Discussion Paper Series – CRC TR 224

Discussion Paper No. 141
Project B 06

Human Capitalists, Reallocation and the Global Division of Labor

Jan Schymik*

July 2020
(First version: January 2020)

*Department of Economics, University of Mannheim, D-68161 Mannheim, jschymik@mail.uni-mannheim.de

Funding by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) through CRC TR 224 is gratefully acknowledged.

Human Capitalists, Reallocation and the Global Division of Labor

Jan Schymik
University of Mannheim

July 2020

Abstract

The rise of top inequality in the United States and many other countries in recent decades is well documented but its causes remain controversial. Using data on equity ownership and income streams of corporate top earners in the U.S. and the U.K., this paper assesses the role of reallocation towards "superstar firms" for top earners. If economic activity is reallocated toward the largest firms in the economy, this affects equity prices, top earners' marginal product and their incentives. Exploiting the global rise of trade in intermediate inputs as a source for economic reallocation, I assess three predictions of this hypothesis: *(i)* equity prices increase more for superstar firms, *(ii)* the value of equity ownership and labor incomes of top earners in superstar firms increase, *(iii)* equity ownership responds more elastically than labor incomes which changes the compensation structure of top earners. The results suggest that focusing on the income skill premium fundamentally underestimates the returns to globalization for top earners. Furthermore, the reallocation-channel rationalizes the prevalence of capital incomes vis-à-vis labor incomes for top earners.

Keywords: Top Inequality, Offshoring, Equity Ownership
JEL classification: F14, F16, J33, L22

Department of Economics, University of Mannheim, D-68161 Mannheim. *Email contact:* jschymik@mail.uni-mannheim.de.
I am extremely grateful to Paola Conconi, Carsten Eckel, Florian Englmaier, Harald Fadinger, Maria Guadalupe, Rocco Macchiavello, Kalina Manova, Dalia Marin, Raffaella Sadun, Alexander Tarasov, and formal discussants Agnes Bäker and Lei Li for helpful comments and suggestions. I also wish to thank participants at the FIW International Economics Conference Vienna, CRC TR 224 Conference Montabaur, Committee for Organizational Economics Meeting of the Verein für Socialpolitik (HU Berlin), European Trade Study Group Bern, CRC TR 224 conference on Trade Policy and Firm Performance in the Global Economy (Bad Homburg), SIOE Stockholm, GEABA Frankfurt, Midwest International Trade Meetings (SMU Dallas) as well as seminar participants at Mannheim, Goethe University Frankfurt, Higher School of Economics St. Petersburg, LMU Munich (IO&Trade), TU Munich (Finance), Duisburg-Essen and IfW Kiel for their valuable comments. Funding by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) through CRC TR 224 (Project B06) is gratefully acknowledged.

1 Introduction

Many industrialized economies have witnessed sharp increases in labor and capital incomes at the top of the income distribution over previous decades.[1] Compared to salaried employees, a particular feature in the compensation of corporate top earners is that they often receive significant equity-based compensation such that a substantial part of their earnings stems from capital ownership instead of labor incomes. This distinguishes those "human capitalists" from a pure labor input and makes them partial firm owners in their employing firms.[2] Alongside these changes on the labor market for top earners, an overall rise in average profits and concentration at the top of the firm-size distribution has been documented. One candidate explanation for this development is globalization.[3] In particular, industrialized economies have experienced an increasing fragmentation of production across national borders that has been driven by economic or political reforms, improvements in infrastructure or IT. While some tasks at the core of a firm's business such as management activities are typically undertaken within local headquarters, the production of various inputs is nowadays frequently moved offshore to exploit differences in factor prices leading to productivity gains within importing firms.[4] Using the global rise of trade in intermediate inputs as a source of economic reallocation towards large, import intensive firms, this paper studies how corporate top earners are affected by reallocation.

To guide the empirical analysis I present a model that links intra-industry reallocation to changing variation in top earners' compensation contracts across firms. The model combines firm heterogeneity à la Melitz (2003) and introduces a stylized moral hazard problem that yields a tractable micro-foundation for incentive contracts. Adding incentive contracting into a heterogeneous-firms model endogenizes the compensation structure into labor incomes and capital ownership. Agents are heterogeneous in their knowledge and have multiplicative preferences for consumption and leisure. This preference for leisure is increasing in compensation levels such that top earners are compensated with more equity ownership to be sufficiently incentivized. I borrow from Edmans et al. (2009) in modeling moral hazard and incentive contracting. In equilibrium, the sum of expected equity value and labor income that a manager obtains is determined by clearing product and labor markets and the prevalence of equity ownership increases in firm size due to the positive assignment of managers to firms. Additionally, whenever equity is paid in the form of options, growing firms might want to grant more equity ownership since a larger underlying firm value ceteris paribus reduces the elasticity of the equity value and thus reduces the strength of incentives. I then show that a reallocation of economic activity towards larger, importing firms alters the compensation structure of top earners. It shifts compensation towards more equity ownership and a lower fraction of labor income within large and

[1] Among others, Atkinson et al. (2011) and Alvaredo et al. (2013) document rising top income shares in Anglo-Saxon economies over the last thirty years.

[2] Eisfeldt et al. (2019) and Smith et al. (2019) provide evidence for the importance of equity ownership for human capital in the U.S. Piketty and Saez (2003) report a declining share of labor incomes and an increasing share of capital incomes as one moves up within the top decile and the top percentile of the income distribution.

[3] See Autor et al. (2019), De Loecker et al. (2020) and Akcigit and Ates (2019) among others.

[4] See Baldwin (2016), Baldwin and Lopez-Gonzalez (2015), Hummels et al. (2001), Johnson and Noguera (2012) or Timmer et al. (2014) among others for evidence on the increasing international fragmentation of production.

importing firms such that the prevalence of equity ownership within the largest firms increases. Calibrating the model suggests that importing inputs from abroad has substantial effects on top earners' compensation structure: the majority of adjustments to reallocation is in changing values of equity ownership and not in changing labor incomes. On average, the value of equity ownership adjusts about twice as elastic compared to labor incomes. Consequently, the income skill premium underestimates the effects of trade on top inequality as it ignores changing values of equity ownership.

Theoretically, any source of intra-industry reallocation causes similar effects on equity ownership. In the empirical analyses, I focus on trade in intermediate inputs for mainly three reasons. First, according to input-output data the majority of U.S. and U.K. imports is trade in intermediates for the period that my dataset covers (2000-2014). Second, during the sample period there has been faster growth in intermediates trade than in final goods trade. Lastly, focusing on trade in inputs allows me to construct shift-share instruments based on the industries' input-output structure which helps identification. These instruments rely on developments in input industries and thus do not rely solely on variation of fundamentals in the output industries themselves.

I comprise a panel dataset on managers in U.S. and U.K. firms over the period between 2000 and 2014. The data is a matched employer-employee panel that follows the careers of more than 40,000 distinct managers employed by over 4,000 corporations. It contains information on the level of various components of incomes and an annual measure of a manager's ownership of equity linked to the employing firm's stock price. This measure of equity ownership tracks and prices the value of equity that managers own in their employing firm such as stocks, stock options or retirement plan contributions. The sample firms are listed in the major U.S. and U.K. stock indices. Overall, sample firms cover 82% of the U.S. and 57% of the U.K. total market capitalization and own 49% of the economy-wide corporate assets in the U.S. and 74% of corporate assets in the U.K. The median managerial income level is more than 900 thousand $ and the median value of equity ownership equals about 3 million $. More than 80% of the managers in the sample are within the top 1% of their respective country income distribution and more than one third is within the top 0.1% of the income distribution. For more than 60% of the U.S. managers in the sample their value of equity ownership is sufficient to belong to the top 1% of the wealth distribution and for more than one fourth of the managers it is even enough to belong to the top 0.1%.[5] Equity ownership is substantial across firms, both in the U.S. and in the U.K. On average managers have an equity ownership quota (the value of equity ownership normalized by the sum of equity ownership and labor incomes) of 68% in the U.S. and 62% in the U.K. In line with the model, equity ownership is more prevalent in larger firms. While labor incomes and the value of equity ownership both increase with firm size in the cross section, the increase in equity dominates the income increase. Equity ownership also tends to be higher in importing or multinational firms and in industries that are larger, more productive or characterized by more offshorable occupations.

To empirically study how the access to global input markets affects top earners' compensation structures, I combine the manager sample with international input-output tables from WIOD. Variation

[5] These calculations are based on data from the World Income Database and the year 2006. Since there are no aggregate wealth data in the WID for the U.K., the wealth calculations are for U.S. managers, only.

in within-sector import shares over time allows me to analyze the effects on equity ownership. To address endogeneity concerns caused by unobserved demand or productivity shocks, I follow a shift-share instrumentation strategy based on two instrumental variables. First, I construct a measure of input level trade costs. WIOD provides a time-varying measure of trade and transport margins based on the price wedge between c.i.f. and f.o.b. prices that I weight according to initial input-output coefficients. Second, I follow Hummels et al. (2014) and instrument the imports of foreign inputs with the total trade in inputs in the rest of the world again weighted by initial input-output coefficients, to proxy for variation in global input supply.

According to the model, improved access to input markets causes economies of scale at the firm level and ultimately leads to reallocation of economic activity across firms.[6] Using the shift-share instruments to identify the effects of input imports, I first document that an industry-level rise in input imports is associated with an appreciation of firms' equity prices, in particular for relatively large firms, both in terms of output and employment.[7]

I then investigate the role of the reallocation-channel for corporate top earners. I find heterogeneous effects on equity ownership and labor incomes across firm size quantiles with strongest effects on equity ownership in the upper quintile of the firm-size distribution. This finding complements Song et al. (2019) who document that substantial parts of the rise in U.S. income inequality occurred across firms due to a widening gap of firms' employee composition. They suggest that outsourcing parts of the production process might be a relevant driver of that development. Using information on the firms' establishment-level importing status from Dun&Bradstreet WorldBase data, I document that this rise in the value of equity ownership is concentrated on top earners employed by importing firms.

While both, equity ownership and labor incomes increase at the top of the firm-size distribution, I find the adjustment of equity ownership to be substantially more elastic. In accordance with the calibrated model, equity ownership is about twice elastic to globalization compared to labor incomes. The reallocation-channel thus shifts the compensation of top earners towards capital incomes and away from labor incomes, as Piketty and Saez (2003) have documented. Furthermore, skill premia based on incomes fundamentally underestimate returns to globalization for top earners once equity ownership gets more prevalent. This rising prevalence of equity ownership is driven by both, an appreciation of equity prices and firms issuing new equity to top earners.

When I relate top earners' equity ownership to aggregate labor expenses within each firm, I find evidence that input imports also shift the distribution of rents within firms. While input imports increase labor expenses relative to top earners' equity ownership in smaller firms, the opposite is true in larger firms. This coincides with empirical evidence that links the fall of aggregate labor shares to the growth of superstar firms (Autor et al. 2019) and reallocation in labor income shares across skill groups (Dao et al. 2017). Since corporate top earners are not just receivers of labor income but

[6] This intra-industry reallocation is also present in other models of offshoring and firm heterogeneity such as Antràs et al. (2006) or Carluccio et al. (2019).

[7] This finding complements Breinlich (2014) who documents heterogeneous stock-price responses in an event study around the Canada–U.S. FTA of 1989 in accordance with expected intra-industry reallocation of economic activity.

also capital owners they are not as adversely affected by the decline in the aggregate labor share. This point is also made by Eisfeldt et al. (2019) but not in the context of intra-industry reallocation. They calculate that including equity that accrues to high-skilled labor reduces the total decline in the aggregate U.S. labor share since the 1980s by more than 60%.

The paper covers a question at the intersection between international, organizational and labor economics and thus relates to different literature strands. First, the paper relates to empirical studies on top income inequality and executive compensation. Piketty and Saez (2003), Atkinson et al. (2011) and Alvaredo et al. (2013) document a general trend of increasing top 1% income shares for Anglo-Saxon countries and other economies since the 1980s or even earlier with the exception of the Great Recession period (see Piketty and Saez 2013). Bakija et al. (2008) report that top managers roughly account for one third of the top 1% in the U.S. income distribution based on income tax return data such that their incomes comprise a relevant fraction of top income inequality in general. Talent assignment models by Gabaix and Landier (2008), Edmans et al. (2009), Falato and Kadyrzhanova (2012), Baranchuk et al. (2011) and Terviö (2008) study the relation between CEO pay and product market size. Since these models either consider an exogenous firm mass or an exogenous demand side, they deliver only limited information about responses of the compensation structure to shocks in the economic environment. By introducing the assignment and a principal-agent problem into an industry equilibrium framework, my model makes testable predictions how the cross-section of compensation contracts responds to reallocation.

Cuñat and Guadalupe (2009), Keller and Olney (2017) and Ma and Ruzic (2019) study how compensation of U.S. corporate executives is shaped by trade integration. As these studies do not consider the value of equity portfolios they focus on trade-induced income changes. In contrast, this paper primarily studies the effects of globalization on equity ownership and argues that increases in equity ownership often quantitatively dominate the income changes. Monte (2011) and Sampson (2014) develop general equilibrium assignment models with firm heterogeneity to explain the role of trade on the dispersion of incomes across firms. My theoretical framework extends their approaches by including incentive contracts to endogenize equity ownership. Pupato (2017) develops a model of performance pay and trade to study the impact of trade liberalization on inequality between homogeneous workers. While changes in incentive contracts in his model are caused by firms endogenously adjusting desired effort levels, in my model firms adjust incentive contracts in response to agents' changing opportunity costs of effort.

The paper also relates to studies that explore the role of input trade for various labor market outcomes. Grossman and Rossi-Hansberg (2008) propose a theory of global production and investigate how falling offshoring costs affect factor prices. They show that one might expect a widening wage gap between managers and production workers if production jobs are also the most offshorable ones.[8] Feenstra and Hanson (1999) report that trade in inputs explains around 40% of the wage gap between high and low skilled U.S. workers between 1979 and 1990. Becker et al. (2013) find that offshoring shifted the wage

[8] To the extent that offshoring is associated with reductions in consumer prices, production workers may still benefit from increases in real wages.

bill towards more non-routine and more interactive tasks in German firms. Furthermore, Hummels et al. (2014) and Baumgarten et al. (2013) report varying wage effects of offshoring across occupational task characteristics for Denmark, respectively Germany. Offshoring has the largest positive wage effect on occupations that are intensive in communication and language, followed by social sciences and maths. Notably, all these skills are categorical for managerial occupations.

