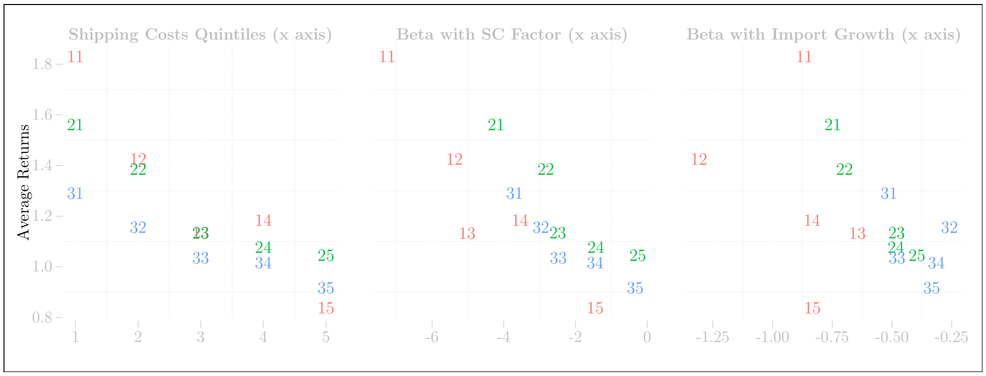
Ready, Robert, Nikolai Roussanov, and Colin Ward, "Commodity Trade and the Carry Trade: A tale of Two Countries," *NBER Working Paper*, 2013.

Tian, Mary, "Tradability of Output, Business Cycles, and Asset Prices," *Working Paper*, 2011.

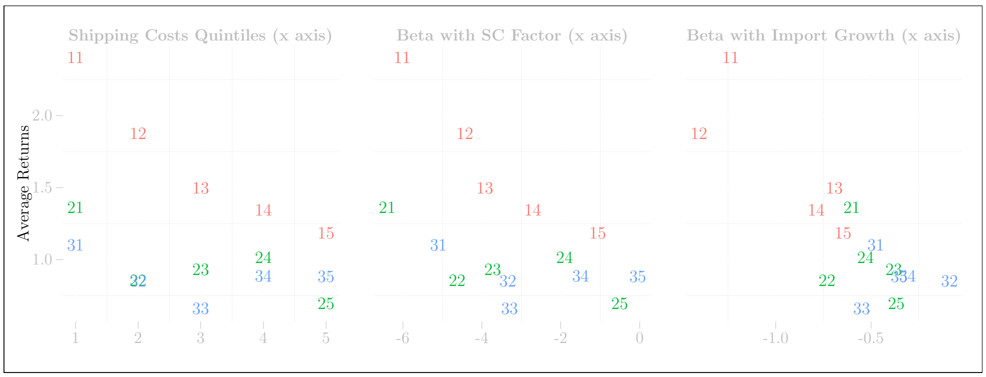
Trefler, Daniel, "The Long and Short of the Canada-US Free Trade Agreement," *American Economic Review*, 2004, *94* (4), 870–895.

Valta, Philip, "Competition and the Cost of Debt," *Journal of Financial Economics*, 2012, *105* (3), 661–682.

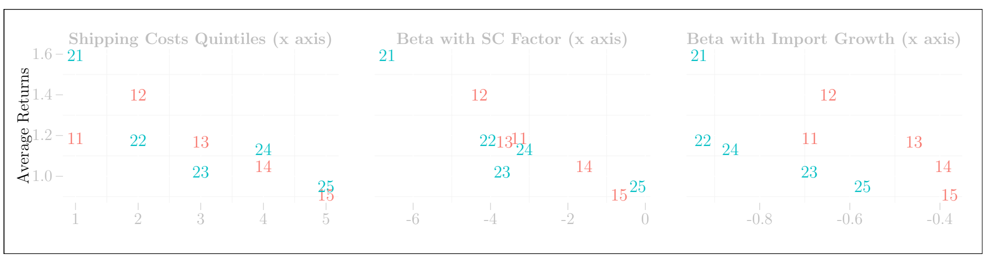
Xu, Jin, "Profitability and Capital Structure: Evidence from Import Penetration," *Journal of Financial Economics*, 2012, *106* (2), 427–446.



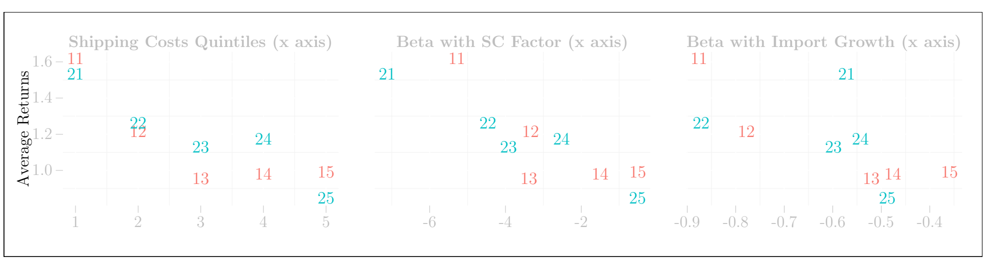
(a) Portfolios Sorted by ROA



(b) Portfolios Sorted by Size



(c) Portfolios Sorted by Demand Elasticity (σ)



(d) Portfolios Sorted by Pareto Tail (γ)

Figure 1

Portfolio Characteristics across Shipping Costs Quintiles

Each panel represents average returns of portfolios on the y axis against respectively from left to right: shipping costs quintiles, the beta of a univariate regression of returns against the high–low shipping costs portfolio and the beta of a univariate regression of returns against the import growth of China in the US (monthly frequency, Census). Portfolios are sorted on shipping costs (last digit, from 1, low shipping costs, to 5, high shipping costs) and another characteristic: Figure 1a double sorts portfolios using ROA (first digit from 1, low ROA, to 3, high ROA), Figure 1b using size (first digit from 1, small, to 3, big), Figure 1c using σ (first digit from 1, low σ, to 2, high σ) and Figure 1d using γ (last digit from 1, low γ, to 2, high γ).