A separate literature has examined how trade affects the organization of firm management. Previous papers have studied different margins of organizational adjustment to changing trade expose such as hierarchical layers (Caliendo and Rossi-Hansberg 2012, Antràs et al. 2006, 2008), management practices (Bloom et al. 2019, Chen 2019), corporate governance (Schymik 2018) and decision autonomy (Marin et al. 2018).

The remainder of the paper is organized as follows. In the next section, I present the theoretical framework and calibrate it to U.S. and U.K. data. In Section 3, I present the data and empirical analyses. Section 4 concludes.

2 A Model of Human Capitalists and Superstar Firms

This section presents a quantifiable model that relates intra-industry reallocation of economic activity to changes in equity ownership. It combines an assignment approach like in Monte (2011) or Sampson (2014) with incentive contracting for managerial agents like in Edmans et al. (2009). Larger firms employ more knowledgeable managers with higher levels of equilibrium compensation. Richer agents have larger opportunity costs of effort such that they require more equity ownership. This rationalizes heterogeneous income and equity ownership effects across firms caused by intra-industry reallocation. I begin by discussing preferences and endowments, production and how input sourcing triggers intra-industry reallocation of market shares towards larger firms. I then introduce the microfoundation for incentive contracts within firms and discuss comparative statics of input trade globalization. For a more detailed outline, I refer to Appendix A.

Preferences and Endowments: An industrialized economy accommodates a set of industries I and is endowed with a mass of agents $\sum_I N_i$ and blueprints $\sum_I Q_i$. Agents are heterogeneous in their knowledge and blueprints are heterogeneous in their efficiencies. Knowledge and blueprints are industry-specific such that the mass of potential blueprints for industry $i \in I$ is Q_i and the mass of potential managers for that industry is N_i. The efficiency of blueprints is denoted by $q \in (0, \infty)$ such that $Q_i(q) = Q_i/q$ is the measure of blueprints that are at least as good as the blueprint with efficiency q. Furthermore, agents differ in their knowledge $k \in [1, \infty)$ such that $N_i(k) = N_i/k$ is the measure of agents with knowledge level k or higher. Agents that do not choose management occupations can take up production employment which is independent from knowledge and not sector-specific. Agents' preferences are characterized by a multiplicative utility function over consumption and leisure:

$$U = C\cdot G, \qquad C = \prod_{i=1}^{I} \left[\left(\int_{\omega} q_{\omega}^{\frac{\sigma-1}{\sigma}} d\omega \right)^{\frac{\sigma}{\sigma-1}} \right]^{\beta_i}, \tag{1}$$

where C denotes utility arising from consuming varieties across industries and G denotes utility gains from leisure. Consumption utility C aggregates consumption amounts q_ω across sectors and varieties. Sectoral expenditure shares β_i add up to one and σ is the constant elasticity of substitution across varieties. The indirect utility associated with (1) is $W(k) = r_i(k)P^{-1}\cdot G$, where $r_i(k)P^{-1} = E[w_i(k)]P^{-1}$ is the *expected* real compensation of an agent with knowledge k employed in industry i. Note that the *realized* compensation $w_i(k)$ might differ from the expected compensation $r_i(k)$ since agents in management occupations will be partially compensated with firm ownership that underlies fluctuating market value.

Production and Firm Entry: Within each industry, firms originate from the matching of a manager to a blueprint and firms operate on a monopolistically competitive product market. Firms face a demand per variety equal to $A_i p^{-\sigma}$, where the term $A_i = X_i P_i^{\sigma-1}$ is an aggregate demand shifter that captures the market size from the perspective of individual firms in the industry. Similar to Chaney (2008), the mass of blueprints comprises the mass of potential entrants into the industry.[9] The productivity of each firm is determined by the blueprint-manager match quality and the firm's importing status. There are complementarities between managerial knowledge k and blueprint efficiency q such that more knowledgeable managers have a comparative advantage in running firms with higher efficiency. Furthermore, importing inputs increases firm productivity by $Z_{iS} \geq 1$. To sum up, the unit costs of production for a firm with a blueprint q and a manager with knowledge k are given as follows:

$$\varphi(k,q) = \begin{cases} \frac{w}{Z_{iS}k^{\mu_i}q^{\kappa_i}} & \text{if importer} \\ \frac{w}{k^{\mu_i}q^{\kappa_i}} & \text{if domestic,} \end{cases} \tag{2}$$

where the labor wage rate w is used as the numéraire in what follows. Parameters $\mu_i > 0$ and $\kappa_i > 0$ measure the influence of knowledge and blueprints for firm productivity. The marginal firm employs the marginal manager with knowledge level $\underline{k}_i$. This firm will just break even and the marginal manager will receive an expected compensation equal to the numéraire wage. Assuming that not all firms are importers the indifference condition for the marginal firm can be stated as follows:

$$\frac{1}{\sigma}\left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} A_i \left(\left(\frac{Q_i}{N_i}\right)^{\kappa} \underline{k}_i^{\kappa_i+\mu_i} \right)^{\sigma-1} = 1. \tag{3}$$

Input Sourcing: I borrow from Halpern et al. (2015) to model the sourcing decision of firms. Production of one output unit involves a bundle of tasks S_i in terms of labor. A fraction of these

[9] I assume that all blueprints are owned by a mutual fund (the principal) which maximizes firm profits and redistributes them equally across the population.

tasks S_{iS} can come from a foreign source and the remainder of tasks S_{iH} is conducted domestically such that $S_{iS} + S_{iH} = 1$. The task bundle is assembled according to a c.e.s. technology such that

$$S_i = \left[S_{iH}^{\frac{\theta-1}{\theta}} + \left(B_{iS} S_{iS}\right)^{\frac{\theta-1}{\theta}} \right]^{\frac{\theta}{\theta-1}}, \tag{4}$$

where θ is the elasticity of substitution across tasks and B_{iS} is the quality of imported tasks. Importing production tasks requires to pay fixed costs F_{iS} in terms of domestic production labor. The prices of the foreign tasks are denoted P_{iS} and the firms are price takers in foreign input markets. The quality-adjusted price advantage of foreign tasks is thus $\Omega_i = B_{iS}/P_{iS}$ and measures the advantage of a dollar spent on a foreign relative to a domestic task. The effective price of the composite bundle S stated in terms of Ω_i is then $\left(1 + \Omega_i^{\theta-1}\right)^{\frac{1}{1-\theta}}$ which means that the productivity gains from global sourcing represented by Z_{iS} are

$$Z_{iS} = \left(1 + \Omega_i^{\theta-1}\right)^{\frac{1}{\theta-1}} \geq 1. \tag{5}$$

As can be seen, Z_{iS} is increasing in Ω_i and if there is no sourcing from abroad ($\Omega_i = 0$), then Z_{iS} equals one. Because of imperfect substitutability, importing firms use both domestic and foreign inputs and an importer's expenditure share on foreign inputs in total expenditure on inputs equals $\frac{\Omega_i^{\theta-1}}{1+\Omega_i^{\theta-1}}$.

Compensation Levels and Assignment: To endogenize the expected compensation level that a manager with knowledge level k will obtain in industry equilibrium, I consider the standard assignment approach where individual firms balance the marginal benefit of higher knowledge with the marginal increase in expected compensation:[10]

$$\frac{\partial E\left[\pi\left(k,q\right)\right]}{\partial k}_{|q=q(k)} = r_i'\left(k\right). \tag{6}$$

The marginal manager in the industry with knowledge level $\underline{k}_i$ must be indifferent between management or production work such that $r_i(\underline{k}_i) = 1$. Integrating (6) over the knowledge distribution and setting $r_i(\underline{k}_i) = 1$ allows to state the expected compensation of a manager with knowledge k in industry i as

$$r_i\left(k\right) = 1 + \Psi_i\left(k\right). \tag{7}$$

The term $\Psi_i\left(k\right)$ corresponds to the expected knowledge premium that managers with knowledge k obtain in industry i on top of the numéraire production wage rate. This knowledge premium is specified as follows.

Proposition 1: *The knowledge premium $\Psi_i\left(k\right)$ that a manager with knowledge level k receives in*

[10] I take the market size A_i and the mass of active firms in the industry as exogenous here (as in Gabaix and Landier 2008, Terviö 2008, Edmans et al. 2009 or Baranchuk et al. 2011). These will be endogenized when the model is closed.

expectation over the production wage rate can be stated as follows:

$$\Psi_i(k) = \begin{cases} \frac{\mu_i}{\kappa_i+\mu_i}\frac{1}{\sigma}\left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} A_i \left(\frac{Q_i}{N_i}\right)^{\kappa_i(\sigma-1)} \left[\left(k_{iS}^{1-\xi_i} - \underline{k}_i^{1-\xi_i}\right) + Z_{iS}^{\sigma-1}\left(k^{1-\xi_i} - k_{iS}^{1-\xi_i}\right)\right] & \text{if } k_{iS} \leq k \\ \frac{\mu_i}{\kappa_i+\mu_i}\frac{1}{\sigma}\left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} A_i \left(\frac{Q_i}{N_i}\right)^{\kappa_i(\sigma-1)} \left(k^{1-\xi_i} - \underline{k}_i^{1-\xi_i}\right) & \text{if } \underline{k}_i < k < k_{iS}, \end{cases} \tag{8}$$

where $\xi_i \equiv 1-(\kappa_i+\mu_i)(\sigma-1) \in (0,1)$, $\underline{k}_i$ is the zero earnings cutoff skill and k_{iS} is the cutoff skill for the marginal importing firm.[11]

For all managers within the industry the knowledge premium scales with aggregate variables such as the industry-specific market size A_i, the technological intensity of the industry $\frac{Q_i}{N_i}$ and the relative importance of knowledge in the production process $\frac{\mu_i}{\kappa_i+\mu_i}$. Besides, there is a match-specific component to $\Psi_i(k)$ given by $k^{1-\xi_i} - \underline{k}_i^{1-\xi_i}$ for domestic firms and by $k_{iS}^{1-\xi_i} - \underline{k}_i^{1-\xi_i} + Z_{iS}^{\sigma-1}(k^{1-\xi_i} - k_{iS}^{1-\xi_i})$ for global firms. This match-specific factor relates the knowledge level k relative to the knowledge of the marginal manager in the industry $\underline{k}_i$ and increases with the elasticity of substitution, κ_i, μ_i and Z_{iS}. Since the marginal knowledge level $\underline{k}_i$, the importer cutoff k_{iS} and the industry-specific market size A_i are equilibrium objects, the expected compensation stated in equation (8) can be regarded as the partial equilibrium expression of expected compensation.[12]

Microfoundation of Incentive Contracts: To endogenize the split of $r_i(k)$ into labor income and equity ownership, I introduce a moral hazard problem with tractable incentive contracts. A manager's effort is modeled as an unobservable binary choice between high effort $\overline{e}$ or low effort $\underline{e}$. Without loss of generality I normalize these effort levels to be $-1 < \underline{e} < \overline{e} = 0$. The firm's realized ex post surplus Π is

$$\Pi = \eta(1+e)\pi, \tag{9}$$

where $\eta \geq 0$ is an idiosyncratic stochastic noise term with a mean of one and $e \in \{\underline{e}, \overline{e}\}$ such that high effort implies $E[\Pi|\overline{e}] = \pi$ and low effort implies $E[\Pi|\underline{e}] < \pi$.[13] The term $\eta(1+e)$ corresponds to the mass of varieties that the firm produces based on the chosen strategy where each variety generates a profit stream of π. Firms offer contracts that induce high effort $\overline{e}$ and need to provide sufficient incentives for the manager to be willing to forego private benefits from low effort. I specify the impact of leisure on utility G as follows:

$$G = \frac{1}{1-\lambda(e,\Psi_i)} \geq 1, \quad \lambda(e,\Psi_i) \in [0,1), \tag{10}$$

[11] If $(\sigma-1)(\kappa+\mu) > 1$ the firm productivity distribution would be too skewed towards highly efficient firms such that the industry price index would converge to zero.

[12] The knowledge premium in partial equilibrium stated in Proposition 1 closely matches the distribution of executive pay in assignment models with an exogenous firm mass and market size such as Gabaix and Landier (2008). Equilibrium pay levels are increasing with the size of a "reference firm" in the economy (here $\underline{k}_i$) and the aggregate market size (here A_i). in this model, Both objects are equilibrium outcomes to study comparative exercises of a globalization shock.

[13] This model entails a broad definition of effort as any action that increases firm surplus but imposes personal costs on the manager. For example, e could be interpreted as the choice of a strategy where $\overline{e}$ is the first best strategy and $\underline{e}$ yields private benefits to the manager. Since effort choice has a proportional effect on firm value, the agency model is particularly well suited in capturing decisions that scale proportionally with firm value.

where the parameter $\lambda(e, \Psi_i)$ captures the magnitude of private benefits that the manager can obtain from shirking. The relation of $\lambda(e, \Psi_i)$ to knowledge premia Ψ_i is crucial for the characterization of compensation contracts and I make the following assumption.

Assumption 1: *Private managerial benefits of shirking weakly increase with the knowledge premium* $\frac{d\lambda(\underline{e}, \Psi_i)}{d\Psi_i} \geq 0$ *such that agency frictions are more severe in larger firms. High effort* $\overline{e}$ *does not entail private benefits such that* $\lambda(\overline{e}, \Psi_i) = 0$, $\forall \Psi_i$.

This assumption imposes that more able and therefore richer agents have higher opportunity costs of working. Together with the multiplicative form of the utility function (1) this implies that leisure and compensation are perceived as complements. This complementarity forces relatively large firms to provide sufficient incentives for their managers to induce high effort since low effort would increase the manager's utility by a fraction of $\lambda(e, \Psi_i)$.[14] I abstract from any agency frictions in production work by assuming that production worker effort is perfectly contactable such that $\lambda = 0$.

A manager's compensation package is comprised of labor income f and the ownership of equity with value $V(\Pi)$. Equity ownership comprises a portfolio of stocks and stock options on the firm's realized surplus. A manager's *realized* compensation $w_i(k)$ can be stated as

$$w_i(k) = f + V(\Pi). \tag{11}$$

Since agents are risk-neutral, in principle there exists a continuum of incentive-compatible contracts that induce $\overline{e}$. I follow Edmans et al. (2009) and restrict attention to those contracts which are incentive-compatible, satisfy individual rationality and minimize equity ownership. These contracts would be the optimal ones under positive risk aversion. The following Proposition characterizes contracts:

Proposition 2: *The incentive-compatible contract that minimizes equity and satisfies individual rationality compensates the manager with a fraction* $\triangle$ *of the expected compensation* $r_i(k)$ *in equity and pays the remainder* $(1-\triangle)r_i(k)$ *in labor income:*

$$\begin{aligned} \textit{Equity Ownership} &= E[V(\Pi)] = \triangle r_i(k), \\ \textit{Labor Income} &= f = (1-\triangle) r_i(k). \end{aligned}$$

The fraction of equity ownership in total compensation $\triangle$ *is given by*

$$\triangle = \frac{\lambda(e, \Psi_i)}{|\underline{e}|^{\varepsilon_V}} \in (0, 1],$$

where ε_V *denotes the elasticity of the equity portfolio with respect to firm surplus* π.

Intuitively, there are two channels of adjustment for the equity ownership share in compensation $\triangle$.

[14] Since the variation in the knowledge premium is congruent to variation in firm size an alternative microfoundation for this assumption is based on utility from "empire building" if one interprets e as project choice and λ as non-pecuniary utility from running large firms. Among others, this "empire building" tendency has been emphasized by Stein (2003).

First, managers in larger firms have larger private benefits ($\lambda(\underline{e}, \Psi_i) \uparrow$) such that a larger equity share is required to keep the contract incentive-compatible. Second, an additional channel of adjustment arises when stock options are part of the managers' equity portfolio since options become less elastic ($\varepsilon_V \downarrow$) when the underlying firm value rises. To keep the compensation contract incentive-compatible, additional equity compensation is required.

Equilibrium: I close the model by clearing labor markets and ensuring that no firm with negative expected profits enters the industry. Relating profits for the zero cutoff firm and profits for the marginal importer allows to write the importing cutoff k_{iS} as a linear function of the zero earnings cutoff $\underline{k}_i$. For those firms that employ managers above knowledge level k_{iS} in industry i the decision to source inputs from abroad will be profitable. I define an index of input-trade integration δ_i as $\delta_i \equiv \left(Z_{iS}^{\sigma-1} - 1\right)^{\frac{1}{1-\xi_i}} F_{iS}^{-\frac{\xi_i}{1-\xi_i}}$ which increases with Z_{iS} and falls with F_{iS}. The zero earnings cutoff condition for an individual industry i can then be stated as

$$X_i(\underline{k}_i) = \frac{\sigma N_i \left(1+\delta_i\right)}{\xi_i} \underline{k}_i^{-1}, \tag{12}$$

which pins down the number of firms and the knowledge level $\underline{k}_i$ of the marginal manager in industry i for a given nominal industry GDP X_i.[15] To close the model and to endogenize the industry expenditure levels X_i for each individual industry, the labor market needs to clear. In contrast to Melitz (2003), production worker supply is endogenous because the supply of production workers depends on the occupational choice between managerial and production work around the cutoff knowledge levels $\underline{k}_i$.[16] Integrating the production labor demand for an individual firm over all firms and including fixed labor demand of input importing yields aggregate labor demand. Setting it equal to the aggregate supply of production labor ensures labor market clearing which yields the labor market clearing condition:

$$X = \sum_{i=1}^{I} \frac{\sigma}{\sigma - 1 + \xi_i} N_i. \tag{13}$$

The equilibrium is pinned down by a set of $I+1$ equations: the labor market clearing condition (13) and the zero cutoff earnings conditions (12) for each individual industry i. Equilibrium knowledge premia (8) that managers can expect to obtain in industry i on top of the numéraire wage are

$$\Psi_i\left(k\right) = \begin{cases} \frac{\mu_i}{\kappa_i+\mu_i}\left(Z_{iS}^{\sigma-1}\left(\frac{k}{\underline{k}_i}\right)^{1-\xi_i} - \left(F_{iS}+1\right)\right) & \text{if } k_{iS} \leq k \\ \frac{\mu_i}{\kappa_i+\mu_i}\left(\left(\frac{k}{\underline{k}_i}\right)^{1-\xi_i} - 1\right) & \text{if } \underline{k}_i < k < k_{iS}. \end{cases} \tag{14}$$

[15] $X_i(\underline{k}_i)$ is negatively sloped since a larger nominal industry GDP X_i translates into higher firm revenues. To restore zero earnings for the marginal firm, the cutoff knowledge level $\underline{k}_i$ must fall. Furthermore, stronger productivity gains from input sourcing ($\delta_i \uparrow$) lower the price index such that for any industry GDP X_i the marginal manager must be more knowledgeable.

[16] Other assignment models that share the same feature are Chen (2019), Wu (2011) or Monte (2011).

Together with Proposition 2, equation (14) relates compensation differences across managers to differences across firms driven by positive assignment. Compensation inequality across firms is larger among importers since the slope of $\Psi_i(k)$ is steeper for $k \geq k_{iS}$. Furthermore, (14) also suggests that compensation levels are higher in sectors that are more integrated (higher Z_{iS}, lower F_{iS}) since managers of importing firms are expected to earn more than managers of importing firms in other sectors and since there is a larger fraction of importers in those sectors.

Reallocation, Input Trade and Contracts: Consider a policy or technological change that raises the productivity gains from importing ($d\Omega_i > 0 \rightarrow dZ_{iS} > 0$) which are associated with an increase in the index of input-trade integration ($d\delta_i > 0$). This causes a reallocation of economic activity towards larger firms that is well-known from heterogeneous firm models. The industry price index falls and this increase in competitive pressure leads to a higher cutoff knowledge $\underline{k}_i$ in equilibrium. Furthermore, the cutoff k_{iS} for the marginal importer decreases such that the fraction of importing firms in the economy rises. Such a reallocation has the following effects on compensation contracts:

Proposition 3: When import trade is liberalized in an industry i ($d\delta_i > 0$):

1. *Equity ownership and labor incomes increase (fall) in firms with knowledge level $k > k_{iS}$ ($k < k_{iS}$).*
2. *The equity ownership increase is higher in larger (high k) firms than in smaller firms.*
3. *Equity ownership increases more elastically than labor income in firms with knowledge level $k > k_{iS}$. Consequently the fraction of equity ownership in total compensation $\triangle$ increases in larger and importing firms.*

Discussion: Reallocation across firms causes a change in equity ownership for corporate top earners. This change depends on firm size or importer status. While importers benefit from easier access to foreign input markets, domestic firms lose sales due to tougher competitive pressure which affects the incentive structure for corporate top earners captured by $\lambda(e, \Psi_i)$ and the elasticity of the equity portfolio ε_V. Both, a higher leisure utility gain and a lower elasticity of the equity portfolio induce a shift towards higher equity ownership within relatively large firms. While the comparative static of the model makes a prediction on the change in equity ownership it remains silent on the mechanism how a new equity allocation is reached. To make this point clear consider the following decompositions of the change in equity ownership:

$$\hat{\triangle}\hat{r}_i(k) = \underbrace{\frac{r_i'(k)}{r_i(k)}}_{\text{labor market}} \times \underbrace{\frac{\triangle'}{\triangle}}_{\text{incentive contract}} = \underbrace{\frac{V(\Pi')}{V(\Pi)}}_{\text{appreciation}} \times \underbrace{\frac{V'(\Pi')}{V(\Pi')}}_{\text{new equity}}. \tag{15}$$

The first decomposition illustrates the adjustments explained by the model. Equity ownership adjusts in the model since a reduction in the costs of importing changes the expected compensation levels that are determined on the labor market and since there are adjustments in incentive contracts via changing equity shares. The second decomposition illustrates how this adjustment of equity is reached. When firm value changes there is a direct pass-through to the value of the equity portfolio that occurs mechanically without any contractual adjustments. Additionally, top earners might obtain new equity to ensure that they are sufficiently incentivized.

2.1 Quantifying the Model

In this subsection, I calibrate the model and perform a counterfactual analysis to illustrate the quantitative importance of equity ownership variation in response to a reallocation shock.

2.1.1 Parameter Calibration

I specialize the model to match moments of the U.S. and the U.K. economy in the year 2006. Calibration requires values for the following set of parameters: σ, θ, $\triangle(\Psi_i)$, N_i, μ_i, κ_i, β_i, Z_{iS}, F_{iS}, where I distinguish between three broad sectors i: manufacturing, services and all other economic activities. For the values of σ and θ, I use reference values from the literature. I set the elasticity of substitution across varieties to 2.29 for the U.S. and to 2.38 for the U.K. based on median elasticities reported by Broda and Weinstein (2006).[17] The elasticity of substitution between domestic and foreign inputs is set to 4.006 based on estimates in Halpern et al. (2015). To obtain β_i, I rely on the WIOD socio-economic accounts and calculate expenditure shares for each sector i from the data.

Since there are no obvious moments that can be used to calibrate the shirking utility G, I directly discipline the fraction of equity ownership $\triangle$ to match its relation to the knowledge premium Ψ_i in the data. Specifically, I fit the exponential function $\frac{B_2 \Psi_i^{B_3}}{B_1 + B_2 \Psi_i^{B_3}}$ to match values for $\triangle$ in the data.

The remaining parameters μ_i, κ_i, N_i, Z_{iS}, F_{iS} are calibrated to match 16 micro and macro moments for the U.S. and the U.K. economy. The macroeconomic moments that the calibration targets are the expenditure share on imported inputs in each sector and the total mass of firms in the economy.[18] For the remaining microeconomic moments I focus on the 500 largest firms within each economy[19] and match the logarithm of the 10th, 50th and 90th percentile of the knowledge premium and the logarithm of the 50th percentile of firm sales within each sector for this group of firms. Since individual knowledge levels k and firm blueprints q are unobservable, I restate the terms for the knowledge premia and firm sales as a function of each individual firm's market share which I can observe in the data.[20]

[17] See http://www.columbia.edu/~dew35/TradeElasticities/TradeElasticities.html for the data.

[18] Statistics on the total number of firms in each economy are obtained from the Census Statistics of U.S. Businesses (SUSB) for the U.S. and the UK Office for National Statistics publication "UK Business: Activity, Size and Location - 2006" (Section B1.1) for the U.K. The expenditure share on imported inputs is obtained from WIOD data.

[19] Firm size is based on sales in 2006 and conditional on observable CEO compensation and employment. Firm data come from Compustat North America for U.S. firms and Compustat Global for U.K. firms. CEO compensation is obtained from ExecuComp for the U.S. and BoardEx for the U.K. In Subsection 3.1 of the Empirical Section, I discuss the data in more detail.

[20] See Appendix B for details.

All these moments are expressed in units of the country-specific average (numéraire) wage rate that I compute from the WIOD socio-economic accounts by dividing the economy-wide compensation of employees by total employment.[21] The calibration searches over the parameter space to match the discussed moments using a weighted sum of squared relative differences between the model and the data as a loss function. Since the counterfactual exercise will consider the move from autarky to import levels of 2006, I want to ensure that the calibrated expenditure shares on imported inputs match the data well enough to consider a realistic degree of openness in the counterfactual. I do so in giving these moments a hundredfold weight compared to the other targeted moments.[22]

I list the calibrated parameter values in Table 1. Relative to the influence of technologies κ_i on firm output, the contribution of knowledge μ_i is fairly low which is identified in the model calibration by the share of rents $\frac{\mu_i}{\kappa_i+\mu_i}$ that accrue to managers according to the knowledge premium. Furthermore, calibrated productivity gains from importing are largest in manufacturing and since the expenditure share on imported inputs is lower in the U.S. the calibration suggests higher fixed costs of importing for the U.S. relative to the U.K. In Table 2, I list the calibrated moments and their data counterparts as well as the relative deviations from each other. Since the calibration puts a large weight on the expenditure shares on imported inputs, the calibrated import shares match the data closely within less than half a percent deviation for either sector and country. The deviations of the calibrated knowledge premia from the data vary across percentiles, sectors and countries. Most model moments are within less than 10% deviation from their respective data moments. The sales of the median firms in the top 500 is calibrated fairly closely for the U.K. with less than 0.1% deviation from the data and somewhat less precise for the U.S. with about 7% deviation from the data moments. The correlation coefficient for the calibrated and observed equity ownership shares $\triangle$ across firms is 0.73 for the U.K. and 0.63 for the U.S. economy. The R-squared is 0.54 for the U.K. and 0.40 for the U.S.

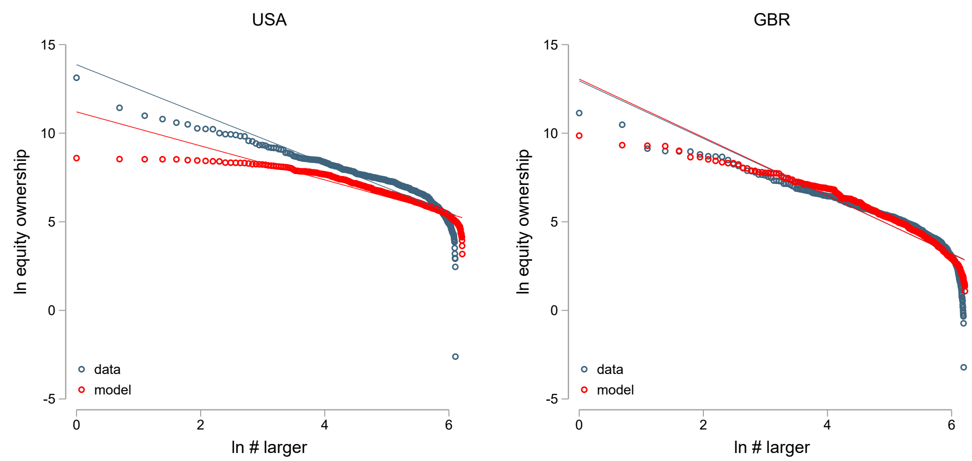
With the help of Figure 1, I evaluate how well the calibration exercise fits the power law of equity ownership suggested by the data. The shape parameter of the equity ownership distribution is not directly targeted in the calibration itself and depends on both, the distribution of the expected compensation levels and the equity ownership shares $\triangle$. The Figure plots the log equity ownership and the log number of firms whose CEOs own more equity.[23] The shape of the observed and calibrated distributions fit very well for the U.K. economy. For the U.S., the shape of the distribution in model and data fit fairly closely although the model tends to slightly underestimate equity ownership with the exception of CEOs at the lower end of the distribution.