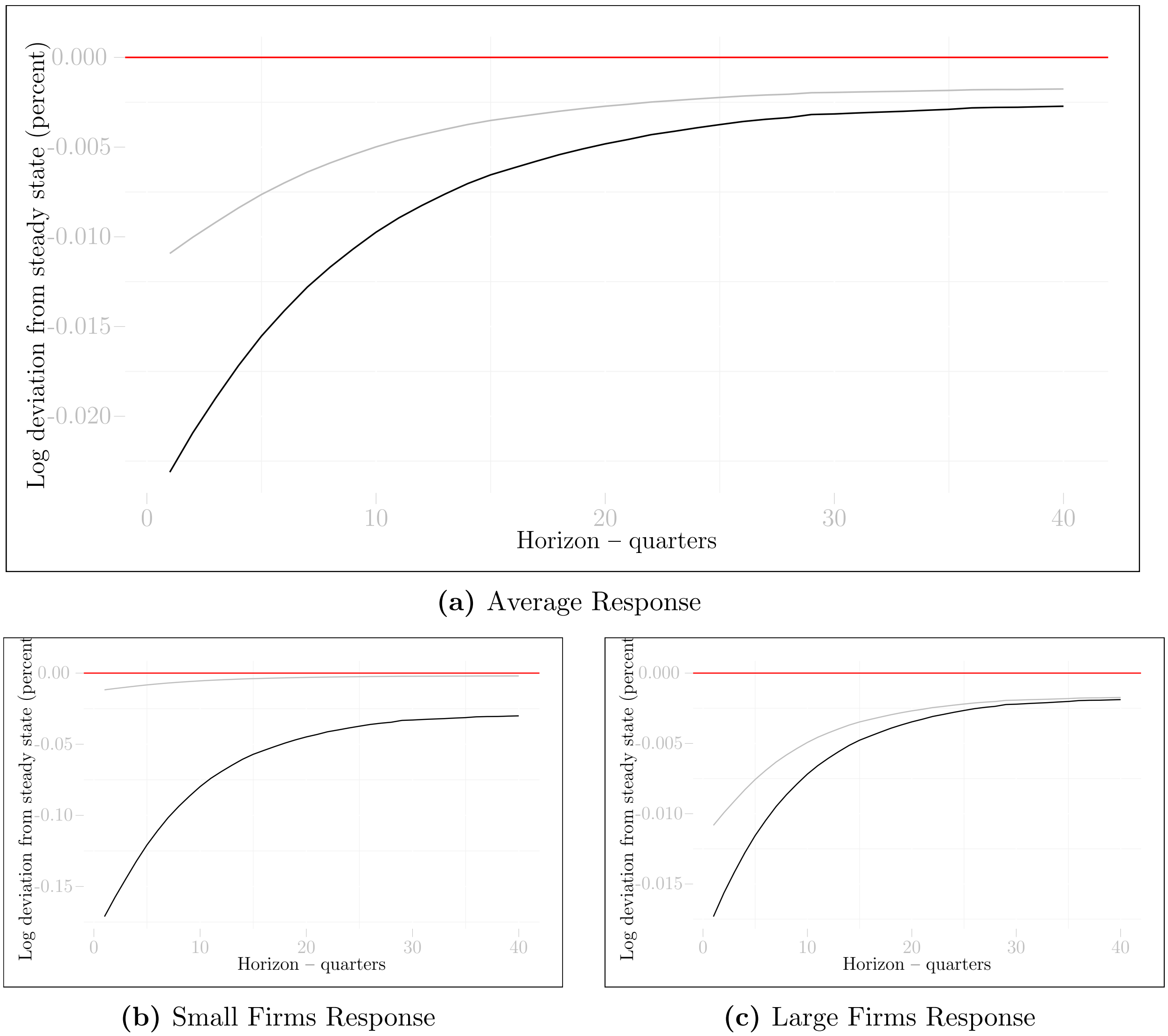


Figure 2
Impulse Response of Local Firms' Profit

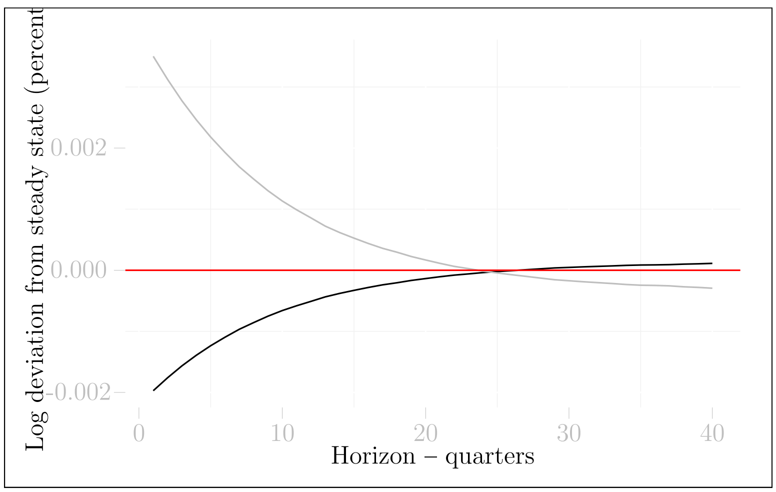
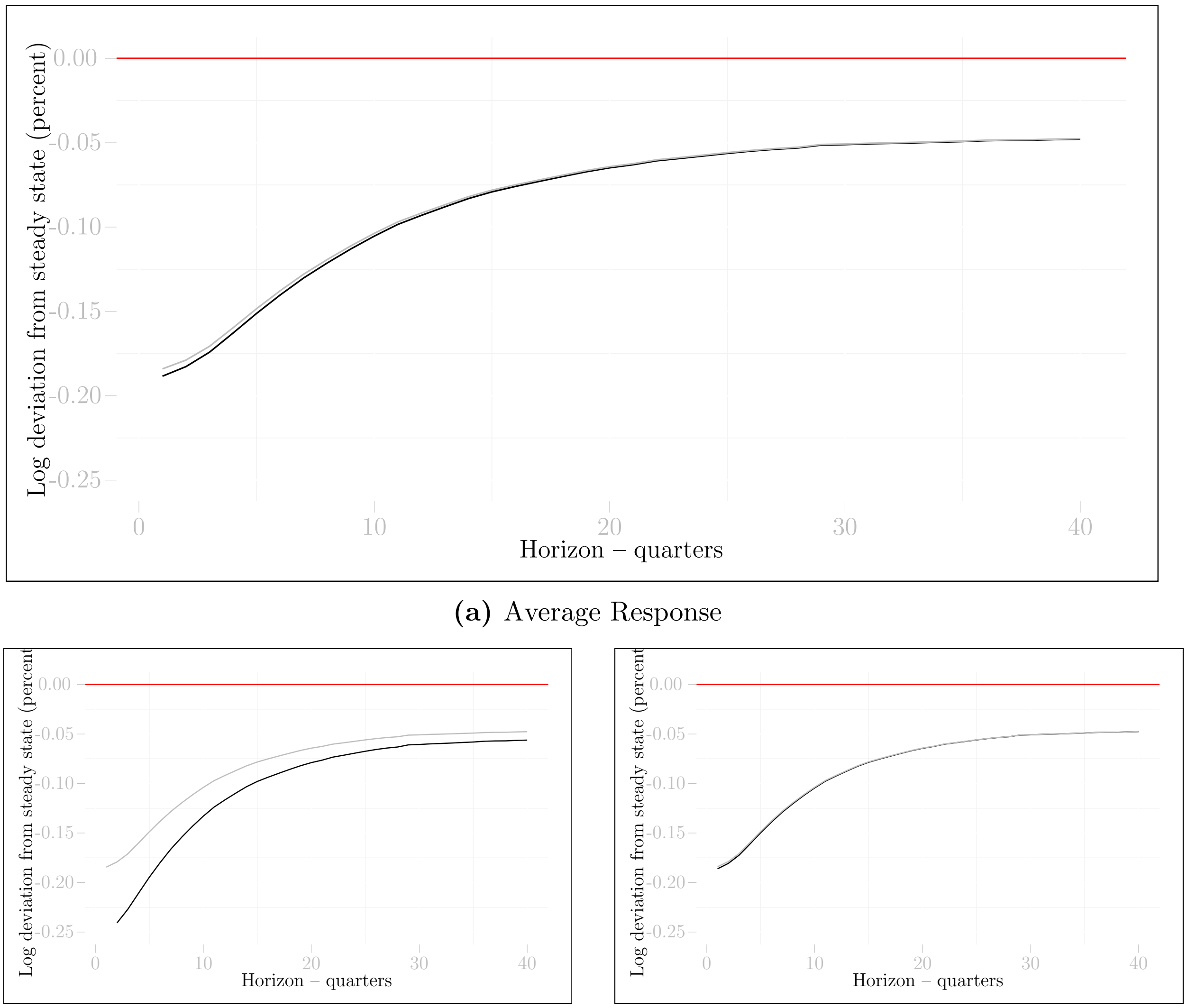


Figure 3
Impulse Response of Domestic Households' Consumption



(a) Average Response

(b) Small Firms Response

(c) Large Firms Response

Figure 4
Impulse Response of Local Firms' Value

Table 1
Summary statistics

This table presents the summary statistics for our industry-year sample that covers 439 unique manufacturing industries (with 4-digit SIC codes between 2000 and 3999). Shipping costs are measured at the industry-year level as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports. Weight-to-value is measured at the industry-year level as the ratio of the weight in kilograms over the Free-On-Board value of imports. Tariffs are measured at the industry-year level as the ratio of customs duties to the Free-on-Board value of imports. Imports, Exports and Net Imports are measured at the industry-year level and normalized by the sum of total shipments and imports. Shipping costs, weight-to-value ratio, tariffs, imports, exports are available from the Census and obtained from Peter Schott's website. Employment, shipments, value added, and TFP are obtained from the NBER CES files. The sample period is 1974-2009.

	Obs.	Mean	SD	p1	p50	p99
Trade Data						
Shipping costs	13590	0.059	0.072	0.002	0.048	0.227
Weight-to-value	7929	0.672	2.637	0.002	0.177	8.987
Tariff	13590	0.044	0.055	0.000	0.029	0.271
Imports	13590	0.163	0.187	0.000	0.095	0.873
Exports	13590	0.105	0.128	0.000	0.065	0.595
Net Imports	13590	0.058	0.202	-0.413	0.012	0.788
Industry Controls						
Log employment	13590	3.008	1.119	0.182	2.996	5.639
Log value added	13590	7.242	1.301	4.218	7.251	10.36
Log shipments	13590	7.979	1.308	4.990	8.005	11.17
TFP	13590	1.050	1.350	0.628	0.989	1.663

Table 2
Shipping cost persistence

This table presents transition frequencies across shipping cost quintiles from year $t-1$ to t (Panel A) and from year $t-5$ to t (Panel B) in the sample over the period 1974-2009. Shipping costs are measured at the industry-year level as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports.

Transition across shipping cost portfolios

Panel A:	from year $t-1$ to year t				
	Q1 (t)	Q2 (t)	Q3 (t)	Q4 (t)	Q5 (t)
Q1 (t-1)	0.863	0.115	0.013	0.003	0.006
Q2 (t-1)	0.115	0.732	0.137	0.014	0.002
Q3 (t-1)	0.010	0.138	0.680	0.162	0.010
Q4 (t-1)	0.004	0.012	0.157	0.704	0.122
Q5 (t-1)	0.003	0.005	0.015	0.122	0.855

Panel B:	from year $t-5$ to year t				
	Q1 (t)	Q2 (t)	Q3 (t)	Q4 (t)	Q5 (t)
Q1 (t-5)	0.757	0.164	0.046	0.019	0.015
Q2 (t-5)	0.155	0.571	0.214	0.047	0.014
Q3 (t-5)	0.039	0.203	0.493	0.227	0.038
Q4 (t-5)	0.015	0.050	0.204	0.546	0.185
Q5 (t-5)	0.016	0.019	0.056	0.185	0.723

Table 3
Shipping costs and trade flows

This table presents the result of industry-year regressions of the value of trade flows on shipping costs (Panel A) and the weight-to-value ratio (Panel B). We consider successively imports (Columns 1 to 3), exports (Columns 4 to 6) and imports net of exports (Columns 7 to 9) normalized by the total value of shipments plus imports. Shipping costs are measured at the industry-year level as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports. Weight-to-value is measured as the ratio of the weight in kilograms over the Free-On-Board value of imports. Tariffs are measured at the industry-year level as the ratio of customs duties to the Free-on-Board value of imports. Some regressions include control for the industry level of tariffs, penetration, log employment, log value added, log shipments and total factor productivity, all obtained from the NBER CES datasets. Standard errors are clustered at the industry level and reported in parentheses. *, ** and *** means statistically different from zero at 10%, 5% and 1% level of significance. The sample period is 1974-2009 in Panel A, and 1989-2009 in Panel B.

	Panel A: Shipping costs								
	Imports			Exports			Net imports		
Shipping costs	-0.311*	-0.565***	-0.094	-0.665***	-0.672***	-0.041	0.358*	0.111	-0.044
	(0.164)	(0.157)	(0.088)	(0.118)	(0.103)	(0.092)	(0.194)	(0.168)	(0.116)
Tariff		0.504***	-0.465***		-0.213***	-0.089		0.710***	-0.375***
		(0.124)	(0.126)		(0.046)	(0.056)		(0.125)	(0.129)
Log employment		0.033***	-0.075***		-0.031***	-0.020		0.063***	-0.056**
		(0.012)	(0.016)		(0.009)	(0.014)		(0.013)	(0.022)
Log value added		-0.050**	-0.055***		0.025*	-0.020		-0.075***	-0.035
		(0.023)	(0.018)		(0.014)	(0.016)		(0.023)	(0.024)
Log shipments		-0.029	0.006		-0.005	0.009		-0.024	-0.000
		(0.022)	(0.021)		(0.013)	(0.017)		(0.023)	(0.025)
TFP		0.007***	0.000		0.006***	0.001		0.001	-0.001
		(0.002)	(0.001)		(0.002)	(0.003)		(0.004)	(0.005)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	No	No	Yes	No	No	Yes
Observations	13590	13590	13590	13590	13590	13590	13590	13590	13590
R^2	0.138	0.313	0.863	0.107	0.143	0.695	0.046	0.229	0.769
	Panel B: Weight-to-value ratio								
	Imports			Exports			Net imports		
Weight-to-value	-0.008***	-0.005***	0.000	-0.004***	-0.005***	0.001	-0.004*	0.000	-0.000
	(0.002)	(0.002)	(0.000)	(0.001)	(0.001)	(0.000)	(0.002)	(0.002)	(0.001)
Tariff		1.128***	-0.135		-0.550***	-0.126*		1.655***	0.001
		(0.289)	(0.088)		(0.101)	(0.065)		(0.313)	(0.099)
Log employment		0.031**	-0.061***		-0.028***	0.005		0.058***	-0.064**
		(0.016)	(0.017)		(0.010)	(0.015)		(0.016)	(0.025)
Log value added		-0.012	-0.029*		0.045***	-0.021		-0.057**	-0.006
		(0.030)	(0.015)		(0.017)	(0.015)		(0.028)	(0.022)
Log shipments		-0.072**	-0.030		-0.031**	-0.014		-0.041	-0.017
		(0.032)	(0.020)		(0.015)	(0.019)		(0.031)	(0.028)
TFP		0.008***	-0.001		0.006***	-0.001		0.002	0.000
		(0.002)	(0.002)		(0.002)	(0.003)		(0.004)	(0.005)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	No	No	Yes	No	No	Yes
Observations	7929	7929	7929	7929	7929	7929	7930	7929	7929
R^2	0.057	0.305	0.941	0.016	0.071	0.815	0.023	0.275	0.873

Table 4
Shipping cost and weight-to-value portfolios

This table reports report (annualized) mean excess returns over the risk-free rate, volatilities, and Sharpe ratios (return/$\sqrt{12}\times$ volatility) for five shipping costs portfolios (Panel A), and five weight-to-value portfolios (Panel B). Shipping costs are measured at the industry-year level as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports. Weight-to-value is measured at the industry-year level as the ratio of the weight in kilograms over the Free-On-Board value of imports. The sample period is 1974-2013 in Panel A, and 1989-2013 in Panel B.