[21] $w = \frac{\sum_i \texttt{COMP}_i}{\sum_i \texttt{EMP}_i}$

[22] To search for the parameter values, I first use a simulated annealing algorithm. Then, starting from the parameter set suggested by the algorithm outcome, I run a minimization limited BFGS algorithm that incorporates parameter bound constraints. The calibration uses the "basin-hopping" routine in Scipy Python.

[23] This approach is similar to what other researchers have done to illustrate the shape of the firm-size distribution (see e.g. Luttmer 2007).

Figure 1: Shape of the Equity Ownership Distribution in the Model and the Data



Notes: The Figure depicts the shape of the equity ownership distribution for the U.S. (left graph) and the U.K. (right graph).

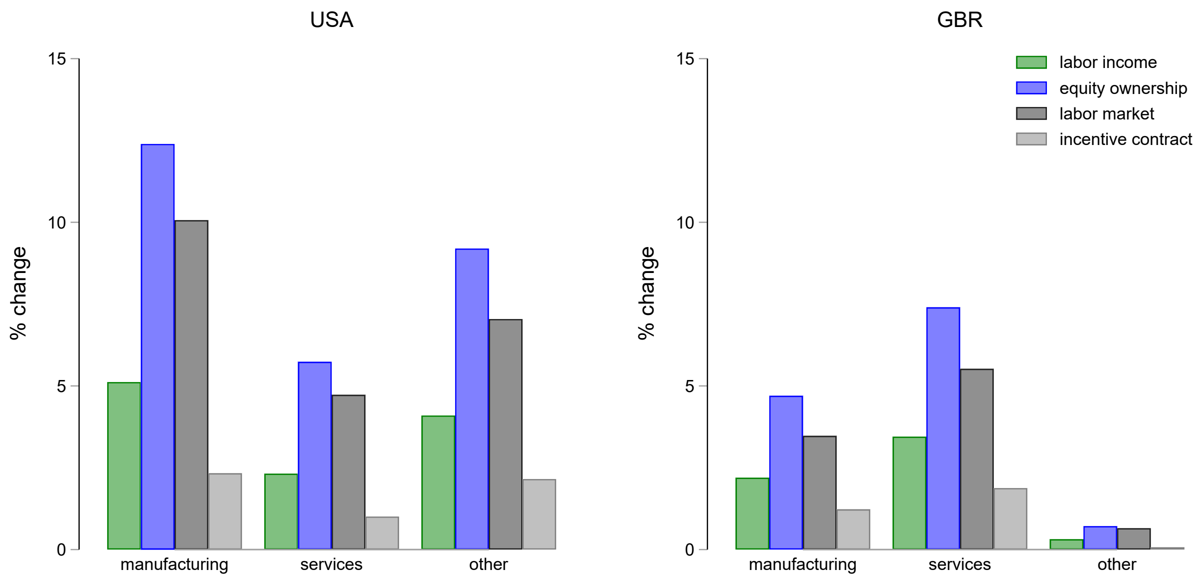
2.1.2 Counterfactual Analysis

To illustrate the quantitative implications of the model, I consider how a move from counterfactual autarky (i.e. an economy with $Z_{iS} \to 1$ and/or $F_{iS} \to \infty$) to the calibrated 2006 levels would affect equity ownership for the top earners of the top 1,000 firms within each economy. Using the observed market shares of each firm in the year 2006, I back out the knowledge levels k for each firm. These backed out knowledge levels k are all above the importer cutoff k_{iS}. The counterfactual move from autarky to an open economy corresponds to a change of the expenditure share on imported inputs of 28.1 (manuf.) / 13.7 (serv.) / 15.4 (oth.) percentage points for the U.K. and of 17.6 (manuf.) / 5.3 (serv.) / 10.1 (oth.) percentage points for the U.S. Figure 2 shows how opening up the economy to input imports changes the compensation structure for top earners. As predicted by the model, increases in equity ownership (blue) are larger than increases in labor incomes (green). Across sectors, the calibrated elasticity of equity ownership to the trade shock appears to be about twice as large as the according labor income elasticity. I then decompose the change in equity ownership into the labor market adjustment caused by variation in expected compensation levels ($\frac{r_i'(k)}{r_i(k)}$) and into contractual adjustments ($\frac{\triangle'}{\triangle}$) according to equation (15). Both margins seem to be relevant for the change in equity ownership with the labor market adjustment being about 3-4 times larger than the change in the equity ownership share.

3 Empirical Analysis

In this section I study empirically how access to foreign input markets affects top earners. I combine a matched manager-firm panel dataset that contains information on equity ownership and labor incomes

Figure 2: Counterfactual Effects on Equity Ownership



Notes: The Figure considers the effects of a counterfactual move from autarky to 2006 parameter values. It depicts percentage increases of average labor incomes (green), equity ownership (blue) and its decomposition into labor market adjustment (dark gray) and adjustments in contracts (light gray).

of individual managers and link these to variation in sectoral input imports. To address the endogeneity of input imports I use a shift-share instrumentation strategy to identify exogenous shifts in input sourcing.

3.1 Data and Descriptive Statistics

3.1.1 Data on Corporate Top Earners

The empirical analyses rely on individual level data for managers of publicly quoted firms in the U.S. and the U.K. spanning from 2000 until 2014. While information on managers employed by U.S. firms is obtained from S&P Compustat ExecuComp data, I obtain information on managers employed by British firms from BoardEx. BoardEx is a British business intelligence company that collects details on remuneration and biographical information on business leaders across the world. Both data sources consolidate public domain information concerning the executives and senior managers of publicly quoted and large private companies.[24]

Both data sources contain information on direct monetary compensation and in some cases also its

[24] The majority of information from both data providers is collected from regulatory entities. These are the RNS (Regulatory News Service), the London Stock Exchange and Companies House for the U.K. and SEC (Security Exchange Commission) filings, the NASDAQ or NYSE for the U.S. firms. Additionally, data is collected from annual reports but also from corporate press releases or third party sources providing bibliographical information.

individual components such as salary, bonuses or other incentive payments. Since it is often difficult to distinguish these side payments from regular incomes I will treat the total sum of these monetary incomes as labor income throughout the empirical analyses. In addition, both databases contain information on equity-linked parts of compensation over a manager's employment duration within the firm. These equity-linked compensation parts are mostly option grants but also include direct stock transfers and long-term incentive or retirement plans that are tied to the employer's stock price. Using information on stock prices, expiry dates and option strike prices it is possible to individually price these equity-linked components using the Black-Scholes pricing formula. Aggregating the total value of previously obtained equity-linked compensation delivers a measure of equity ownership for each individual manager for each year in the sample. While BoardEx provides information on managerial equity ownership data directly, I obtain managerial equity ownership data based on ExecuComp using the calculation methods from Coles et al. (2006).

Altogether, the panel includes more than 40,000 distinct managers employed by over 4,000 corporations. About 10,000 of these top earners are employed by British companies while the remaining 30,000 are employed by companies in the U.S. Compared to World Bank data, the sample firms cover 82% of the U.S. and 57% of the U.K. market capitalization of listed companies. Compared to total country-wide assets from KLEMS data, the sample firms own 49% of corporate assets in the U.S. and 74% of corporate assets in the U.K. The median labor income level of a sample manager is over 900 thousand $ and the median value of equity ownership equals about 3 million $. Based on data from the World Income Database for the year 2006, more than 80% of the managers in the sample are above the top 1% pre-tax national income threshold of their respective country and more than one third are above the top 0.1% threshold. For more than 60% of the U.S. managers their value of equity ownership is sufficient to belong to the top 1% of the wealth distribution and for more than one fourth of the U.S. managers it is even sufficient to be within the top 0.1% of the wealth distribution (there are no wealth information in the World Income Database for the U.K. in 2006).

3.1.2 Data on Firms and Industries

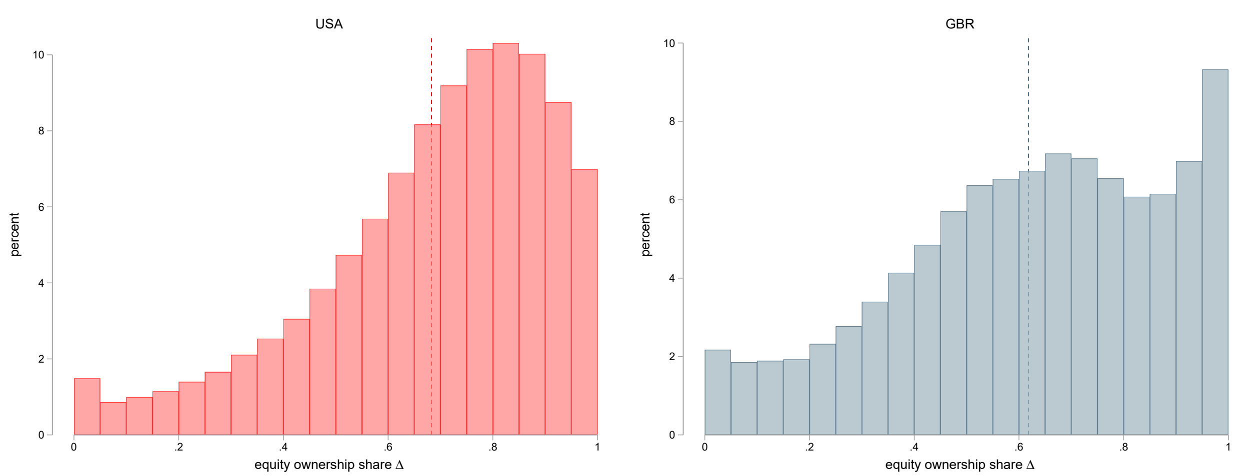
I match individuals in my sample to firm-level information from Compustat U.S. or Compustat Global for British firms. Besides firm-level information from Compustat, I also match the firms in my sample to two additional firm-level databases: the Dun&Bradstreet WorldBase and the Thompson World-Scope database. While D&B WorldBase allows to classify firms into importers and non-importing firms, Thompson WorldScope provides information on foreign asset ownership, i.e. multinational firm status. To measure the exposure of an individual top earner to foreign input sourcing, I then match firms to industry data from WIOD (World Input Output Database, 2016 release) based on the firms' primary industries. The WIOD data track the flow of intermediate and final goods and services across countries and industries over time. The data cover imports from 43 countries across 56 sectors based on ISIC Rev. 4 over the period 2000 to 2014. Industries cover all types of economic activity including agriculture, mining, construction, utilities, manufacturing and services. My measure of input imports thus aggregates imports of physical and service inputs. To measure the exposure of individual managers to foreign inputs during each year, I calculate the value of imported inputs relative to the value of total input consumption for each country-industry-year cell. Industries are based on the firms' primary 4-digit SIC level industry and matched to the industries in WIOD. Alternatively, I use a more disaggregated I-O table for manufacturing industries based on the 1992 U.S. Benchmark I-O Table from the U.S. Bureau of Economic Analysis and import data from the UN Comtrade database. I also construct an offshorability measure based on the task composition within occupations and the occupational composition within industries. This proxy has been used by Acemoglu and Autor (2011), Blinder (2009) and Bretscher (2019), is measured at the 3-digit SIC industry level and not varying over time (see Appendix C). I provide selected summary statistics on managers, firms and industries in Table 3.

3.2 Facts on Equity Ownership of Corporate Top Earners

Before turning to the empirical analyses, I present four stylized facts on equity ownership of corporate top earners based on descriptive statistics that are broadly consistent with the model.

Fact #1: There is heterogeneity in the prevalence of top earners' equity ownership across firms The distribution of equity ownership shares (equity ownership relative to the sum of labor incomes and equity ownership as defined in the model) in Figure 3 suggests that there is substantial heterogeneity of equity ownership shares across firms and that equity ownership shares are on average a bit higher in the U.S. than in the U.K. (0.68 versus 0.62).

Figure 3: Prevalence of Equity Ownership



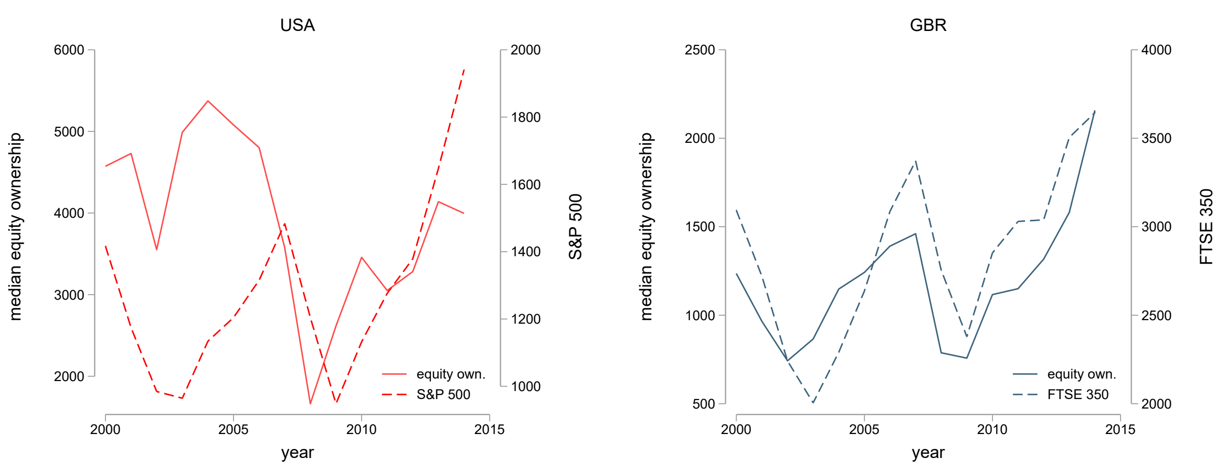
Notes: The Figure plots the distribution of *Equity Ownership Shares* $\triangle$ in the data. The *Equity Ownership Share* $\triangle$ is calculated as *Equity Ownership* relative to the sum of *Labor Income* and *Equity Ownership*.

Fact #2: Equity ownership is more common in larger and more international firms The upper part of Table 4 correlates the value of equity ownership and the equity ownership share with firm-level covariates. Correlating equity ownership with firm covariates suggests that top earners in larger firms, measured by sales or employment, own on average more equity in their employing firms. This is also true for more capital-intensive firms, importing firms and partially also for multinationals.

Fact #3: Equity ownership is more common in larger, more productive and more offshorable industries At the industry level, owning more equity is correlated with industry productivity measured by an industry TFP index, industry size measured by industry output or a task-based measure of industry offshorability as it can be seen in the bottom part of Table 4.[25]

Fact #4: The value of equity ownership correlates with the development of equity prices Figure 4 illustrates that the development of the value of top earners' equity portfolios over time closely tracks the evolution of market-wide equity indices proxied by the S&P 500 index for the U.S. or the FTSE 350 index for the U.K.

Figure 4: Equity Ownership and Equity Prices



Notes: The Figure plots the median value of *Equity Ownership* and the S&P 500 or the FTSE 350 stock price index over time.

[25]To calculate offshorability, I use data from the U.S. Department of Labor O*NET program on occupational task contents and the U.S. BLS Occupational Employment Statistics to calculate an industry-specific offshorability score following Acemoglu and Autor (2011). I use version O*NET 20.3 available from https://www.onetonline.org and the BLS OES from the year 2000. I first calculate an offshorability score at the occupation level and then aggregate at the industry level according to industry-specific employment shares of individual occupations. Higher values for offshorability indicate that there are many employees within the industry whose occupations do not involve face-to-face interaction and can be done off site. See the Appendix for details.

3.3 Empirical Strategy: Identifying the Effect of Reallocation on Corporate Top Earners

3.3.1 Specification

The following empirical analyses aim to test the predictions of the model regarding the relationship between trade-induced reallocation and the structure of corporate top earners' compensation. In order to measure the effects of foreign input sourcing, I use the value of imported inputs relative to the value of total input consumption from WIOD as my main measure of foreign input sourcing as in the calibration. In particular, I estimate specifications of the following type:

$$I_{mfict} = \alpha_1 \times q_f \times imp_{ict} + \Delta_{mfict} + \mu_{mf} + \mu_{ct} + \varepsilon_{mfict}, \tag{16}$$

where I_{mfict} is the measure of interest (e.g. equity ownership in logs) and the subscripts correspond to a manager m, employed by firm f, active in industry i based in country $c \in \{U.S., U.K.\}$, during year t. The regressor imp_{ict} is the expenditure share on foreign intermediates and measures the extend of input imports in a country-industry cell over time. In order to allow for different effects across the firm-size distribution, I interact imp_{ict} with a vector of firm-size quintile dummies q_f which allows me to estimate separate effects of input sourcing for each firm-size quintile. I construct these time-invariant firm-size quintiles by sorting firms by their sales or employment levels within each country. In order to prevent endogeneity issues driven by firms changing their position within the firm-size distribution over time, I base the measure on average firm size during the first 3 sample years 2000 - 2002 to calculate q_f.[26] Alternatively, I also estimate models where I interact imp_{ict} with a dummy for firm f's import status. The vector Δ_{mfict} includes control variables such as the firms' capital intensity, industry output and an industry TFP index. Furthermore, I include country-year fixed effects μ_{ct} and match-specific fixed effects μ_{mf} for manager-firm pairs. Since the expenditure share on foreign intermediates is measured at the country-industry level, I correct for clustered standard errors at that level (see Abadie et al. 2017).

3.3.2 Instrumental Variables

The empirical specifications relate time-varying levels of equity ownership or labor income to time-variation in input sourcing. The identification challenges that I am facing are twofold. First, time variation in equity prices or incomes within industrialized economies might affect sourcing decisions leading to reversed causality biases. Second, unobservable productivity or demand shocks will affect both, sourcing and managerial compensation leading to potential biases that can lead to over- or underestimation of the effects. To address these concerns, I construct two shift-share instrumental variables that are correlated with foreign input sourcing but arguably exogenous to changes in managerial compensation: international trade and transport margins (ttm_{ict}) and the world export supply

[26] I plot transition probabilities of firms across size quintiles in Table C5 of the Appendix.

(wes_{ict}).

Changes in transport margins capture shocks to the delivered price of imported inputs. To construct the ttm_{ict} instrument, I use time-varying trade and transport margins provided by WIOD. These margins are defined as the wedge between f.o.b. and c.i.f. prices and WIOD provides them at the input supplying country-industry level ($\hat{i}\hat{c}$). In order to obtain ad-valorem transport margins I divide those by export values of the input supplier $\hat{i}\hat{c}$. To calculate trade transport margins that are specific to the output country-industry pair (ic), I weight these ad-valorem transport margins according to input shares $\theta(\hat{i},\hat{c})_{2000}$ from the WIOD input-output table in the base year 2000. Finally, since input-sided transport margins are highly correlated with the output country-industry level transport margins, I subtract the transport margins from the output side and obtain the ttm_{ict} instrument as the wedge between input- and output-sided trade and transport margins:

$$\begin{aligned} ttm_{ict} &= \sum_{\hat{i},\hat{c}} \theta\left(\hat{i},\hat{c}\right)_{2000} \times \frac{\text{total ttm}_{\hat{i}\hat{c}t}}{\text{total exports}_{\hat{i}\hat{c}t}} - \frac{\text{total ttm}_{ict}}{\text{total exports}_{ict}}, \\ \sum_{\hat{i},\hat{c}} \theta\left(\hat{i},\hat{c}\right)_{2000} &= 1. \end{aligned} \tag{17}$$

My second instrumental variable is the world export supply wes_{ict}, following Hummels et al. (2014). This instrumental variable aims to capture technological developments within input supplying countries. I aggregate the log value of inputs exported in the rest of the world excluding exports to and from the U.S. or the U.K., respectively. These input export values are again weighted according to the input shares $\theta(\hat{i},\hat{c})_{2000}$ in base year 2000

$$wes_{ict} = \sum_{\hat{i},\hat{c}} \theta\left(\hat{i},\hat{c}\right)_{2000} \times \ln\left(\text{total exports excluding those to/from } c_{\hat{i}\hat{c}t}\right). \tag{18}$$

The validity of these shift-share instruments hinges on two sufficient conditions. First, exogeneity of the instrument is satisfied when the initial country-industry input shares $\theta(\hat{i},\hat{c})_{2000}$ are exogenous conditional on controls (i.e. including fix effects) as shown by Goldsmith-Pinkham et al. (2018). If the composition of the input shares $\theta(\hat{i},\hat{c})_{2000}$ predicts changes in equity ownership via other channels than input sourcing this assumption would be violated. Alternatively, exogeneity is also satisfied whenever the shocks in the transport margins or export supply are random across input supplying country-industry pairs $\hat{i}\hat{c}$ and the number of shock pairs $\hat{i}\hat{c}$ is sufficiently large (Borusyak et al. 2018).

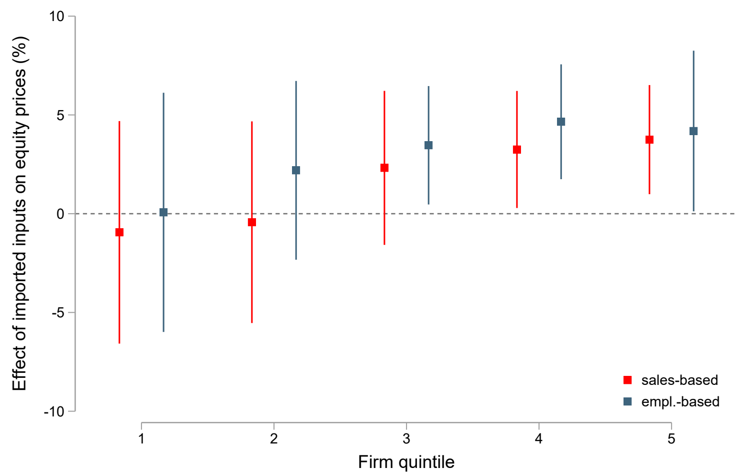
I explore the exogeneity assumption of my instruments in three ways. First, I compute Rotemberg weights for both instruments as suggested by Goldsmith-Pinkham et al. (2018). These weights are a scaled sensitivity-to-misspecification parameter and show on which country-industry combinations identification hinges the most. I then construct instruments with an alternative weight structure omitting the country-industry pairs with the largest Rotemberg weights and show that the estimates based on these perturbed instruments are similar to instrumental variable estimations using all input supplying country-industry pairs. Second, industry-specific technology shocks that are correlated across countries could lead to omitted variable bias because the input shares used to construct the instruments place a lot of weight on the diagonal. I address this by constructing alternative instruments without using the diagonal elements of the input-output matrix and show that also here the estimates resemble estimations using all input supplying country-industry pairs. For the discussion of these sensitivity-to-misspecification results I refer to Appendix C. Third, with trade and transport margins and world export supply to instrument for input sourcing, I can test for overidentified empirical models. As I interact the instruments with q_f I estimate five first stage regressions (or two when I differentiate by importer status) and report overidentifaction test statistics for the null hypothesis that the effect of input sourcing is overidentified.

3.4 Results

3.4.1 Equity Prices

To see if trade-induced reallocation is reflected in equity prices, I begin by studying the capital-market response of stock prices across firms. Since the value of top earners' equity ownership is directly linked to stock prices, one potential channel of adjustment is the direct pass-through from capital markets to the value of top earners' equity portfolios. When firms become more productive and the market prices this into the value of the firms' stock this should be reflected in an appreciation of stock prices which ultimately pass through to top earners' equity ownership. In order to explore if there is a capital-market response of stock prices on variation in input sourcing, I regress the average annual price of each firm's main security in logs on the interaction between input imports and firm-size quintile dummies including firm fixed effects and control variables. The estimated coefficients of interest correspond to a semi-elasticity that indicates a percentage change in equity prices associated with a percentage point increase in the industry-level share of imported inputs. Figure 5 depicts the instrumental variable coefficient estimates, the full regression results are presented in Table 5. The estimated semi-elasticities support the hypothesis that equity price reactions differ across firms and that input imports increase equity prices mostly for the largest firms. At the top quintile, equity prices appreciate by 3.8-4.2% in response to a percentage-point increase in industry-level intermediate imports. This complies with Smith et al. (2019) who document that growth in pass-through business profits are a primary source of U.S. top incomes. A similar pattern emerges when comparing importing with non-importing firms. In order to obtain information about the firms' status as importer, I match the sample firms with a 2018 vintage of the Dun&Bradstreet WorldBase dataset, a database covering public and private companies in various countries and territories. The unit of observation in WorldBase is an individual establishment and establishments belonging to the same firm are linked in the data. Most importantly, WorldBase provides a binary indicator whether an establishment is an importer. I match the sample firms to U.S. or U.K. headquarters in WorldBase and classify importers as those firms that have at least one establishment that is classified as an importer in WorldBase. With this definition, around 75% of the firms in the matched sample count as importers. The estimated semi-elasticities in Table 6 suggest that equity price appreciations in response to increases in imports of

Figure 5: Importing and Equity Price Reactions Across Firms



Notes: The Figure depicts the IV coefficients of offshoring on equity prices for individual firm-size quintiles (either sales-based or employment-based). The estimates are based on columns (2) and (4) from Table 5. Individual coefficients capture the effect of a percentage-point increase in the industry-level share of imported inputs on equity prices in percent. The lines correspond to 95% confidence intervals with standard errors corrected for clustering at the country-industry level.

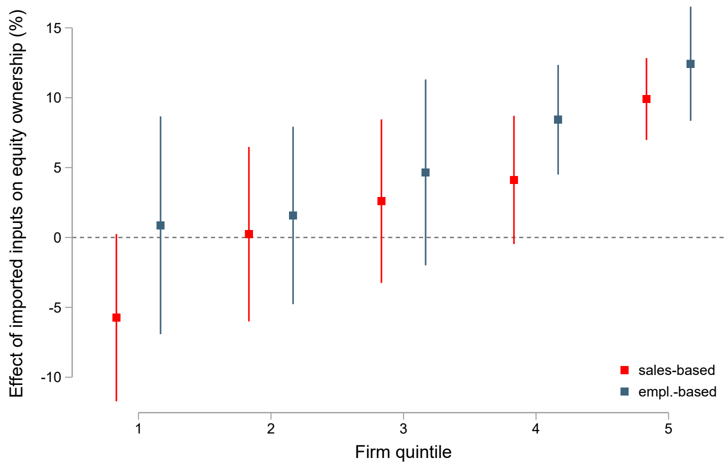
intermediate inputs only occur for the group of importing firms with an estimated price appreciation of 2.9% per percentage-point increase in the import share.

3.4.2 Equity Ownership and Compensation Structure of Corporate Top Earners

In a next step, I study how input sourcing effects equity ownership of top earners based on estimating empirical models described by equation (16). When there is intra-industry reallocation from improved access to foreign input markets such as described in the theoretical model, an increase in global sourcing should lead to higher equity ownership premia for top earners that are employed by larger firms. In Table 7, I again estimate semi-elasticities of input imports by firm-size quintiles. While specifications (1) to (3) rely on size quintiles based on sales, specifications (4) to (6) rely on employment-based size quintiles. Figure 6 depicts the instrumental-variable coefficient estimates of the baseline estimates. As predicted by the model, the effects on equity ownership are heterogeneous across firms. Although the firms in my sample are relatively large overall,[27] the effects of input imports are small or even negative for top earners in firms within the bottom quintiles of the firm-size distribution. In contrast, the value of equity ownership appreciates by 9.9-12.4% for top earners employed by firms in the top quintile in response to a percentage-point increase in industry-level intermediate imports. This appreciation is even larger for the top earners within the CEO subsample (11.9-14.0%). Besides the interpretation of effects for individual firm-size quintiles, one can also formally test for effect heterogeneity across size bins. Table C7 in Appendix C reports p-values for hypothesis tests that equity ownership effects

[27] The median level of sales equals 740 Mio. $ and 2,600 employees, see Table 3.