	Panel A: Shipping cost portfolios					
Portfolio Moments	Low	2	3	4	High	Hi-Lo
Mean excess return	0.195	0.153	0.133	0.133	0.117	-0.078
	(0.046)	(0.043)	(0.039)	(0.036)	(0.033)	(0.030)
Volatility	0.083	0.078	0.071	0.065	0.059	0.054
Sharpe ratio	0.677	0.567	0.539	0.591	0.573	-0.418

	Panel B: Weight-to-value portfolios					
Portfolio Moments	Low	2	3	4	High	Hi-Lo
Mean excess return	0.193	0.169	0.136	0.112	0.095	-0.098
	(0.064)	(0.059)	(0.055)	(0.043)	(0.041)	(0.047)
Volatility	0.091	0.083	0.078	0.061	0.059	0.066
Sharpe ratio	0.614	0.586	0.504	0.530	0.467	-0.429

Table 5
Shipping cost portfolios - Returns

This table presents the monthly excess returns (α) over a three-factor Fama-French model of shipping costs portfolios. Shipping costs are measured at the industry-year level as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports. In any given month, stocks are sorted into five portfolios based on their industry shipping costs in the previous year. We regress a given portfolio's return in excess of the risk free rate on the market portfolio minus the risk-free rate, the size factor (small minus big), and the value factor (high minus low), all obtained from Kenneth French's website. Monthly portfolios returns are either equally-weighted or value-weighted. Standard Errors are estimated using Newey-West with 12 lags. ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. The sample period is from 1974 to 2013.

	Shipping cost portfolios - Equally weighted					
	Low	2	3	4	High	Hi-Lo
α	0.630***	0.223	0.089	0.027	-0.162	-0.792***
	(0.226)	(0.195)	(0.146)	(0.114)	(0.121)	(0.284)
β^{MKT}	1.083***	1.032***	1.024***	1.081***	1.058***	-0.025
	(0.056)	(0.044)	(0.041)	(0.045)	(0.040)	(0.077)
β^{SMB}	-0.347***	-0.126*	-0.040	0.247***	0.580***	0.927***
	(0.075)	(0.069)	(0.084)	(0.083)	(0.086)	(0.122)
β^{HML}	1.283***	1.321***	1.123***	0.871***	0.729***	-0.555***
	(0.095)	(0.079)	(0.066)	(0.098)	(0.111)	(0.182)

	Shipping cost portfolios - Value weighted					
	Low	2	3	4	High	Hi-Lo
α	0.348***	0.012	-0.179	-0.032	0.129	-0.218
	(0.129)	(0.124)	(0.163)	(0.113)	(0.118)	(0.172)
β^{MKT}	0.960***	1.068***	1.089***	1.067***	0.920***	-0.040
	(0.051)	(0.044)	(0.039)	(0.030)	(0.042)	(0.050)
β^{SMB}	-0.366***	-0.340***	-0.150	-0.075	0.334***	0.700***
	(0.051)	(0.061)	(0.118)	(0.063)	(0.094)	(0.086)
β^{HML}	-0.098*	0.255***	0.193***	0.105*	-0.027	0.071
	(0.052)	(0.056)	(0.052)	(0.061)	(0.066)	(0.095)

Table 6
Weight-to-value portfolios - Returns

This table presents the monthly excess returns (α) over a three-factor Fama-French model of weight-to-value portfolios. Weight-to-value is measured at the industry-year level as the ratio of the weight in kilograms over the Free-On-Board value of imports. In any given month, stocks are sorted into five portfolios based on their industry weight-to-value ratio in the previous year. We regress a given portfolio's return in excess of the risk free rate on the market portfolio minus the risk-free rate, the size factor (small minus big), and the value factor (high minus low), all obtained from Kenneth French's website. Monthly portfolios returns are either equally-weighted or value-weighted. Standard Errors are estimated using Newey-West with 12 lags. ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. The sample period is from 1989 to 2013.

	Weight-to-value portfolios - Equally weighted					
	Low	2	3	4	High	Hi-Lo
α	0.751**	0.553**	0.271	0.066	-0.172	-0.923**
	(0.343)	(0.275)	(0.206)	(0.157)	(0.176)	(0.415)
β^{MKT}	1.136***	1.077***	1.103***	1.030***	1.084***	-0.052
	(0.084)	(0.063)	(0.078)	(0.043)	(0.061)	(0.099)
β^{SMB}	-0.434***	-0.277***	-0.176*	0.295***	0.679***	1.113***
	(0.099)	(0.084)	(0.104)	(0.101)	(0.087)	(0.127)
β^{HML}	1.303***	1.282***	1.108***	0.782***	0.632***	-0.671***
	(0.139)	(0.096)	(0.094)	(0.123)	(0.086)	(0.183)

	Weight-to-value - Value weighted					
	Low	2	3	4	High	Hi-Lo
α	0.427**	0.360*	-0.128	-0.080	0.096	-0.331
	(0.173)	(0.209)	(0.158)	(0.137)	(0.116)	(0.237)
β^{MKT}	0.871***	1.141***	1.197***	0.990***	0.834***	-0.037
	(0.058)	(0.070)	(0.055)	(0.030)	(0.037)	(0.075)
β^{SMB}	-0.349***	-0.674***	-0.484***	0.331***	0.331***	0.680***
	(0.061)	(0.092)	(0.067)	(0.082)	(0.090)	(0.115)
β^{HML}	-0.106	0.219**	0.321***	0.092*	-0.074	0.031
	(0.079)	(0.086)	(0.062)	(0.049)	(0.068)	(0.128)

Table 7
Shipping cost and weight-to-value portfolios - Returns, conditional on size and profitability

This table presents the equally-weighted monthly excess returns (α) over a three-factor Fama-French model of either shipping costs portfolios (Columns 1 to 6) or weight-to-value portfolios (Columns 7 to 12). Shipping costs are measured at the industry-year level as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports. Weight-to-value is measured at the industry-year level as the ratio of the weight in kilograms over the Free-On-Board value of imports. In any given month, stocks are independently sorted into five portfolios based on either their industry shipping costs or weight-to-value ratio in the previous year, and into three portfolios based on either their market capitalization (Size) in the previous month or based on their return on assets (ROA) in year t-2. Stocks at the intersection of the two sorts are grouped together to form portfolios based on shipping costs and either Size or ROA (Columns 1 to 6), and based on weight-to-value and either Size or ROA (Columns 7 to 12). We then regress a given portfolio's return in excess of the risk free rate on the market portfolio minus the risk-free rate, the size factor (small minus big), and the value factor (high minus low), all obtained from Kenneth French's website. Standard errors are estimated using Newey-West with 12 lags. ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. The sample period is 1974-2013 in Columns 1 to 6, and 1989-2013 in Columns 7 to 12.

	Shipping cost portfolios (EW)						Weight-to-value portfolios (EW)					
	Low	2	3	4	High	Hi-Lo	Low	2	3	4	High	Hi-Lo
	Size terciles						Size terciles					
T1	1.347***	0.797***	0.476*	0.356*	0.139	-1.208***	1.634***	1.168***	0.812**	0.587**	0.235	-1.399***
	(0.346)	(0.293)	(0.249)	(0.206)	(0.219)	(0.349)	(0.517)	(0.406)	(0.347)	(0.296)	(0.318)	(0.500)
T2	0.353	-0.169	-0.095	-0.175	-0.504***	-0.857***	0.361	0.283	-0.068	-0.245*	-0.493**	-0.854*
	(0.251)	(0.216)	(0.150)	(0.133)	(0.126)	(0.326)	(0.399)	(0.313)	(0.206)	(0.144)	(0.197)	(0.511)
T3	0.389*	-0.009	-0.152	-0.073	-0.108	-0.497*	0.509*	0.121	0.002	-0.105	-0.187	-0.696*
	(0.199)	(0.140)	(0.132)	(0.104)	(0.115)	(0.265)	(0.293)	(0.205)	(0.177)	(0.144)	(0.157)	(0.371)
	ROA terciles						ROA terciles					
T1	0.794**	0.315	0.088	0.093	-0.271	-1.065***	0.897**	0.713*	0.457	0.169	-0.146	-1.043**
	(0.309)	(0.285)	(0.259)	(0.202)	(0.235)	(0.366)	(0.455)	(0.427)	(0.339)	(0.273)	(0.311)	(0.516)
T2	0.719***	0.363**	0.209	0.019	-0.084	-0.802***	0.922***	0.836***	0.326*	0.079	-0.116	-1.039***
	(0.190)	(0.166)	(0.137)	(0.114)	(0.130)	(0.268)	(0.238)	(0.209)	(0.188)	(0.162)	(0.204)	(0.360)
T3	0.522***	0.319**	0.204	0.055	-0.040	-0.562***	0.590**	0.402*	0.377*	0.096	-0.085	-0.674**
	(0.151)	(0.162)	(0.137)	(0.122)	(0.122)	(0.209)	(0.249)	(0.205)	(0.204)	(0.174)	(0.146)	(0.304)

Table 8
Shipping cost and and weight-to-value portfolios - Returns, conditional on US trade elasticities (σ)

This table presents equally-weighted monthly excess returns (α) over a three-factor Fama-French model of either shipping costs portfolios (Columns 1 to 6) or weight-to-value portfolios (Columns 7 to 12). Shipping costs are measured at the industry-year level as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports. Weight-to-value is measured at the industry-year level as the ratio of the weight in kilograms over the Free-On-Board value of imports. In any given month, stocks are independently sorted into five portfolios based on either their industry shipping costs or weight-to-value ratio in the previous year, and into two portfolios based on their industry US trade elasticities (σ). US trade elasticities are estimated by Broda and Weinstein (2006) from 1990 to 2001 at the commodity level, and aggregated at the four-digit SIC based on total imports over 1990-2001. Stocks at the intersection of the two sorts are grouped together to form portfolios based on either shipping costs (Columns 1 to 6), or weight-to-value (Columns 7 to 12) and US trade elasticities. We then regress a given portfolio's return in excess of the risk free rate on the market portfolio minus the risk-free rate, the size factor (small minus big), and the value factor (high minus low), all obtained from Kenneth French's website. Standard errors are estimated using Newey-West with 12 lags. ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. The sample period is 1974-2013 in Columns 1 to 6, and 1989-2013 in Columns 7 to 12.

	Shipping cost portfolios (EW)						Weight-to-value portfolios (EW)					
	Low	2	3	4	High	Hi-Lo	Low	2	3	4	High	Hi-Lo
Low σ industries	0.255	0.483*	0.200	-0.020	-0.123	-0.377*	0.304	0.733**	0.077	0.076	-0.182	-0.487
	(0.189)	(0.268)	(0.141)	(0.123)	(0.124)	(0.199)	(0.306)	(0.298)	(0.218)	(0.147)	(0.191)	(0.318)
High σ industries	0.607**	0.178	0.138	0.135	-0.200	-0.807**	0.716*	0.632*	0.366	0.044	-0.060	-0.776
	(0.275)	(0.198)	(0.193)	(0.152)	(0.177)	(0.367)	(0.392)	(0.354)	(0.257)	(0.231)	(0.247)	(0.528)

Table 9
Shipping cost and and weight-to-value portfolios - Returns, conditional on Pareto parameter (γ)

This table presents equally-weighted monthly excess returns (α) over a three-factor Fama-French model of either shipping costs portfolios (Columns 1 to 6) or weight-to-value portfolios (Columns 7 to 12). Shipping costs are measured at the industry-year level as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports. Weight-to-value is measured at the industry-year level as the ratio of the weight in kilograms over the Free-On-Board value of imports. In any given month, stocks are independently sorted into five portfolios based on either their industry shipping costs or weight-to-value ratio in the previous year, and into two portfolios based on their industry Pareto tail parameter (γ) in the previous year. We estimate the Pareto parameter separately for each industry-year as the estimated coefficient γ of the following OLS regression: $ln(SIZE) = -\gamma ln(Rank) + constant$, where for each year and 4-digit industries, firms are ranked in descending order according to their total firm market value (Compustat item CSHO $\times$ PRCC_F+AT-CEQ). Stocks at the intersection of the two sorts are grouped together to form portfolios based on either shipping costs (Columns 1 to 6), or weight-to-value (Columns 7 to 12) and the Pareto tail parameter. We then regress a given portfolio's return in excess of the risk free rate on the market portfolio minus the risk-free rate, the size factor (small minus big), and the value factor (high minus low), all obtained from Kenneth French's website. Standard errors are estimated using Newey-West with 12 lags. ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. The sample period is 1974-2013 in Columns 1 to 6, and 1989-2013 in Columns 7 to 12.

	Shipping cost portfolios (EW)						Weight-to-value portfolios (EW)					
	Low	2	3	4	High	Hi-Lo	Low	2	3	4	High	Hi-Lo
Low γ industries	0.604***	0.095	0.153	-0.077	0.009	-0.595**	0.758**	0.511	0.246	0.013	-0.088	-0.846**
	(0.198)	(0.207)	(0.159)	(0.127)	(0.127)	(0.250)	(0.298)	(0.316)	(0.253)	(0.179)	(0.177)	(0.353)
High γ industries	0.706**	0.294	0.096	0.054	-0.292**	-0.998**	0.753	0.551*	0.297	0.109	-0.255	-1.008*
	(0.321)	(0.212)	(0.169)	(0.132)	(0.141)	(0.390)	(0.483)	(0.286)	(0.223)	(0.161)	(0.193)	(0.565)

Online Appendix

The Globalization Risk Premium

This Online Appendix includes the full derivation of the model and details about the calibration (Appendix A), as well as a series of robustness tables (Appendix B).

A Model

Our description of the model is more complete than in the main body of the paper. For clarity we introduce a taste for variety parameter at the industry level, κ_J. It is such that the aggregator of varieties within industry takes the following form:

$$\mathcal{C}_J = \left[M_J^{1-\kappa_J \sigma_J} \int_{\Omega_J} c_J(\omega)^{\frac{\sigma_J - 1}{\sigma_J}} d\omega \right]^{\frac{\sigma_J}{\sigma_J - 1}}$$

Varying κ_J allows to mute the variety effects: with $\kappa_J = 0$, we are in standard case of Dixit-Stiglitz as described in the paper, while with $\kappa_J = 1/\sigma_J$ we mute any variety effect.

A.1 Notation

We define some constants that are useful in developing some of the proofs. First we define import competition as:

$$\mathcal{I}_J = \frac{(M_J^\star \zeta_J^\star)^{1-\kappa_J \sigma_J} p_J^{\mathcal{X}\star}(\bar{\varphi}_J^{\mathcal{X}\star})}{\Gamma_J^{1-\sigma_J}}$$

It represents the marginal impact of foreign firms on the domestic price index for a given industry. Given our definition of Γ_J, import penetration is bounded: $\mathcal{I}_J \in [0, 1]$. The second constant represents the averaging of firms given a Pareto distribution (tail γ_J) and elasticity of substitution σ_J. In that case the average productivity is a multiple of the productivity of the marginal producer. The ratio is given by:

$$\nu_J = \left(\frac{\gamma_J}{\gamma_J - (\sigma_J - 1)} \right)^{\frac{1}{\sigma_J - 1}}$$

The operating leverage of exporters is due to the probability of losing their status after an adverse productivity shock; we define:

$$\ell(\varphi) = \frac{1}{\left(\frac{\varphi}{\varphi^{\mathcal{X}}}\right) - 1}$$

A.2 Solution

Firms — Firms price their goods at a markup over marginal cost:

$$p_J(\varphi) = \frac{\tilde{p}(\varphi)}{P} = \frac{\sigma_J}{\sigma_J - 1} \cdot \frac{w}{A\varphi}$$

$$p_J^{\mathcal{X}}(\varphi) = \frac{\tilde{p}_J^{\mathcal{X}}(\varphi)}{P^\star} = \mathbf{F}^{-1} \; \tau_J \cdot p(\varphi),$$

And real profits are:

$$\pi_J^{\mathcal{D}}(\varphi) = \frac{\eta_J}{\sigma_J} \left(p_J(\varphi)\right)^{1-\sigma_J} \; \Gamma_J^{\sigma_J - \theta} \mathcal{C},$$

$$\pi_J^{\mathcal{X}}(\varphi) = \frac{\eta_J}{\sigma_J} \left(p_J^{\mathcal{X}}(\varphi)\right)^{1-\sigma_J} \; (\Gamma_J^\star)^{\sigma_J - \theta} \; \mathcal{C}^\star \; F - \frac{w}{A} f^{\mathcal{X}},$$

The equation accounting for displacement stems from the zero-profit condition of the exporters: $\pi_J(\varphi_J^{\mathcal{X}}) = 0$, such that we have the following expression for the cutoff in the domestic country (the foreign country cutoffs are symmetric):

$$(\varphi_J^{\mathcal{X}})^{\sigma_J-1} = A^{-\sigma_J}\ \mathbf{F}^{-\sigma_J}\ \ (C^\star)^{-1}\ (\Gamma_J^\star)^{\theta-\sigma_J}\ \ \cdot (wf^{\mathcal{X}}) \cdot \frac{\sigma_J}{\eta_J} \cdot \left(\frac{\sigma_J}{\sigma_J-1} w\tau_J\right)^{\sigma_J-1}$$
$$(\varphi_J^{\mathcal{X}\star})^{\sigma_J-1} = (A^\star)^{-\sigma_J}\ \mathbf{F}^{+\sigma_J}\ \ C^{-1}\ (\Gamma_J)^{\theta-\sigma_J}\ \ \cdot (wf^{\mathcal{X}}) \cdot \frac{\sigma_J}{\eta_J} \cdot \left(\frac{\sigma_J}{\sigma_J-1} w^\star\tau_J\right)^{\sigma_J-1}$$

A.2.1 Aggregate production function

Given the allocations we solve for the aggregate production function, expressing final tradable consumption given labor in the tradable sector $\mathcal{L}$. First we define the labor allocated for each variety production:

$$l_J(\varphi) = \frac{c_J(\varphi)}{A\varphi} = \frac{\mathcal{C}}{A} \cdot \eta_J \cdot \Gamma_J^{\sigma_J-\theta} p_J(1)^{-\sigma_J} \varphi^{\sigma_J-1}.$$

Aggregating at the industry level gives us:

$$L_J = \int_{\Omega_J} l_J(\varphi)\mathrm{d}\varphi = \underbrace{\left[M_J \cdot \eta_J \cdot \Gamma_J^{\sigma_J-\theta} p_J(1)^{-\sigma_J} \bar{\varphi}_J^{\sigma_J-1}\right]}_{\tilde{\alpha_J}} \cdot \frac{\mathcal{C}}{A}.$$

So we finally have consumption in the tradable sector from labor used in the tradable sector $\mathcal{L}$:

$$\mathcal{C} = \left[\sum_J \Gamma_J^{-\theta} \left(\frac{p_J(\bar{\varphi}_J)}{\Gamma_J}\right)^{-\sigma_J} \eta_J \frac{M_J}{\bar{\varphi}_J}\right]^{-1} A\mathcal{L}$$

A.3 Elasticities

We write with the convention that the elasticities of variable X with respect to domestic shock and foreign shock are $\mathcal{E}(X)$ and $\mathcal{E}^\star(X)$ respectively.

Tradable Consumption — A key elasticity is consumption to productivity:

$$\mathcal{E}(\mathcal{C}) = \frac{\partial \log \mathcal{C}}{\partial \log A} = 1 - \sum_J \alpha_J \left((\sigma_J - \theta)\mathcal{E}(\Gamma_J) + \sigma_J\right) \tag{A.1}$$

where $\sum_J \alpha_J = 1$ and $\alpha_J = \tilde{\alpha}_J / \sum_J \tilde{\alpha}_J$.

Productivity Cutoff — Using the definition of $\varphi^{\mathcal{X}}$ from the zero-profit cutoff condition, $\pi^{\mathcal{X}}(\varphi^{\mathcal{X}}) = 0$, we have:

$$\varphi_J^{\mathcal{X}} = \left[\frac{\sigma_J}{\eta_J}\frac{wf^{\mathcal{X}}}{A}\right]^{\frac{1}{\sigma_J-1}} \cdot \frac{\sigma_J}{\sigma_J-1}\tau_J \frac{w}{A} \cdot \mathbf{F}^{\frac{\sigma_J}{1-\sigma_J}} \cdot (C^\star)^{\frac{1}{1-\sigma_J}} \cdot (\Gamma_J^\star)^{\frac{\theta-\sigma_J}{\sigma_J-1}}$$
$$\propto A^{\frac{\sigma_J}{\sigma_J-1}} \cdot (\Gamma_J^\star)^{\frac{\theta-\sigma_J}{\sigma_J-1}} \cdot \mathbf{F}^{\frac{\sigma_J}{1-\sigma_J}} \cdot (C^\star)^{\frac{1}{1-\sigma_J}},$$

where the coefficient of proportionality does not depend on A or $A^\star$.

We derive the foreign shock elasticity of the cutoff:

$$\mathcal{E}^\star(\varphi_J^{\mathcal{X}}) = \frac{\partial \log \varphi_J^{\mathcal{X}}}{\partial \log A^\star} = \frac{\theta - \sigma_J}{\sigma_J - 1} \cdot \mathcal{E}^\star(\Gamma_J^\star) - \frac{1}{\sigma_J - 1} \cdot \left(\sigma_J \mathcal{E}^\star(\mathbf{F}) + \mathcal{E}^\star(C^\star)\right). \tag{A.2}$$

Now the domestic elasticity cutoff:

$$\mathcal{E}(\varphi_J^{\mathcal{X}}) = \frac{\partial \log \varphi_J^{\mathcal{X}}}{\partial \log A} = \frac{\sigma_J}{\sigma_J - 1}\left(1 - \mathcal{E}^\star(\mathbf{F})\right) + \frac{\theta - \sigma_J}{\sigma_J - 1} \cdot \mathcal{E}(\Gamma_J^\star). \tag{A.3}$$

And finally the foreign cutoff:

$$\mathcal{E}^\star(\varphi_J^{\mathcal{X}\star}) = \frac{\partial \log \varphi_J^{\mathcal{X}\star}}{\partial \log A^\star} = -\frac{\sigma_J}{\sigma_J - 1}\left(1 - \mathcal{E}^\star(\mathbf{F})\right) - \frac{\sigma_J - \theta}{\sigma_J - 1} \cdot \mathcal{E}^\star(\Gamma_J) - \frac{1}{\sigma_J - 1}\mathcal{E}^\star(C). \tag{A.4}$$

Given the distribution of cutoff and the definition for the fraction of firms exporting ζ_J we directly write the elasticity:

$$\frac{\partial \log \zeta_J}{\partial \log A} = -\gamma_J \cdot \mathcal{E}(\varphi_J^{\mathcal{X}}) \tag{A.5}$$

Industry Prices — Most of the price effects go through industry prices, that reflect the competitiveness of an industry. Both elasticities to a country's own productivity or to foreign productivity are important here. First we recall the definition of the industry price index in a domestic industry:

$$\Gamma_J = \left(M_J^{1-\kappa_J\sigma_J} p_J(\bar{\varphi}_J)^{1-\sigma_J} + (\zeta_J^\star M_J^\star)^{1-\kappa_J\sigma_J}\left(p_J^{\mathcal{X}\star}(\nu_J \varphi_J^{\mathcal{X}})\right)^{1-\sigma_J}\right)^{\frac{1}{1-\sigma_J}}$$

Now we are able to compute elasticities:

$$\mathcal{E}(\Gamma_J) = \frac{\partial \log \Gamma_J}{\partial \log A} = \frac{M_J^{1-\kappa_J\sigma_J} p_J(\bar{\varphi}_J)^{1-\sigma_J}}{M_J^{1-\kappa_J\sigma_J} p_J(\bar{\varphi}_J)^{1-\sigma_J} + \left(\zeta_J^\star M_J^\star\right)^{1-\kappa_J\sigma_J} p_J^{\mathcal{X}\star}(\varphi_J^{\mathcal{X}\star})^{1-\sigma_J}},$$

which corresponds to the marginal impact of the domestic industry to local industry prices. It is decreasing in import penetration, as the share of domestic goods decrease and domestic firms impact gets diluted.