Figure 6: Importing and Equity Ownership Across Firms



Notes: The Figure depicts the IV coefficients of offshoring on equity ownership of corporate top earners for individual firm-size quintiles (either sales-based or employment-based). The estimates are based on columns (2) and (5) from Table 7. Individual coefficients capture the effect of a percentage-point increase in the industry-level share of imported inputs on equity prices in percent. The lines correspond to 95% confidence intervals with standard errors corrected for clustering at the country-industry level.

are identical (i) for the top and the bottom quintile, (ii) for the second lowest and the second largest quintile and (iii) across all quintiles. These hypotheses are tested based on specifications (1) to (6) in Table 7. The null hypothesis of equal equity effects across all size quintiles is rejected at the one-percent level throughout all specifications. Furthermore, the null hypothesis of equal equity effects in the bottom versus the top firm quintile is rejected at the five-percent level or lower.

To further explore the link between equity ownership and importing activity, I differentiate the effects between top earners employed by importing and non-importing firms. Results are presented in Table 8. According to the model, increases in the value of equity ownership in response to input trade globalization should only occur within importing firms which is supported by the data. While variation in the industry-level import share does not significantly affect the value of equity ownership for top earners of non-importing firms, top earners of importing firms are more positively affected as I estimate a semi-elasticity for equity ownership adjustments of 6.5% which is significant at the one-percent level.

It is noteworthy, that the estimated price semi-elasticities in the top quintile are substantially smaller compared to equity ownership semi-elasticities for top earners. This suggests already that the pass-through of trade-induced stock price appreciations do not fully explain the appreciation in equity ownership for top earners. To further explore the adjustments of equity ownership, I consider new equity grants to top earners in Table 9. If top earners receive new stocks or option grants this also causes an accumulation of equity. I replicate the previous specifications but use the fraction of new equity-linked income relative to the sum of salaries, bonuses and equity-linked incomes as the outcome variable, here. The results in Table 9 indicate that the largest firms shifted compensation towards equity by granting relatively more equity-linked income to their top earners while the opposite occurred in smaller firms. This suggests that both margins of adjustment play a role for the accumulation of equity ownership for top earners: reallocation causes equity-price appreciations at the top leading to pass-through incomes for top earners and firms adapt by adjusting compensation structures.[28] A microfoundation of the latter channel is shareholders' desire to keep managers sufficiently incentivized in response to a reallocation shock. Both channels are present in the theoretical model: reallocation affects firm values directly but it also affects incentives for given contracts since private benefits and the elasticity of equity portfolios change.[29]

The model suggests that equity ownership should respond more elastically than labor incomes to a reallocation shock such that equity ownership gets more prevalent for top earners employed by large firms. This is explored in Table 10, where I compare equity ownership, labor incomes and equity ownership shares as outcome variables. Similar to the calibration results, the estimated semi-elasticities for equity ownership are about twice as large than those for labor incomes for top earners in the top two quintile bins. This shift towards a higher prevalence of equity within firms is confirmed in specifications (5) and (6), where I repeat the previous specifications with the equity ownership share as the dependent variable. The observed changes in compensation structures suggest that the reallocation-channel can be a driver of the higher prevalence of capital incomes vis-à-vis labor incomes for top earners documented by Piketty and Saez (2003).

3.4.3 Rent Distribution Within Firms

Empirical studies by Autor et al. (2019) and De Loecker et al. (2020) explore the role of increasing market concentration on falling aggregate labor shares. They argue that lower labor shares are in part driven by increasing concentration of economic activity among top firms. In Table 11, I use the average top earner's labor income relative to aggregate labor expenses within the firm and the average top earner's equity ownership relative to aggregate labor expenses within the firm as an outcome to study how reallocation affects the within-firm rent distribution. Overall, the estimates suggest that more foreign input sourcing tilts the rent distribution within firms towards aggregate labor expenses for the bottom three quintiles of firm sizes. However, top earners gain relative to labor in the upper two quintiles.

3.4.4 Robustness and Additional Results

Multinational firms: The theoretical model does not distinguish between input sourcing from within or across firm boundaries. Table C8 in the Appendix, shows results for a split sample into multinationals and non-multinational firms.[30] The results suggest that the effects of input sourcing on com-

[28]The former channel has often been referred to as pay-for-luck in the literature (see Bertrand and Mullainathan 2001).

[29]Table C6 in Appendix C replicates Table 7 and additionally controls for firm variation in equity prices. Estimated semi-elasticities of input imports on equity ownership remain positive but are smaller.

[30]A firm is defined as a multinational firm if reports foreign asset ownership. Since Compustat does not disclose international assets separately, I obtain this information from Thompson WorldScope data.

pensation contracts are present in both types of firms. Top earners of both, the largest multinationals and non-multinational firms attain higher levels of equity ownership.

Controlling for import competition: A typical feature of an economy's input-output structure is that a substantial fraction of inputs stem from within the same industry. When the differentiation between input imports and imports of competing products is imprecise this might blur the measure of input imports. In Table C9 of the Appendix I study if the results survive when I control for interactions between firm-size quintiles and import competition. I define import competition as industry imports relative domestic industry absorption (industry output net of exports plus imports). When controlling for variation in import competition, the effect on equity ownership still dominates the income effect. Furthermore, the heterogeneity of managerial equity and income effects across firms prevails.

Omitting the trade collapse during the Great Recession: During the global recession of 2008-2009 the value of international trade collapsed. From the first quarter in 2008 to the first quarter in 2009, real world trade fell by about 15% which exceeded the downfall of real global GDP by roughly a factor of 4 (Bems et al. 2013). Similarly, stock prices substantially depreciated during the recession. In Table C10, I reestimate the specifications from Table 7 but omit the global recession years 2008-2009 to illustrate that the results survive without the variation from those recession years.

Using more granular I-O tables for U.S. manufacturing: An advantage of the WIOD I-O tables is that these are available for all types of industries since WIOD combines information from trade in goods as well as trade in services which are obtained from balance of payment measures. Furthermore, WIOD provides information on total intermediate consumption, output, imports and exports at the same level. This combined approach comes at a cost: in order to maintain comparability of I-O tables across countries and over time, the level of industry aggregation in WIOD is fairly broad with less than 60 industries covering all sorts of economic activity. In order to evaluate the robustness of my results to a more disaggregated I-O table that is specialized to firms in manufacturing industries, I turn to the 1992 U.S. Benchmark I-O Table from the U.S. Bureau of Economic Analysis (BEA). This table has been used extensively in previous studies of intermediate goods trade (Alfaro et al. 2019, Alfaro et al. 2016, Conconi et al. 2018) and I use the version from Alfaro et al. (2019) who transform this table to the SIC industry level. Based on this I-O table, I calculate my alternative measure of exposure to imported inputs: $\tilde{imp}_{cit} = \sum_{\hat{i}} \theta\left(\hat{i}\right)_{BEA} \times \ln\left(\text{total imports}_{\hat{i}ct}\right)$, where $\theta\left(\hat{i}\right)_{BEA}$ are I-O coefficients from the BEA table (at the 3-digit SIC level) and $\ln\left(\text{total imports}_{\hat{i}ct}\right)$ is the logarithm of total imports in country c during year t. Table C11 presents the robustness results using this alternative proxy for imported inputs based on the sample of managers in manufacturing firms. The value of equity ownership is positively associated with input imports as suggested by column (1). Furthermore, the heterogeneity of equity elasticities across firm-size quintiles prevails.

4 Conclusion

This paper examines how reallocation affects the compensation structure of top earners. I incorporate a stylized principal-agent model into an assignment framework to rationalize how access to foreign input markets affects equity ownership of corporate top earners. Intra-industry reallocation leads to a higher equity ownership for top earners in the largest firms. Furthermore, there is a reallocation of compensation away from labor incomes towards higher equity ownership. Using panel data on managers across U.S. and U.K. firms, I find broad support for these predictions. This suggests that the ownership of equity considerably contributes to the returns of globalization for top earners and ignoring equity ownership results in considerable understatements of the effects of globalization on top earners' skill premium.

References

Abadie, Alberto, Susan Athey, Guido W. Imbens, and Jeffrey Wooldridge. When Should You Adjust Standard Errors for Clustering? NBER Working Papers 24003, National Bureau of Economic Research, Inc, 2017.

Acemoglu, Daron and David Autor. Skills, Tasks and Technologies: Implications for Employment and Earnings. volume 4 of *Handbook of Labor Economics*, chapter 12, pages 1043–1171. Elsevier, 2011.

Akcigit, Ufuk and Sina T. Ates. Ten Facts on Declining Business Dynamism and Lessons from Endogenous Growth Theory. NBER Working Papers 25755, National Bureau of Economic Research, Inc, 2019.

Alfaro, Laura, Pol Antràs, Davin Chor, and Paola Conconi. Internalizing Global Value Chains: A Firm-Level Analysis. *Journal of Political Economy*, 127(2):508–559, 2019.

Alfaro, Laura, Paola Conconi, Harald Fadinger, and Andrew F. Newman. Do Prices Determine Vertical Integration? *Review of Economic Studies*, 83(3):855–888, 2016.

Alvaredo, Facundo, Anthony B. Atkinson, Thomas Piketty, and Emmanuel Saez. The Top 1 Percent in International and Historical Perspective. *Journal of Economic Perspectives*, 27(3):3–20, 2013.

Antràs, Pol, Luis Garicano, and Esteban Rossi-Hansberg. Offshoring in a Knowledge Economy. *Quarterly Journal of Economics*, 121(1):31–77, 2006.

Antràs, Pol, Luis Garicano, and Esteban Rossi-Hansberg. Organizing Offshoring: Middle Managers and Communication Costs. In **Helpman, Elhanan, Dalia Marin, and Thierry Verdier**, editors, *The Organization of Firms in a Global Economy*, chapter 10, pages 311–340. Harvard University Press, 2008.

Atkinson, Anthony B., Thomas Piketty, and Emmanuel Saez. Top Incomes in the Long Run of History. *Journal of Economic Literature*, 49(1):3–71, 2011.

Autor, David, David Dorn, Lawrence F. Katz, Christina Patterson, and John Van Reenen. The Fall of the Labor Share and the Rise of Superstar Firms. *Quarterly Journal of Economics*, forthcoming, 2019.

Bakija, Jon, Adam Cole, and Bradley Heim. Jobs and Income Growth of Top Earners and the Causes of Changing Income Inequality: Evidence from U.S. Tax Return Data. Department of Economics Working Papers 2010-22, Department of Economics, Williams College, 2008.

Baldwin, Richard. *The Great Convergence: Information Technology and the New Globalization*. Harvard University Press, 2016.

Baldwin, Richard and Javier Lopez-Gonzalez. Supply-Chain Trade: A Portrait of Global Patterns and Several Testable Hypotheses. *The World Economy*, 38(11):1682–1721, 2015.

Baranchuk, Nina, Glenn MacDonald, and Jun Yang. The Economics of Super Managers. *Review of Financial Studies*, 24(10):3321–3368, 2011.

Baumgarten, Daniel, Ingo Geishecker, and Holger Görg. Offshoring, Tasks, and the Skill-Wage Pattern. *European Economic Review*, 61(C):132–152, 2013.

Becker, Sascha O., Karolina Ekholm, and Marc-Andreas Muendler. Offshoring and the Onshore Composition of Tasks and Skills. *Journal of International Economics*, 90(1):91–106, 2013.

Bems, Rudolfs, Robert C. Johnson, and Kei-Mu Yi. The Great Trade Collapse. *Annual Review of Economics*, 5(1):375–400, 2013.

Bertrand, Marianne and Sendhil Mullainathan. Are CEOs Rewarded For Luck? The Ones Without Principals are. *Quarterly Journal of Economics*, 116(3):901–932, 2001.

Blinder, Alan S. How Many US Jobs Might be Offshorable? *World Economics*, 10(2):41–78, 2009.

Bloom, Nicholas, Kalina Manova, John Van Reenen, Stephen Teng Sun, and Zhihong Yu. Trade and Management. *Review of Economics and Statistics*, forthcoming, 2019.

Borusyak, Kirill, Peter Hull, and Xavier Jaravel. Quasi-Experimental Shift-Share Research Designs. NBER Working Papers 24997, National Bureau of Economic Research, Inc, 2018.

Breinlich, Holger. Heterogeneous Firm-Level Responses to Trade Liberalization: A Test Using Stock Price Reactions. *Journal of International Economics*, 93(2):270–285, 2014.

Bretscher, Lorenzo. From Local to Global: Offshoring and Asset Prices. mimeo, London Business School, 2019.

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

Caliendo, Lorenzo and Esteban Rossi-Hansberg. The Impact of Trade on Organization and Productivity. *Quarterly Journal of Economics*, 127(3):1393–1467, 2012.

Carluccio, Juan, Alejandro Cuñat, Harald Fadinger, and Christian Fons-Rosen. Offshoring and Skill-upgrading in French Manufacturing. *Journal of International Economics*, 118:138–159, 2019.

Chaney, Thomas. Distorted Gravity: The Intensive and Extensive Margins of International Trade. *American Economic Review*, 98(4):1707–21, 2008.

Chen, Cheng. Trade Liberalization, Agency Problem and Aggregate Productivity. *European Economic Review*, 111(C):421–442, 2019.

Coles, Jeffrey L., Naveen D. Daniel, and Lalitha Naveen. Managerial Incentives and Risk-Taking. *Journal of Financial Economics*, 79(2):431–468, 2006.

Conconi, Paola, Manuel García-Santana, Laura Puccio, and Roberto Venturini. From Final Goods to Inputs: The Protectionist Effect of Rules of Origin. *American Economic Review*, 108(8):2335–2365, 2018.

Cuñat, Vicente and Maria Guadalupe. Globalization and the Provision of Incentives inside the Firm: The Effect of Foreign Competition. *Journal of Labor Economics*, 27(2):179–212, 2009.

Dao, Mai Chi, Mitali Das, Zsoka Koczan, and Weicheng Lian. Why Is Labor Receiving a Smaller Share of Global Income? Theory and Empirical Evidence. IMF Working Papers 17/169, 2017.