The elasticity with respect to foreign markets reflect the opposite mechanism:

$$\begin{aligned}
\frac{\partial \log \Gamma_J}{\partial \log A^\star} &= \frac{(\zeta_J^\star M_J^\star)^{1-\kappa_J\sigma_J}\, p_J^{\mathcal{X}\star}(\bar{\varphi}_J^{\mathcal{X}\star})^{1-\sigma_J}}{\Gamma_J^{1-\sigma_J}} \cdot \left[\frac{\partial \log p^{\mathcal{X}\star}}{\partial \log \varphi^{\mathcal{X}\star}} \frac{\partial \log \varphi^{\mathcal{X}\star}}{\partial \log A^\star} + \mathcal{E}^\star(\mathbf{F}) + \frac{1-\kappa_J\sigma_J}{1-\sigma_J} \frac{\partial \log \zeta^\star}{\partial \log A^\star}\right] \\
&= \frac{(\zeta_J^\star M_J^\star)^{1-\kappa_J\sigma_J}\, p_J^{\mathcal{X}\star}(\bar{\varphi}_J^{\mathcal{X}\star})^{1-\sigma_J}}{\Gamma_J^{1-\sigma_J}} \cdot \left[-1 - \mathcal{E}^\star(\varphi^{\mathcal{X}\star}) + \mathcal{E}^\star(\mathbf{F}) + \frac{1-\kappa_J\sigma_J}{1-\sigma_J}\mathcal{E}^\star(\zeta^\star)\right] \\
&= \mathcal{I}_J \cdot \left[-1 - \mathcal{E}^\star(\varphi^{\mathcal{X}\star}) + \gamma \frac{1-\kappa_J\sigma_J}{\sigma_J - 1}\mathcal{E}^\star(\varphi^{\mathcal{X}\star}) + \mathcal{E}^\star(\mathbf{F})\right]
\end{aligned}$$

We are looking for a first order approximation of the elasticity. Hence we ignore the elasticity of exchange rates, that also pushes the price.

$$\mathcal{E}^\star(\Gamma_J) = \frac{\partial \log \Gamma_J}{\partial \log A^\star} =$$
$$\frac{(\zeta_J^\star M_J^\star)^{1-\kappa_J\sigma_J}\, p_J^{\mathcal{X}\star}(\varphi_J^{\mathcal{X}\star})^{1-\sigma_J}}{\Gamma_J^{1-\sigma_J}} \left[-1 + \left(1 - \gamma_J \cdot \frac{1-\kappa_J\sigma_J}{\sigma_J - 1}\right) \cdot \left(-\mathcal{E}^\star(\varphi_J^{\mathcal{X}\star})\right) + \mathcal{E}^\star(\mathbf{F})\right]$$

Finally using the expression for $\mathcal{E}^\star(\varphi_J^{\mathcal{X}\star})$ from Equation (A.3), we have:

$$\mathcal{E}^\star(\Gamma_J) = \mathcal{I}_J \cdot \left[-1 - \left(1 - \gamma_J \cdot \frac{1-\kappa_J\sigma_J}{\sigma_J - 1}\right) \cdot \left(\frac{\sigma_J}{\sigma_J - 1}(1 - \mathcal{E}^\star(\mathbf{F})) - \frac{\sigma_J - \theta}{\sigma_J - 1}\mathcal{E}^\star(\Gamma_J)\right) + \mathcal{E}^\star(\mathbf{F})\right]$$

For analytical convenience we define:

$$\tilde{\kappa}_J = \frac{1}{\sigma_J - 1}\left(\gamma_J \frac{1-\kappa_J\sigma_J}{\sigma_J - 1} - 1\right)$$

Since we assume that $\gamma_J > \sigma_J - 1$, we have in the case of Dixit-Stiglitz CES aggregator where $\kappa_J = 0$, the following convenient expression:

$$\tilde{\kappa}_J = \frac{1}{\sigma_J - 1}\left(\frac{\gamma_J}{\sigma_J - 1} - 1\right) > 0$$

We express the elasticity as a function of import penetration and the exchange rate elasticity:

$$\left(\mathcal{I}_J^{-1} + \tilde{\kappa}_J(\sigma_J - \theta)\right) \cdot \mathcal{E}^\star(\Gamma_J) = (1 + \sigma_J\tilde{\kappa}_J) \cdot (-1 + \mathcal{E}^\star(\mathbf{F})) - \tilde{\kappa}_J \mathcal{E}^\star(C)$$

and finally:

$$\mathcal{E}^\star(\Gamma_J) = \mathcal{I}_J \cdot \frac{1 + \sigma_J\tilde{\kappa}_J}{1 + \mathcal{I}_J\tilde{\kappa}_J(\sigma_J - \theta)} \cdot (-1 + \mathcal{E}^\star(\mathbf{F})) - \mathcal{I}_J \cdot \frac{\tilde{\kappa}_J}{1 + \mathcal{I}_J\tilde{\kappa}_J(\sigma_J - \theta)} \cdot \mathcal{E}^\star(C) \tag{A.6}$$

or in its expanded form:

$$\begin{aligned}\mathcal{E}^\star(\Gamma_J) = \mathcal{I}_J \cdot &\frac{1 - \frac{\sigma_J}{\sigma_J - 1}\left(1 - \frac{\gamma_J}{\sigma_J-1}(1 - \kappa_J\sigma_J)\right)}{1 - \mathcal{I}_J\frac{\sigma_J - \theta}{\sigma_J - 1}(1 - \frac{\gamma_J}{\sigma_J - 1}(1-\kappa_J\sigma_J))} \cdot (-1 + \mathcal{E}^\star(\mathbf{F})) \\ &+ \mathcal{I}_J \frac{\frac{1}{\sigma_J - 1}\left(1 - \gamma_J\frac{1-\kappa_J\sigma_J}{\sigma_J - 1}\right)}{1 - \mathcal{I}_J\frac{\sigma_J - \theta}{\sigma_J - 1}(1 - \frac{\gamma_J}{\sigma_J - 1}(1-\kappa_J\sigma_J))}\mathcal{E}^\star(C)\end{aligned}$$

A.4 Proofs

Our results are proven under the assumption that the non-tradable sector is infinitesimal. It simplifies greatly the exposition by removing a layer of aggregation (there are two already in the tradable sector). Given the Cobb-Douglas specification, this does not affect the result qualitatively, nor does it quantitatively.

A.4.1 Proof of Lemma 3.1

We start with the expression of domestic profits:

$$\pi_J^{\mathcal{D}}(\varphi) = \eta_J \cdot \frac{p_J(\varphi)}{\sigma_J} \cdot \left(\frac{p_J(\varphi)}{\Gamma_J}\right)^{-\sigma_J} \cdot \Gamma_J^{-\theta} \cdot \mathcal{C}$$

Only two elements of domestic profits depend on foreign productivity: industry prices Γ_J and tradable consumption $\mathcal{C}$. So the elasticity follows:

$$\mathcal{E}^\star(\pi_J^{\mathcal{D}}(\varphi)) = \frac{\partial \log \pi_J^{\mathcal{D}}(\varphi)}{\partial \log A^\star} = -(\sigma_J - \theta) \cdot \left(-\frac{\partial \log \Gamma_J}{\partial \log A^\star}\right) + \mathcal{E}^\star(\mathcal{C}).$$

Using Equation (A.6) we expand for the elasticity of industry prices to foreign productivity:

$$\mathcal{E}^\star(\pi_J^{\mathcal{D}}(\varphi)) = \mathcal{I}_J \cdot (\sigma_J - \theta) \cdot \left(-1 + \left(1 + \gamma_J \frac{1 - \kappa_J \sigma_J}{\sigma_J - 1}\right) \cdot \left(-\frac{\partial \log \varphi^{\mathcal{X}\star}}{\partial \log A^\star}\right) + \frac{\partial \log \mathbf{F}}{\partial \log A^\star}\right) + \mathcal{E}^\star(\mathcal{C})$$

which is exactly what we are after. Note that aggregate demand elasticity is defined in Equation (A.1). ∎

A.4.2 Proof of Lemma 3.2

We start with the expression of export profits:

$$\pi_J^{\mathcal{X}}(\varphi) = \frac{\eta_J}{\sigma_J} (\Gamma_J^\star)^{\sigma_J - \theta} \; \mathbf{F} \; C^\star \left[(p_J^{\mathcal{X}}(\varphi))^{1-\sigma_J} - (p_J^{\mathcal{X}}(\varphi^{\mathcal{X}}))^{1-\sigma_J}\right]$$

Elasticity with respect to foreign productivity $A^\star$:

$$\frac{\partial \log \pi_J^{\mathcal{X}}(\varphi)}{\partial \log A^\star} = \sigma_J \mathcal{E}^\star(\mathbf{F}) + \mathcal{E}^\star(C^\star) + (\sigma_J - \theta)\mathcal{E}^\star(\Gamma_J^\star) - (\sigma_J - 1)\left[\left(\frac{\varphi}{\varphi^{\mathcal{X}}}\right) - 1\right]^{-1} \mathcal{E}^\star(\varphi^{\mathcal{X}})$$

We recall, $\ell(\varphi) = \left[\left(\frac{\varphi}{\varphi^{\mathcal{X}}}\right) - 1\right]^{-1}$ and using equation (A.3):

$$\mathcal{E}^\star(\pi_J^{\mathcal{X}}(\varphi)) = (\sigma_J \mathcal{E}^\star(\mathbf{F}) + \mathcal{E}^\star(C^\star) + (\sigma_J - \theta)\mathcal{E}^\star(\Gamma_J^\star)) \cdot (1 + \ell(\varphi)). \quad \blacksquare$$

A.4.3 Proof of Lemma 3.3

First we recall total average profits:

$$\langle \pi_J \rangle = \pi_J^{\mathcal{D}}(\bar{\varphi}_J) + \zeta_J \pi_J^{\mathcal{X}}(\nu_J \varphi_J^{\mathcal{X}})$$

We have solved for the elasticities of $\pi_J^{\mathcal{D}}$ (see Lemma 3.1) and ζ_J (see equation A.5). Now we focus on average export profits:

$$\pi_J^{\mathcal{X}}(\nu_J \varphi_J^{\mathcal{X}}) = \frac{\eta_J}{\sigma_J} \left(p_J^{\mathcal{X}}(\varphi_J^{\mathcal{X}})\right)^{1-\sigma_J} (\Gamma_J^\star)^{\sigma_J - \theta} \; \mathcal{C}^\star \; F \cdot \nu_J^{\sigma_J - 1},$$

such that the elasticity is:

$$\mathcal{E}^\star(\langle\pi_J^{\mathcal{X}}\rangle) = (\sigma_J - \theta)(-\mathcal{E}^\star(\Gamma_J^\star)) + \sigma_J\mathcal{E}^\star(\mathbf{F}) + \mathcal{E}^\star(C^\star) - (\sigma_J - 1)(-\mathcal{E}(\varphi_J^{\mathcal{X}})),$$

where the last term comes from the elasticity of the productivity of the cutoff that determines the average export profit level. And the total effects on average export profits:

$$\begin{aligned}\mathcal{E}^\star(\zeta_J \cdot \langle\pi_J^{\mathcal{X}}\rangle) = & - (\sigma_J - \theta) \cdot (-\mathcal{E}^\star(\Gamma_J^\star)) + (\gamma_J - (\sigma_J - 1)) \cdot (-\mathcal{E}^\star(\varphi_J^{\mathcal{X}})) \\ & + \sigma_J \cdot \mathcal{E}^\star(\mathbf{F}) + \mathcal{E}^\star(C^\star). \quad \blacksquare\end{aligned}$$

A.4.4 Proof of Proposition 3.4

The proposition contains several statements. We prove them in order.

Differences in variable trade costs — First we recall the definition of import penetration as of foreign firms into domestic industry J:

$$\mathcal{I}_J := \frac{(M_J^\star\zeta_J^\star)^{1-\kappa_J\sigma_J} p_J^{\mathcal{X}\star}(\bar{\varphi}_J^{\mathcal{X}\star})}{\Gamma_J^{1-\sigma_J}}$$

Given $\zeta_J^\star$ and $p_J^{\mathcal{X}\star}$ are proportional to $\tau_J^{-\gamma_J}$ and τ_J respectively, then $\partial\mathcal{I}_J/\partial\tau_J < 0$.
The average elasticity of profits can be rewritten as:

$$\begin{aligned}\mathcal{E}^\star(\langle\pi_J\rangle) = & - (\sigma_J - \theta) \cdot \left(\alpha_J^{\mathcal{D}}(-\mathcal{E}^\star(\Gamma_J)) + \alpha_J^{\mathcal{X}}(-\mathcal{E}^\star(\Gamma_J^\star))\right) \\ & + \alpha^{\mathcal{X}} \left[(\gamma_J - (\sigma_J - 1)) \cdot (-\mathcal{E}^\star(\varphi_J^{\mathcal{X}})) + \sigma_J \cdot \mathcal{E}^\star(\mathbf{F}) + \mathcal{E}^\star(C^\star)\right].\end{aligned}$$

where $\alpha^{\mathcal{D}}$ represents the share of profits from the domestic market $\langle\pi^{\mathcal{D}}\rangle/\langle\pi_J\rangle$ and $\alpha^{\mathcal{X}} = 1 - \alpha^{\mathcal{D}}$ is the share of export profits. Substituting for the elasticity of $\varphi^{\mathcal{X}}$ gives:

$$\begin{aligned}\mathcal{E}^\star(\langle\pi_J\rangle) = & - (\sigma_J - \theta) \cdot \left[\alpha_J^{\mathcal{D}}(-\mathcal{E}^\star(\Gamma_J)) + \alpha_J^{\mathcal{X}} \frac{\gamma_J}{\sigma_J - 1}(-\mathcal{E}^\star(\Gamma_J^\star))\right] \\ & + \alpha^{\mathcal{X}} \frac{\gamma_J}{\sigma_J - 1} \cdot (\sigma_J\mathcal{E}^\star(\mathbf{F}) + \mathcal{E}^\star(C^\star)),\end{aligned} \tag{A.7}$$

The first term summarises the negative effect of an increase in competition in the foreign and domestic market while the other terms show the dampening (positive) effect of increase demand and higher exchange rate for the exporting market. The effect of foreign productivity across industries with $\tau_1 > \tau_2$, is ambiguous on average profits. Ignoring the second term (which is positive), we show why this is the case.

The negative competition effects of import penetration are higher for firms with low shipping costs. However lower shipping costs also tilt the average profits towards export profits and reduces the role of import penetration. As changing shipping costs affects the competition channel in two opposing directions, only the relative magnitude of the two forces will characterize the comparative statics exercise. In our calibration we see average profits elasticities do not vary monotonously with shipping costs. Hence we focus on a subset of firms for which a sharp characterization of elasticities with respect to shipping costs is possible.

Specifically we take small firms. In that case, profit elasticity is simply the first part as there is no exporting channel. In that case it suffices to infer from Lemma 3.1, that the elasticity of profit is proportional to import penetration $\mathcal{I}_J$. $\blacksquare$

Differences in demand elasticity — First we recall the expression for average profit elasticity in (A.7). The first term exposes the displacement effect. It is clearly greater for higher level of σ_J. Hence in more demand elastic industries, cash-flow elasticity is higher. ∎

Differences in firm distribution — Given a productivity cutoff $\varphi^{\mathcal{X}}$, the fraction of firms exporting is $\zeta_J \propto (\varphi_J^{\mathcal{X}})^{-\gamma_J}$. For a more dispersed size firm distribution, the fraction of exporters is smaller hence decreasing the impact of the elasticity of export profits on total average profits: lower $\alpha^{\mathcal{X}}$. We reformulate equation (A.7):

$$\begin{aligned}\mathcal{E}^\star(\langle\pi_J\rangle) = &- (\sigma_J - \theta)\cdot\left[\alpha_J^{\mathcal{D}}(-\mathcal{E}^\star(\Gamma_J))\right] \\ &+ \alpha_J^{\mathcal{X}}\frac{\gamma_J}{\sigma_J-1}\left[-(\sigma_J-\theta)\cdot(-\mathcal{E}^\star(\Gamma_J^\star)) + \sigma_J\mathcal{E}^\star(\mathbf{F}) + \mathcal{E}^\star(C^\star)\right],\end{aligned}$$

Since the last part affects compensating profits from exports, we look at the effect of a change in γ_J on that last part. A first order approximation of the effect of a change in γ_J on the elasticity of average profits is given by:

$$\begin{aligned}\partial_{\gamma_J}\mathcal{E}^\star(\langle\pi_J\rangle) &\simeq \left[\alpha^{\mathcal{X}} + \partial_{\gamma_J}\alpha^{\mathcal{X}}\gamma_J\right]\cdot\frac{1}{\sigma_J-1}(\cdots) \\ &\simeq \left[1-\gamma_J\log(\varphi^{\mathcal{X}})\right]\cdot\frac{\alpha^{\mathcal{X}}}{\sigma_J-1}(\cdots)\end{aligned}$$

If $\gamma_J > \log(\varphi^{\mathcal{X}})$ the effect is unambiguously negative: the decrease in the fraction of exporters is not compensated by the the added mass at the extensive margin of export. ∎

A.4.5 Proof of Proposition 3.6

Differences in firm productivity — We assume there is a risk premium as described in Section 2. Second we will assume we observe the risk premium described in Section 4: small firms in low-shipping-cost industries earn a higher risk premium than in high-shipping-costs industries. That risk premium difference is higher than for large firms. Those results are without loss of generality; however they make the proof more constructive.[20]

We note returns on high and low-shipping-costs industries using H and L respectively. Similarly we write returns of small (big) firms using S and B respectively. From Section 2, we have the following results: $\mathbf{E}\{R^L\} > \mathbf{E}\{R^H\}$. We rewrite this inequality as $(\beta^L - \beta^H)\lambda > 0$, where (β^L, β^H) are the covariance of returns with the pricing kernel (betas) and λ is the price of risk. So far we have shown that firms in low-shipping-costs industries have larger cash-flow beta in absolute value than in high-shipping-costs industries: the covariance of their cash-flows with the SDF is higher. This translates into their returns covariance with the SDF being higher, in absolute value: $|\beta_L| > |\beta_H|$ The sign of their betas thus is the same as the price of risk.

Using the cross-section of firms within industries identifies the sign of λ. As small firms have productivity below the export cutoff, they do not export. Their sole exposure to aggregate shocks $A^\star$ goes through displacement of domestic rents. If two industries are such that $\mathcal{I}_1 > \mathcal{I}_2$, due to

[20] Our proof only relies on the results from Section 2, that firms in industries more exposed to trade have higher expected returns, namely that the price of risk is non-zero: $\lambda \neq 0$.

heterogeneous $\tau_1 < \tau_2$ for example, then we have:

$$\frac{\partial |\mathcal{E}^\star(\pi_J^{\mathcal{D}})|}{\partial \mathcal{I}_J} > 0$$

This in turn translates into a difference for realized returns: $\partial_{A^\star} R^{\mathrm{LS}} < \partial_{A^\star} R^{\mathrm{HS}} < 0$. If the price of risk is positive ($A^\star$ is a good shock), then $\partial_{A^\star} C > 0$ and marginal utility falls: $\partial_{A^\star} S < 0$. In that case small firms in low-shipping-cost industries will earn lower risk premium than their high-shipping-costs counterpart. This is due to their lower covariance with the SDF. Empirically we find the opposite to be true, leading us to infer a negative price of risk of $A^\star$ shocks. ∎

Differences in demand elasticity — The argument follows the one above. Let us assume there are two sets of industries are such that $\sigma_h > \sigma_l$. We have shown expected returns across industries with different shipping costs are different: higher shipping costs industries have lower expected returns and lower shipping costs industries. Moreover from Equation (A.7) we infer the following industry difference: the negative elasticity effect of foreign productivity on average domestic profits is amplified by the elasticity of substitution and the positive effects are dampened such that $\partial_\sigma \mathcal{E}^\star(\langle \pi_J \rangle) < 0$. If the price of risk of shocks to $A^\star$ is positive then, a greater elasticity of substitution will dampen risk premium commanded in low shipping costs industries (respective to high shipping costs): $\partial_\sigma \partial_\tau \mathcal{E}^\star(\langle \pi_J \rangle) < 0$. In that case a higher elasticity of substitution amplifies the hedging properties of cash-flows. This leads to lower risk premium across industries based on shipping costs. Observing the direction of the risk premium across these two sets of industries thus determine the sign of the price of risk. ∎

Differences in firm distribution — We start from equation A.7 and the third part of the proof for Proposition 3.4. We show that if γ_J is large enough the ex-ante selection effect is not compensated by entry at the extensive margin. If that is the case as we assume, we show industries with large γ have lower (algebraically) elasticity of exports to foreign productivity. The reasoning used for differences in demand elasticities follow: if we find the differences are more pronounced within high γ industries, then it must be that the price of risk is negative, as γ amplifies the negative effects of trade shocks. ∎