De Loecker, Jan, Jan Eeckhout, and Gabriel Unger. The Rise of Market Power and the Macroeconomic Implications. *Quarterly Journal of Economics*, 135(2):561–644, 2020.

Edmans, Alex, Xavier Gabaix, and Augustin Landier. A Multiplicative Model of Optimal CEO Incentives in Market Equilibrium. *Review of Financial Studies*, 22(12):4881–4917, 2009.

Eisfeldt, Andrea L., Antonio Falato, and Mindy Z. Xiaolan. Human Capitalists. UCLA mimeo, 2019.

Falato, Antonio and Dalida Kadyrzhanova. Optimal CEO Incentives and Industry Dynamics. Finance and Economics Series 2012-78, Federal Reserve System, 2012.

Feenstra, Robert C. and Gordon H. Hanson. The Impact of Outsourcing and High-Technology Capital on Wages: Estimates for the United States, 1979-1990. *Quarterly Journal of Economics*, 114(3):907–940, 1999.

Gabaix, Xavier and Augustin Landier. Why Has CEO Pay Increased So Much? *Quarterly Journal of Economics*, 123(1):49–100, 2008.

Goldsmith-Pinkham, Paul, Isaac Sorkin, and Henry Swift. Bartik Instruments: What, When, Why, and How. NBER Working Papers 24408, National Bureau of Economic Research, Inc, 2018.

Grossman, Gene M. and Esteban Rossi-Hansberg. Trading Tasks: A Simple Theory of Offshoring. *American Economic Review*, 98(5):1978–97, 2008.

Halpern, László, Miklós Koren, and Adam Szeidl. Imported Inputs and Productivity. *American Economic Review*, 105(12):3660–3703, 2015.

Hummels, David, Jun Ishii, and Kei-Mu Yi. The Nature and Growth of Vertical Specialization in World Trade. *Journal of International Economics*, 54(1):75–96, 2001.

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

Johnson, Robert C. and Guillermo Noguera. Accounting for Intermediates: Production Sharing and Trade in Value Added. *Journal of International Economics*, 86(2):224–236, 2012.

Keller, Wolfgang and William W. Olney. Globalization and Executive Compensation. NBER Working Papers 23384, National Bureau of Economic Research, Inc, 2017.

Luttmer, Erzo G. J. Selection, Growth, and the Size Distribution of Firms. *Quarterly Journal of Economics*, 122(3):1103–1144, 2007.

Ma, Lin and Dimitrije Ruzic. Globalization and Top Income Shares. National University of Singapore mimeo, 2019.

Marin, Dalia, Jan Schymik, and Alexander Tarasov. Trade in Tasks and the Organization of Firms. *European Economic Review*, 107(C):99–132, 2018.

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

Monte, Ferdinando. Skill Bias, Trade, and Wage Dispersion. *Journal of International Economics*, 83(2):202–218, 2011.

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

Piketty, Thomas and Emmanuel Saez. Top Incomes and the Great Recession: Recent Evolutions and Policy Implications. *IMF Economic Review*, 61(3):456–478, 2013.

Pupato, Germán. Performance Pay, Trade and Inequality. *Journal of Economic Theory*, 172(C):478–504, 2017.

Sampson, Thomas. Selection into Trade and Wage Inequality. *American Economic Journal: Microeconomics*, 6(3):157–202, 2014.

Schymik, Jan. Globalization and the Evolution of Corporate Governance. *European Economic Review*, 102(C):39–61, 2018.

Smith, Matthew, Danny Yagan, Owen M. Zidar, and Eric Zwick. Capitalists in the Twenty-First Century. NBER Working Papers 25442, National Bureau of Economic Research, Inc, 2019.

Song, Jae, David J. Price, Fatih Guvenen, Nicholas Bloom, and Till von Wachter. Firming Up Inequality. *Quarterly Journal of Economics*, 134(1):1–50, 2019.

Stein, Jeremy C. Agency, Information and Corporate Investment. In **Constantinides, George M., Milton Harris, and René M. Stulz**, editors, *Handbook of the Economics of Finance*, volume 1 of *Handbook of the Economics of Finance*, chapter 2, pages 111–165. Elsevier, 2003.

Terviö, Marko. The Difference That CEOs Make: An Assignment Model Approach. *American Economic Review*, 98(3):642–668, 2008.

Timmer, Marcel P., Abdul Azeez Erumban, Bart Los, Robert Stehrer, and Gaaitzen J. de Vries. Slicing Up Global Value Chains. *Journal of Economic Perspectives*, 28(2):99–118, 2014.

Wu, Yanhui. Managerial Incentives and Compensation in a Global Market. CEP Discussion Papers 1066, Centre for Economic Performance, LSE, 2011.

Table 1: Calibrated Parameter Values

	μ_i	κ_i	Z_{iS}	F_{iS}	N_i	β_i	σ	θ	B_1	B_2	B_3
	Industry-Specific Parameters						*Economy-Wide Parameters*				
	Calibrated Parameters USA										
Manufacturing	0.014	0.674	1.443	1.978	42,423,485	0.20					
Services	0.018	0.699	1.202	1.845	47,235,149	0.59	2.29	4.006	18.82	0.34	0.72
Other	0.009	0.695	1.307	1.927	42,506,072	0.21					
	Calibrated Parameters GBR										
Manufacturing	0.015	0.675	1.483	1.712	10,157,419	0.17					
Services	0.026	0.639	1.335	1.842	39,268,428	0.58	2.38	4.006	2.12	0.22	0.67
Other	0.015	0.700	1.304	1.545	10,161,213	0.25					

Table 2: Calibrated Moments

Moment		Moments GBR			Moments USA		
		Manuf.	*Serv.*	*Oth.*	*Manuf.*	*Serv.*	*Oth.*
Expenditure Share	Model	0.281	0.137	0.154	0.176	0.053	0.101
on Imported Inputs	Data	0.281	0.138	0.155	0.176	0.053	0.101
	Deviation	*-0.1%*	*-0.2%*	*-0.2%*	*-0.1%*	*-0.3%*	*-0.2%*
Knowledge Premium	Model	2.777	3.310	2.891	5.810	5.943	5.368
10th Percentile	Data	2.736	3.259	3.036	5.442	5.141	4.868
	Deviation	*1.5%*	*1.6%*	*-4.8%*	*6.8%*	*15.6%*	*10.3%*
Knowledge Premium	Model	4.228	4.633	5.118	6.525	6.716	6.065
50th Percentile	Data	4.635	4.912	4.848	6.938	7.218	6.666
	Deviation	*-8.8%*	*-5.7%*	*5.6%*	*-5.9%*	*-6.9%*	*-9.0%*
Knowledge Premium	Model	7.161	6.970	7.365	7.945	8.386	7.558
90th Percentile	Data	6.643	6.558	7.125	8.254	8.920	8.428
	Deviation	*7.8%*	*6.3%*	*3.4%*	*-3.7%*	*-6.0%*	*-10.3%*
Firm Sales	Model	8.911	8.729	9.842	11.262	11.256	11.282
50th Percentile	Data	8.912	8.730	9.842	12.115	12.108	12.135
	Deviation	*-0.1%*	*-0.1%*	*-0.1%*	*-7.0%*	*-7.0%*	*-7.0%*
Mass of	Model		1,649,888			6,279,268	
Active Firms	Data		1,646,285			6,022,127	
	Deviation		*0.2%*			*4.3%*	

Table 3: Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	25th Pct.	Median	75th Pct.
Manager-Year Level						
Labor Income (in Thd. USD)	201,008	2,410	11,040	433	940	2,207
Equity Wealth (in Thd. USD)	165,068	24,150	392,268	870	2,926	9,208
Firm-Year Level						
Assets (in Mio. USD)	42,703	7,976	25,498	196	936	4,060
Employment (in Thd.)	40,291	12.4	27.9	0.5	2.6	9.8
Sales (in Mio. USD)	40,536	3,698	8,942	179	743	2,670
Country-Industry-Year Level						
Imported Inputs (Expenditure Share)	1,431	0.16	0.10	0.08	0.13	0.20
Output (in Mio. USD)	1,431	257,977	360,530	41,585	125,572	315,866
Imports (in Mio. USD)	1,431	25,368	42,949	3,289	9,003	27,360
Exports (in Mio. USD)	1,431	19,069	26,002	3,174	10,056	23,949

Table 4: Equity Ownership, Firm and Industry Characteristics

(a) Firm Covariates

	Sales (log)	Employment (log)	Capital Intensity (log)	Multinational Firm	Importer
Equity Ownership (log)	0.421***	0.378***	0.260***	0.539***	0.734***
Equity Ownership Share	0.0108***	0.00792***	0.0158***	0.00424	0.0114*

(b) Industry Covariates

	Offshorability (S.D.)	TFP (log)	Output (log)
Equity Ownership (log)	0.132***	0.461***	0.200***
Equity Ownership Share	0.00990***	0.0578***	0.00725***

Notes: The cells are coefficient estimates of various univariate regressions, whose dependent variables are down the rows and regressors are along the columns. Specifications additionally include country-year fixed effects and in Table (a) also industry fixed effects. Dependent variables are *Equity Ownership* (in logs) and the *Equity Ownership Share* △ (*Equity Ownership* relative to the sum of *Labor Income* and *Equity Ownership*). Standard errors are cluster-robust at the firm level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5: Importing and Equity Price Reactions Across Firms

	Equity Price			
	(1)	(2)	(3)	(4)
	By Sales		*By Employment*	
Import Share by Firm-Size Quintile				
Import Share × Q1	0.336	-0.943	2.313	0.0675
	(1.740)	(2.837)	(1.526)	(3.049)
Import Share × Q2	0.725	-0.431	1.502	2.195
	(1.382)	(2.570)	(1.097)	(2.279)
Import Share × Q3	2.563***	2.320	2.127**	3.464**
	(0.794)	(1.963)	(0.810)	(1.510)
Import Share × Q4	2.218***	3.251**	3.232***	4.654***
	(0.791)	(1.492)	(0.976)	(1.464)
Import Share × Q5	2.534***	3.750***	2.180***	4.187**
	(0.781)	(1.391)	(0.772)	(2.048)
Firm F.E.	yes	yes	yes	yes
Country-Year F.E.	yes	yes	yes	yes
First-Stage				
KP F-test		8.335		8.904
Overident. (p-value)		0.0579		0.432
Observations	32,100	32,100	30,793	30,793
Cluster Groups	95	95	95	95
Firms	3,123	3,123	2,840	2,840

Notes: The dependent variable *Equity Price* is the average annual price of a firm's main security (in logs). *Import Share* is the expenditure share on foreign inputs measured at the country-industry-year level based on WIOD data. All specifications include firm-level *Capital Intensity* and country-industry-year level *Output* and a *TFP* index (output suppressed). All estimations include fixed effects for firms and country-years. Instrumental variables are international trade and transport margins and world export supply described in subsection 3.3. Firm-size quintiles are based on the average firm sales or employment during the first 3 sample years and order the sample firms within the same country. Standard errors are cluster-robust at the country-industry pair level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6: Importing and Equity Price Reactions By Importer Status

	Equity Ownership	
	(1)	(2)
Import Share by Importer Status		
Import Share × Non-Importer	-0.496	-6.115
	(1.356)	(4.884)
Import Share × Importer	2.116***	2.914*
	(0.578)	(1.601)
Capital Intensity	0.252***	0.252***
	(0.0420)	(0.0418)
Industry Output	0.582***	0.589***
	(0.120)	(0.121)
Industry TFP	-0.0121	-0.00801
	(0.171)	(0.172)
Firm F.E.	yes	yes
Country-Year F.E.	yes	yes
First Stage		
KP F-test		16.61
Overident. (p-value)		0.437
Observations	27,115	27,115
Cluster Groups	94	94
Firms	2,888	2,888

Notes: The dependent variable *Equity Price* is the average annual price of a firm's main security (in logs). *Import Share* is the expenditure share on foreign inputs measured at the country-industry-year level based on WIOD data. *(Non-)Importer* is a time invariant firm dummy obtained using WorldBase data (see description in main text). All specifications include firm-level *Capital Intensity* and country-industry-year level *Output* and a *TFP* index. All estimations include fixed effects for individual firms and country-years. Instrumental variables are international trade and transport margins and world export supply described in subsection 3.3. Standard errors are cluster-robust at the country-industry pair level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7: Importing and Equity Ownership Across Firms

	Equity Ownership					
	(1)	(2)	(3)	(4)	(5)	(6)
	By Sales			*By Employment*		
Import Share by Firm-Size Quintile						
Import Share × Q1	-2.909	-5.738*	-3.991	-1.258	0.874	4.940
	(2.246)	(3.013)	(3.843)	(2.086)	(3.923)	(5.155)
Import Share × Q2	-0.855	0.236	0.946	-0.952	1.579	2.803
	(1.386)	(3.144)	(4.300)	(1.145)	(3.196)	(3.756)
Import Share × Q3	0.351	2.598	4.997	0.925	4.657	6.357
	(0.867)	(2.947)	(4.063)	(0.873)	(3.350)	(3.958)
Import Share × Q4	2.327***	4.116*	3.434	3.573***	8.426***	8.431***
	(0.839)	(2.311)	(3.263)	(0.972)	(1.975)	(3.082)
Import Share × Q5	4.723***	9.908***	11.93***	5.264***	12.43***	14.04***
	(0.838)	(1.475)	(2.460)	(0.940)	(2.058)	(3.258)
Match F.E.	yes	yes	yes	yes	yes	yes
Country-Year F.E.	yes	yes	yes	yes	yes	yes
First-Stage						
KP F-test		12.34	10.64		14.69	13.55
Overident. (p-value)		0.330	0.271		0.339	0.170
Sample	All	All	CEOs	All	All	CEOs
Observations	130,175	130,175	25,896	127,253	127,253	25,079
Cluster Groups	95	95	95	95	95	95
Firms	3,071	3,071	2,921	2,792	2,792	2,698
Individuals	24,295	24,295	5,294	23,454	23,454	5,030