A.5 Summary of the model

Variable		#	Equation
Quantities:			
Aggregate consumption	$C_t, C_t^\star$	2	$\mathcal{C}^{a_0}\mathcal{C}_0^{1-a_0}$
Tradable consumption	$\mathcal{C}_t$	2	$[\sum_J \eta_J^{1/\theta}\mathcal{C}_{\mathcal{J}}^{\frac{\theta-1}{\theta}}]^{\frac{\theta}{\theta-1}}$
Industry consumption	$\mathcal{C}_J$	4	$(\Gamma_J/P)^{-\theta}\mathcal{C}$
Export cutoffs	$\underline{\varphi}_J^X$	4	
Mass of Exporters	ζ_J	4	$1-G(\varphi_J^{\mathcal{X}})$
Prices:			
Wages	w	2	
Exchange rate	$\mathbf{F}$	1	$P^\star/P$
Local goods	$p_J(\varphi)$	4	$\frac{\sigma_J}{\sigma_J-1}\frac{w}{A\varphi}$
Export goods	$p_J^{\mathcal{X}}(\varphi)$	4	$\mathbf{F}^{-1}\tau_J \cdot p_J(\varphi)$
Industry goods	Γ_J	4	$(M_j^{1-\kappa_J\sigma_J}p_j(\bar{\varphi}_J)^{1-\sigma_j}+(\zeta_J^\star M_J^\star)(p_J^{\mathcal{X}\star}(\bar{\varphi}_J^{\mathcal{X}\star}))^{1-\sigma_j})^{1/(1-\sigma_j)}$
Aggregate tradable	P	2	$[\sum_J \eta_J\Gamma_J^{1-\theta}]^{1/(1-\theta)}$
Cash-Flows and Asset Prices:			
Profits	$\pi_J^{\mathcal{D}}(\varphi)$	4	$\frac{1}{\sigma_J}\left(p_J(\varphi)\right)^{1-\sigma_J}\ \Gamma_J^{\sigma_J-\theta}\mathcal{C}$
	$\pi_J^{\mathcal{X}}$	4	$\frac{1}{\sigma_J}\left(p_J^{\mathcal{X}}(\varphi)\right)^{1-\sigma_J}\ (\Gamma_J^\star)^{\sigma_J-\theta}\ \mathcal{C}^\star\ F-\frac{w}{A}f^{\mathcal{X}}$
Valuations	$v_{J,t}(\varphi)$	4	$\beta\mathbf{E}_t S_{t,t+1}(v_{J,t+1}(\varphi)+\pi_{J,t+1}^{\mathcal{D}}(\varphi)+\pi_{J,t+1}^{\mathcal{X}}(\varphi))$

A.6 Calibration

Table A.1
Calibrated parameters

Parameter	Symbol	Value	Source
Preferences (dynamic):			
Discount rate	β	0.971	Bansal-Yaron
Relative risk aversion	ψ	10	Bansal-Yaron
Preferences (variety):			
Elasticity of consumer demand	σ_J	3.74 - 7.36	Broda-Weinstein
Production Technology:			
Labor supply	L	1	
	$L^\star$	12	
Mass of firms in each industry	M_J	1	
	$M_J^\star$	0.2 – 5	
Volatility of production in foreign country	$\sigma_{A^\star}$	8%	
Persistence	$\rho_{A^\star}$	0.9	
Trade:			
Iceberg costs	τ_J	1 - 1.75	

Table A.2
Model moments

Moment	Industry	Model	Data
Import penetration:			
Average	low τ	40%	40%
	high τ	2.5%	2.5%
Elasticity	low τ	0.18	1.1
	high τ	0.013	0.2
Industry profits:			
Elasticity	low τ	-0.33	-3.1
	high τ	-0.02	-1.1
Consumption:			
Std. Dev.		0.09%	1%

B Robustness tables

Table B.3
Distribution of shipping costs across industries

This table presents the average shipping costs in our sample at the 2-digit SIC codes industry level of aggregation. Shipping costs are measured as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports.

2-digit SIC code	Description	Shipping costs
37	Transportation Equipment	0.016
38	Instruments & Related Products	0.018
36	Electronic & Other Electric Equipment	0.021
21	Tobacco Products	0.022
35	Industrial Machinery & Equipment	0.024
28	Chemical & Allied Products	0.028
39	Miscellaneous Manufacturing Industries	0.035
33	Primary Metal Industries	0.036
34	Fabricated Metal Products	0.043
29	Petroleum & Coal Products	0.046
23	Apparel & Other Textile Products	0.046
27	Printing & Publishing	0.050
31	Leather & Leather Products	0.051
22	Textile Mill Product	0.052
26	Paper & Allied Products	0.054
30	Rubber & Miscellaneous Plastics Products	0.057
20	Food & Kindred Products	0.058
24	Lumber & Wood Products	0.070
25	Furniture & Fixtures	0.104
32	Stone, Clay, & Glass Products	0.105

Table B.4
Shipping costs+tariff portfolios - Returns

This table presents monthly excess returns (α) over a three-factor Fama-French model of shipping costs plus tariffs portfolios. Shipping costs are measured at the industry-year level as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports. Tariffs are measured at the industry-year level as the ratio of customs duties to the Free-on-Board value of imports. In any given month, stocks are sorted into five portfolios based on the sum of their industry shipping costs and tariffs in the previous year. We regress a given portfolio's return in excess of the risk free rate on the market portfolio minus the risk-free rate, the size factor (small minus big), and the value factor (high minus low), all obtained from Kenneth French's website. Monthly portfolios returns are either equally-weighted or value-weighted. Standard Errors are estimated using Newey-West with 12 lags. ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. The sample period is from 1974 to 2013.

	Shipping costs+tariff portfolios - Equally weighted					
	Low	2	3	4	High	Hi-Lo
α	0.496**	0.230	0.216	0.005	-0.139	-0.635**
	(0.236)	(0.160)	(0.150)	(0.119)	(0.129)	(0.295)
β^{MKT}	1.056***	1.065***	1.010***	1.097***	1.055***	-0.002
	(0.059)	(0.043)	(0.041)	(0.045)	(0.040)	(0.083)
β^{SMB}	-0.277***	-0.144*	-0.060	0.230***	0.544***	0.821***
	(0.095)	(0.085)	(0.063)	(0.084)	(0.090)	(0.154)
β^{HML}	1.222***	1.263***	1.130***	0.945***	0.770***	-0.452**
	(0.121)	(0.066)	(0.060)	(0.115)	(0.122)	(0.226)

	Shipping cost+tariff portfolios - Value weighted					
	Low	2	3	4	High	Hi-Lo
α	0.215	-0.002	-0.006	0.058	0.049	-0.165
	(0.136)	(0.141)	(0.152)	(0.101)	(0.119)	(0.195)
β^{MKT}	0.918***	1.041***	1.078***	1.025***	0.992***	0.075
	(0.053)	(0.050)	(0.033)	(0.049)	(0.033)	(0.055)
β^{SMB}	-0.202***	-0.433***	-0.262***	-0.125	0.335***	0.537***
	(0.065)	(0.077)	(0.092)	(0.087)	(0.084)	(0.123)
β^{HML}	-0.107	0.187***	0.290***	0.087	-0.014	0.093
	(0.075)	(0.055)	(0.066)	(0.075)	(0.061)	(0.128)

Table B.5
Shipping costs and weight-to-value portfolios - Returns, conditional on size and profitability

This table presents value-weighted monthly excess returns (α) over a three-factor Fama-French model of either shipping costs portfolios (Columns 1 to 6) or weight-to-value portfolios (Columns 7 to 12). Shipping costs are measured at the industry-year level as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports. Weight-to-value is measured at the industry-year level as the ratio of the weight in kilograms over the Free-On-Board value of imports. In any given month, stocks are independently sorted into five portfolios based on either their industry shipping costs or weight-to-value ratio in the previous year, and into three portfolios based on either their market capitalization (Size) in the previous month or based on their return on assets (ROA) in year t-2. Stocks at the intersection of the two sorts are grouped together to form portfolios based on shipping costs and either Size or ROA (Columns 1 to 6), and based on weight-to-value and either Size or ROA (Columns 7 to 12). We then regress a given portfolio's value-weighted return in excess of the risk free rate on the market portfolio minus the risk-free rate, the size factor (small minus big), and the value factor (high minus low), all obtained from Kenneth French's website. Standard errors are estimated using Newey-West with 12 lags. ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. The sample period is 1974-2013 in Columns 1 to 6, and 1989-2013 in Columns 7 to 12.

	Shipping cost portfolios (VW)						Weight-to-value portfolios (VW)					
	Low	2	3	4	High	Hi-Lo	Low	2	3	4	High	Hi-Lo
	Size terciles						Size terciles					
T1	0.898***	0.066	-0.147	-0.123	-0.369*	-1.267***	1.101**	0.260	0.183	-0.004	-0.308	-1.409***
	(0.319)	(0.247)	(0.212)	(0.180)	(0.193)	(0.340)	(0.494)	(0.331)	(0.313)	(0.247)	(0.282)	(0.516)
T2	0.368	-0.180	-0.115	-0.200	-0.436***	-0.804**	0.331	0.239	-0.051	-0.350**	-0.455**	-0.786
	(0.244)	(0.223)	(0.145)	(0.135)	(0.124)	(0.317)	(0.385)	(0.330)	(0.206)	(0.135)	(0.189)	(0.487)
T3	0.353***	0.030	-0.170	-0.022	0.139	-0.214	0.447**	0.388*	-0.124	-0.064	0.109	-0.338
	(0.130)	(0.131)	(0.170)	(0.116)	(0.121)	(0.173)	(0.177)	(0.216)	(0.166)	(0.139)	(0.118)	(0.239)
	ROA terciles						ROA terciles					
T1	0.448**	-0.388	-0.081	-0.022	-0.742**	-1.190***	0.343	-0.277	0.193	-0.928**	-0.438	-0.781*
	(0.227)	(0.263)	(0.334)	(0.267)	(0.291)	(0.335)	(0.319)	(0.406)	(0.469)	(0.370)	(0.403)	(0.410)
T2	0.445**	-0.269	-0.288*	-0.187	0.028	-0.417	0.637**	0.271	-0.197	-0.480**	-0.018	-0.655*
	(0.203)	(0.168)	(0.165)	(0.188)	(0.134)	(0.254)	(0.277)	(0.269)	(0.281)	(0.206)	(0.184)	(0.347)
T3	0.327**	0.219	-0.022	0.051	0.282*	-0.045	0.415**	0.486*	0.010	0.209	0.050	-0.365
	(0.159)	(0.173)	(0.190)	(0.122)	(0.153)	(0.205)	(0.190)	(0.260)	(0.182)	(0.183)	(0.145)	(0.274)

Table B.6
Shipping costs+tariff portfolios - Returns, conditional on cross-sectional characteristics

This table presents monthly excess returns (α) over a three-factor Fama-French model of either shipping costs plus tariffs portfolios. Shipping costs are measured at the industry-year level as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports. Tariffs are measured at the industry-year level as the ratio of customs duties to the Free-on-Board value of imports. In any given month, stocks are independently sorted into five portfolios based on the sum of their industry shipping costs plus industry tariffs in the previous year, and into three portfolios based on either their market capitalization (Size) in the previous month or based on their return on assets (ROA) in year t-2. Stocks at the intersection of the two sorts are grouped together to form portfolios based on shipping costs plus tariffs and either Size or ROA. We regress a given portfolio's return in excess of the risk free rate on the market portfolio minus the risk-free rate, the size factor (small minus big), and the value factor (high minus low), all obtained from Kenneth French's website. Monthly portfolios returns are either equally-weighted (Columns 1 to 6) or value-weighted (Columns 7 to 12). Standard Errors are estimated using Newey-West with 12 lags. ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. The sample period is from 1974 to 2013.

	Shipping cost+tariff portfolios											
	Equally weighted						Value weighted					
	Low	2	3	4	High	Hi-Lo	Low	2	3	4	High	Hi-Lo
	Size terciles						Size terciles					
T1	1.108***	0.942***	0.575**	0.362*	0.186	-0.923***	0.657**	0.258	-0.023	-0.191	-0.285	-0.942***
	(0.352)	(0.270)	(0.248)	(0.211)	(0.217)	(0.350)	(0.333)	(0.218)	(0.224)	(0.178)	(0.194)	(0.349)
T2	0.247	-0.119	-0.000	-0.264**	-0.430***	-0.678**	0.264	-0.065	-0.036	-0.285**	-0.408***	-0.672**
	(0.249)	(0.178)	(0.150)	(0.129)	(0.142)	(0.332)	(0.246)	(0.186)	(0.148)	(0.131)	(0.142)	(0.329)
T3	0.386*	-0.210*	-0.006	-0.068	-0.133	-0.519*	0.222	0.004	0.002	0.068	0.065	-0.156
	(0.207)	(0.123)	(0.119)	(0.107)	(0.119)	(0.274)	(0.137)	(0.147)	(0.156)	(0.105)	(0.122)	(0.195)
	ROA terciles						ROA terciles					
T1	0.541*	0.392	0.361	0.014	-0.153	-0.695**	0.360	-0.442	0.234	-0.432	-0.695**	-1.055***
	(0.309)	(0.260)	(0.256)	(0.222)	(0.217)	(0.349)	(0.253)	(0.283)	(0.246)	(0.345)	(0.276)	(0.329)
T2	0.680***	0.302**	0.188	0.099	-0.082	-0.762***	0.249	-0.200	-0.117	-0.088	0.031	-0.218
	(0.192)	(0.131)	(0.151)	(0.125)	(0.141)	(0.277)	(0.200)	(0.190)	(0.176)	(0.187)	(0.131)	(0.261)
T3	0.454***	0.245**	0.301**	0.079	-0.045	-0.499**	0.244	0.147	0.099	0.129	0.121	-0.123
	(0.158)	(0.107)	(0.139)	(0.115)	(0.121)	(0.212)	(0.161)	(0.176)	(0.167)	(0.125)	(0.154)	(0.224)

Table B.7
Shipping costs and weight-to-value portfolios - Returns, conditional on US trade elasticities (σ)

This table presents value-weighted monthly excess returns (α) over a three-factor Fama-French model of either shipping costs portfolios (Columns 1 to 6) or weight-to-value portfolios (Columns 7 to 12). Shipping costs are measured at the industry-year level as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports. Weight-to-value is measured at the industry-year level as the ratio of the weight in kilograms over the Free-On-Board value of imports. In any given month, stocks are independently sorted into five portfolios based on either their industry shipping costs or weight-to-value ratio in the previous year, and into two portfolios based on their industry US trade elasticities (σ). US trade elasticities are estimated by Broda and Weinstein (2006) from 1990 to 2001 at the commodity level, and aggregated at the four-digit SIC based on total imports over 1990-2001. Stocks at the intersection of the two sorts are grouped together to form portfolios based on either shipping costs (Columns 1 to 6), or weight-to-value (Columns 7 to 12) and US trade elasticities. We then regress a given portfolio's value-weighted return in excess of the risk free rate on the market portfolio minus the risk-free rate, the size factor (small minus big), and the value factor (high minus low), all obtained from Kenneth French's website. Standard errors are estimated using Newey-West with 12 lags. ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. The sample period is 1974-2013 in Columns 1 to 6, and 1989-2013 in Columns 7 to 12.

	Shipping cost portfolios (VW)						Weight-to-value portfolios (VW)					
	Low	2	3	4	High	Hi-Lo	Low	2	3	4	High	Hi-Lo
Low σ industries	0.400	-0.094	-0.147	-0.164	-0.027	-0.427	0.622**	0.101	-0.095	-0.151	-0.156	-0.778
	(0.264)	(0.156)	(0.148)	(0.129)	(0.185)	(0.382)	(0.314)	(0.261)	(0.176)	(0.163)	(0.244)	(0.485)
High σ industries	0.322**	0.120	-0.221	0.026	0.107	-0.215	0.406**	0.506**	-0.205	-0.022	0.113	-0.293
	(0.148)	(0.136)	(0.235)	(0.147)	(0.132)	(0.177)	(0.189)	(0.238)	(0.279)	(0.162)	(0.118)	(0.239)

Table B.8
Shipping cost and and weight-to-value portfolios - Returns, conditional on Pareto parameter (γ)

This table presents value-weighted monthly excess returns (α) over a three-factor Fama-French model of either shipping costs portfolios (Columns 1 to 6) or weight-to-value portfolios (Columns 7 to 12). Shipping costs are measured at the industry-year level as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports. Weight-to-value is measured at the industry-year level as the ratio of the weight in kilograms over the Free-On-Board value of imports. In any given month, stocks are independently sorted into five portfolios based on either their industry shipping costs or weight-to-value ratio in the previous year, and into two portfolios based on their industry Pareto tail parameter (γ) in the previous year. We estimate the Pareto parameter separately for each industry-year as the estimated coefficient γ of the following OLS regression: $ln(SIZE) = -\gamma ln(Rank) + constant$, where for each year and 4-digit industries, firms are ranked in descending order according to their total firm market value (Compustat item CSHO $\times$ PRCC_F+AT-CEQ). Stocks at the intersection of the two sorts are grouped together to form portfolios based on either shipping costs (Columns 1 to 6), or weight-to-value (Columns 7 to 12) and the Pareto tail parameter. We then regress a given portfolio's return in excess of the risk free rate on the market portfolio minus the risk-free rate, the size factor (small minus big), and the value factor (high minus low), all obtained from Kenneth French's website. Standard errors are estimated using Newey-West with 12 lags. ***, **, and * indicate significance at the 1, 5, and 10% level, respectively. The sample period is 1974-2013 in Columns 1 to 6, and 1989-2013 in Columns 7 to 12.

	Shipping cost portfolios (VW)						Weight-to-value portfolios (VW)					
	Low	2	3	4	High	Hi-Lo	Low	2	3	4	High	Hi-Lo
Low γ industries	0.330**	-0.104	-0.119	-0.000	0.243*	-0.087	0.413**	0.267	-0.128	0.072	0.181	-0.231
	(0.129)	(0.168)	(0.213)	(0.130)	(0.124)	(0.162)	(0.191)	(0.291)	(0.214)	(0.145)	(0.119)	(0.237)
High γ industries	0.639**	0.110	-0.282*	-0.235	-0.194	-0.834**	0.682*	0.259	-0.038	-0.412**	-0.183	-0.865**
	(0.313)	(0.138)	(0.147)	(0.144)	(0.150)	(0.388)	(0.370)	(0.215)	(0.227)	(0.188)	(0.161)	(0.406)

Table B.9
Tariff changes, shipping costs and trade flows

This table presents the result of panel regressions assessing the effect of tariff cuts on trade flows, conditional on the level of shipping costs (SC). SC are measured at the industry-year level as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports. High (low) SC industries are those in the top (bottom) quintile of the distribution of SC in any given year. Tariffs are measured at the industry-year level as the ratio of customs duties to the Free-on-Board value of imports. Imports, Exports and Net Imports are measured at the industry-year level and normalized by the sum of total shipments and imports. Tariff change is the difference in tariffs with respect to the previous year. Large tariff change is a variable equal to the tariff change if it is larger than twice the median absolute tariff change in the sample, and zero otherwise. All regressions include controls for the industry level of tariffs, level of import penetration, log employment, log value added and log shipments. Standard errors are clustered at the industry level and reported in parentheses. *, ** and *** means statistically different from zero at 10%, 5% and 1% level of significance. The sample period is from 1974 to 2006.

	Delta (t+1, t+5)			
	Imports	Net imports (Imp-Exp)	Imports	Net imports (Imp-Exp)
Tariff change (t) x High SC	0.113	0.033		
	(0.144)	(0.162)		
Tariff change (t) x Low SC	-0.664***	-0.487**		
	(0.162)	(0.233)		
Large tariff change (t) x High SC			0.110	0.044
			(0.144)	(0.163)
Large tariff change (t) x Low SC			-0.658***	-0.469**
			(0.162)	(0.237)
High SC	0.003	-0.011	0.003	-0.011
	(0.018)	(0.023)	(0.018)	(0.023)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	3951	3951	3951	3951
R^2	0.384	0.292	0.384	0.292
Difference High vs Low SC	0.777***	0.520**	0.768***	0.513**
	(0.188)	(0.245)	(0.189)	(0.248)

Table B.10
Tariff changes, shipping costs and industry cash-flows

This table presents the result of panel regressions assessing the effect of tariff cuts on various sectoral outcomes, conditional on the level of shipping costs (SC). SC are measured at the industry-year level as the % difference of the Cost-Insurance-Freight value with the Free-on-Board value of imports. High (low) SC industries are those in the top (bottom) quintile of the distribution of SC in any given year. Tariffs are measured at the industry-year level as the ratio of customs duties to the Free-on-Board value of imports. Import penetration is measured at the industry-year level as the ratio of the Free-on-Board value of imports and the sum of total shipments and imports. Tariff change is the difference in tariffs with respect to the previous year. Large tariff change is a variable equal to the tariff change if it is larger than twice the median absolute tariff change in the sample, and zero otherwise. All regressions include control for the industry level of tariffs, level of import penetration, log employment, log value added and log shipments. Standard errors are clustered at the industry level and reported in parentheses. *, ** and *** means statistically different from zero at 10%, 5% and 1% level of significance. The sample period is from 1974 to 2006.

	Delta (t+1, t+5)					
	Log employment	Log shipments	Log value added	Log employment	Log shipments	Log value added
Tariff change (t) x High SC	-0.174	-0.052	0.485			
	(0.623)	(0.502)	(0.890)			
Tariff change (t) x Low SC	1.328***	2.629***	3.302***			
	(0.372)	(0.666)	(0.694)			
Large tariff change (t) x High SC				-0.142	-0.027	0.532
				(0.619)	(0.502)	(0.884)
Large tariff change (t) x Low SC				1.327***	2.644***	3.293***
				(0.374)	(0.669)	(0.703)
High SC	-0.003	0.018	-0.041	-0.003	0.018	-0.040
	(0.037)	(0.036)	(0.057)	(0.037)	(0.036)	(0.057)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3951	3951	3951	3951	3951	3951
R^2	0.517	0.503	0.444	0.517	0.503	0.444
Difference High vs Low SC	-1.502**	-2.681***	-2.817***	-1.469**	-2.672***	-2.761***
	(0.729)	(0.698)	(0.961)	(0.725)	(0.697)	(0.961)