Notes: The dependent variable *Equity Ownership* is an individual manager's total ownership of equity (in logs) linked to the employer's stock price. Equity ownership comprises the total value of all equity-linked compensation that an individual has earned over the career that is linked to the equity of the employing firm. Outstanding rewarded options are priced according to Black-Scholes formula. *Import Share* is the expenditure share on foreign inputs measured at the country-industry-year level based on WIOD data. All specifications include firm level *Capital Intensity* and country-industry-year level *Output* and a *TFP* index (output suppressed). All estimations include fixed effects for individual manager-firm matches and country-years. Instrumental variables are international trade and transport margins and world export supply described in subsection 3.3. Firm-size quintiles are based on the average firm sales or employment during the first 3 sample years and order the sample firms within the same country. Standard errors are cluster-robust at the country-industry pair level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 8: Equity Ownership by Importer Status

	Equity Ownership	
	(1)	(2)
Import Share by Importer Status		
Import Share × Non-Importer	-0.443	2.069
	(1.838)	(6.506)
Import Share × Importer	1.893**	6.496***
	(0.913)	(2.122)
Capital Intensity	0.324***	0.324***
	(0.0504)	(0.0506)
Industry Output	0.389***	0.400***
	(0.135)	(0.137)
Industry TFP	0.260*	0.246
	(0.150)	(0.158)
Match F.E.	yes	yes
Country-Year F.E.	yes	yes
First Stage		
KP F-test		18.76
Overident. (p-value)		0.429
Observations	124,032	124,032
Cluster Groups	94	94
Firms	2,822	2,822
Individuals	22,834	22,834

Notes: The dependent variable *Equity Ownership* is an individual manager's total ownership of equity (in logs) linked to the employer's stock price. Equity ownership comprises the total value of all equity-linked compensation that an individual has earned over the career that is linked to the equity of the employing firm. Outstanding rewarded options are priced according to Black-Scholes formula. *Import Share* is the expenditure share on foreign inputs measured at the country-industry-year level based on WIOD data. *(Non-)Importer* is a time invariant firm dummy obtained using WorldBase data (see description in main text). All estimations include fixed effects for individual manager-firm matches and country-years. Instrumental variables are international trade and transport margins and world export supply described in subsection 3.3. Standard errors are cluster-robust at the country-industry pair level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 9: Importing and Changes in Compensation Practices Across Firms

	New Equity-Linked Income / (Salary + Bonus + New Equity-Linked Income)			
	(1)	(2)	(3)	(4)
	By Sales		*By Employment*	
Import Share by Firm-Size Quintile				
Import Share × Q1	-0.288	-2.443**	-0.224	-1.547*
	(0.564)	(0.996)	(0.489)	(0.899)
Import Share × Q2	-0.400	-2.120**	-0.0166	-0.273
	(0.355)	(0.853)	(0.285)	(0.684)
Import Share × Q3	0.213	-0.561	0.510**	0.624
	(0.207)	(0.515)	(0.212)	(0.549)
Import Share × Q4	0.880***	0.573	0.724***	0.705*
	(0.174)	(0.394)	(0.187)	(0.420)
Import Share × Q5	0.959***	0.973***	0.950***	1.660***
	(0.169)	(0.328)	(0.193)	(0.442)
Match F.E.	yes	yes	yes	yes
Country-Year F.E.	yes	yes	yes	yes
First Stage				
KP F-test		13.10		25.61
Overident. (p-value)		0.240		0.290
Observations	151,824	151,824	149,836	149,836
Cluster Groups	94	94	94	94
Firms	3,056	3,056	2,874	2,874
Individuals	27,120	27,120	26,594	26,594

Notes: The dependent variable is the fraction of *Equity-Linked Income* relative to the sum of the *Salary*, *Bonuses* and *Equity-Linked Income*. *Import Share* is the expenditure share on foreign inputs measured at the country-industry-year level based on WIOD data. All specifications include firm level *Capital Intensity* and country-industry-year level *Output* and a *TFP* index (output suppressed). All estimations include fixed effects for individual manager-firm matches and country-years. Instrumental variables are international trade and transport margins and world export supply described in subsection 3.3. Firm-size quintiles are based on the average firm sales or employment during the first 3 sample years and order the sample firms within the same country. Standard errors are cluster-robust at the country-industry pair level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 10: Importing and Changing Compensation Structure

	Equity Ownership		Labor Income		Equity Ownership Share	
	(1)	(2)	(3)	(4)	(5)	(6)
	By Sales	*By Empl.*	*By Sales*	*By Empl.*	*By Sales*	*By Empl.*
Import Share by Firm-Size Quintile						
Import Share × Q1	-5.738*	0.874	-1.884	-1.857	-0.395	0.361
	(3.013)	(3.923)	(2.713)	(2.513)	(0.345)	(0.340)
Import Share × Q2	0.236	1.579	-4.035**	0.209	0.384	0.187
	(3.144)	(3.196)	(1.614)	(1.469)	(0.333)	(0.328)
Import Share × Q3	2.598	4.657	-1.374	1.493	0.345	0.263
	(2.947)	(3.350)	(1.229)	(1.286)	(0.453)	(0.375)
Import Share × Q4	4.116*	8.426***	1.880***	2.057**	0.204	0.867***
	(2.311)	(1.975)	(0.653)	(0.988)	(0.287)	(0.198)
Import Share × Q5	9.908***	12.43***	4.256***	5.962***	0.786***	1.054***
	(1.475)	(2.058)	(0.709)	(1.076)	(0.200)	(0.245)
Match F.E.	yes	yes	yes	yes	yes	yes
Country-Year F.E.	yes	yes	yes	yes	yes	yes
First Stage						
KP F-test	12.34	14.69	13.79	18.81	12.68	14.77
Overident. (p-value)	0.330	0.339	0.178	0.419	0.587	0.661
Observations	130,175	127,253	161,618	158,029	129,349	127,009
Cluster Groups	95	95	95	95	95	95
Firms	3,071	2,792	3,241	2,963	3,031	2,780
Individuals	24,295	23,454	28,677	27,734	24,205	23,480

Notes: The dependent variable *Equity Ownership* is an individual manager's total ownership of equity (in logs) linked to the employer's stock price. Equity ownership comprises the total value of all equity-linked compensation that an individual has earned over the career that is linked to the equity of the employing firm. Outstanding rewarded options are priced according to Black-Scholes formula. The dependent variable *Labor Income* is an individual executive's annual total income (in logs). The dependent variable *Equity Ownership Share* is the value of *Equity Ownership* relative to the sum of *Equity Ownership* and *Labor Income*. *Import Share* is the expenditure share on foreign inputs measured at the country-industry-year level based on WIOD data. All specifications include firm level *Capital Intensity* and country-industry-year level *Output* and a *TFP* index (output suppressed). All estimations include fixed effects for individual manager-firm matches and country-years. Instrumental variables are international trade and transport margins and world export supply described in subsection 3.3. Firm-size quintiles are based on the average firm sales or employment during the first 3 sample years and order the sample firms within the same country. Standard errors are cluster-robust at the country-industry pair level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 11: Importing and Within-Firm Rent Distribution

	∅ Equ. Ownsh./ Labor Expenses		∅ Lab. Inc./ Labor Expenses	∅ Equ. Ownsh./ Labor Expenses		∅ Lab. Inc./ Labor Expenses
	(1)	(2)	(3)	(4)	(5)	(6)
	By Sales			*By Employment*		
Import Share by Firm-Size Quintile						
Import Share × Q1	-5.470	-17.29***	-12.09	-6.177*	-16.28***	-13.90**
	(3.661)	(3.945)	(7.455)	(3.402)	(4.753)	(5.772)
Import Share × Q2	0.524	-18.04**	-10.13**	0.780	-9.251***	-3.799*
	(2.813)	(7.651)	(4.750)	(1.229)	(3.283)	(2.044)
Import Share × Q3	-1.644	-11.51***	-4.908**	-0.238	-12.29***	-2.623
	(2.254)	(3.400)	(2.013)	(2.125)	(4.355)	(2.528)
Import Share × Q4	4.982***	-0.670	2.383	5.651***	3.157	1.365
	(1.703)	(3.227)	(2.069)	(1.809)	(3.061)	(2.323)
Import Share × Q5	6.354***	9.464***	4.381*	7.399***	12.63***	8.304***
	(1.479)	(3.541)	(2.591)	(1.863)	(3.846)	(2.976)
Firm F.E.	yes	yes	yes	yes	yes	yes
Country-Year F.E.	yes	yes	yes	yes	yes	yes
First Stage						
KP F-test		18.09	21.91		9.766	9.429
Overident. (p-value)		0.360	0.556		0.381	0.279
Observations	10,801	10,801	11,030	9,186	9,186	9,489
Cluster Groups	87	87	87	85	85	85
Firms	1,240	1,240	1,240	945	945	961

Notes: The dependent variable ∅ *Equ. Ownsh. / Labor Expenses* is the average firm level managerial value of equity ownership relative to the firm level labor expenses (in logs). The dependent variable ∅ *Lab. Inc. / Labor Expenses* is the average firm level managerial income relative to the firm level labor expenses (in logs). *Import Share* is the expenditure share on foreign inputs measured at the country-industry-year level based on WIOD data. All specifications include firm level *Capital Intensity* and country-industry-year level *Output* and a *TFP* index. All estimations include fixed effects for firms and country-years. Instrumental variables are international trade and transport margins and world export supply described in subsection 3.3. Firm-size quintiles are based on the average firm sales or employment during the first 3 sample years and order the sample firms within the same country. Standard errors are cluster-robust at the country-industry pair level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Online Appendices (Not Intended For Publication)

Contents

A Model Proofs

A.1 Proof of Proposition 1: Assignment

Consider the assignment equation (6). Differentiating expected profits with respect to knowledge k and then substituting $q = \frac{Q_i}{N_i}k$ yields:

$$\frac{dE\left[\pi\left(k,q\right)\right]}{dk}_{|q=q(k)} = \begin{cases} \mu_i\left(\sigma-1\right)\frac{1}{\sigma}\left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} A_i Z_{iS}^{\sigma-1}\left(\frac{Q_i}{N_i}\right)^{\kappa_i(\sigma-1)} k^{(\kappa_i+\mu_i)(\sigma-1)-1} & \text{if } k_{iS} \leq k \\ \mu_i\left(\sigma-1\right)\frac{1}{\sigma}\left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} A_i \left(\frac{Q_i}{N_i}\right)^{\kappa_i(\sigma-1)} k^{(\kappa_i+\mu_i)(\sigma-1)-1} & \text{if } \underline{k}_i < k < k_{iS}. \end{cases}$$

Integrating this expression over k using the occupational indifference of the marginal manager yields

$$r_i\left(k\right) = \Psi_i\left(k\right)+1,$$

where the knowledge premium $\Psi_i\left(k\right)$ can be stated as

$$\Psi_i\left(k\right) = \begin{cases} \frac{\mu_i}{\kappa_i+\mu_i}\frac{1}{\sigma}\left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} A_i\left(\frac{Q_i}{N_i}\right)^{\kappa_i(\sigma-1)} & \\ \times\left(\left(k^{(\kappa_i+\mu_i)(\sigma-1)}-\underline{k}_i^{(\kappa_i+\mu_i)(\sigma-1)}\right)+\left(Z_{iS}^{\sigma-1}-1\right)\left(k^{(\kappa_i+\mu_i)(\sigma-1)}-k_{iS}^{(\kappa_i+\mu_i)(\sigma-1)}\right)\right) & \text{if } k_{iS} \leq k \\ \frac{\mu_i}{\kappa_i+\mu_i}\frac{1}{\sigma}\left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} A_i\left(\frac{Q_i}{N_i}\right)^{\kappa_i(\sigma-1)}\left(k^{(\kappa_i+\mu_i)(\sigma-1)}-\underline{k}_i^{(\kappa_i+\mu_i)(\sigma-1)}\right) & \text{if } \underline{k}_i < k < k_{iS}. \end{cases}$$

A.2 The Industry Price Index

Since firms face identical demand elasticities, the operating profit ratio of a marginal importer and the zero cutoff earnings firm can be stated as

$$\frac{\frac{1}{\sigma}\left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} A_i k_{iS}^{(\sigma-1)(\kappa_i+\mu_i)}}{\frac{1}{\sigma}\left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} A_i \underline{k}_i^{(\sigma-1)(\kappa_i+\mu_i)}}\left(Z_{iS}^{\sigma-1}-1\right) = F_{iS},$$

which yields $k_{iS} = \left(Z_{iS}^{\sigma-1}-1\right)^{-\frac{1}{(\sigma-1)(\kappa_i+\mu_i)}} F_{iS}^{\frac{1}{(\sigma-1)(\kappa_i+\mu_i)}}\underline{k}_i$. The industry price index is $P_i = \left[\int_{\underline{k}_i}^{\infty} p_\omega^{1-\sigma} d\omega\right]^{1/(1-\sigma)}$. Plugging the firms' pricing decision $p = \frac{\sigma}{\sigma-1}\left(\frac{Q_i}{N_i}\right)^{-\kappa_i} Z_{iS}^{-1}k^{-(\kappa_i+\mu_i)}$ into P_i and integrating over the distribution of knowledge, the price index can be written as

$$P_i = \frac{\sigma}{\sigma-1}\left(\frac{Q_i}{N_i}\right)^{-\kappa_i}\left[\int_{\underline{k}_i}^{k_{iS}}\left(k^{-(\kappa_i+\mu_i)}\right)^{1-\sigma} dN_i\left(1-k^{-1}\right)+\int_{k_{iS}}^{\infty}\left(Z_{iS}^{-1}k^{-(\kappa_i+\mu_i)}\right)^{1-\sigma} dN_i\left(1-k^{-1}\right)\right]^{1/(1-\sigma)}.$$

Simplifying notation by introducing $\xi_i \equiv 1-(\sigma-1)(\kappa_i+\mu_i) \in (0,1)$ and the index of input-trade integration $\delta_i \equiv \left(Z_{iS}^{\sigma-1}-1\right)^{\frac{1}{1-\xi_i}} F_{iS}^{-\frac{\xi_i}{1-\xi_i}}$, then leads to

$$P_i = \frac{\sigma}{\sigma-1}\left(\frac{Q_i}{N_i}\right)^{-\kappa_i}\left(\frac{\xi_i}{N_i}\right)^{1/(\sigma-1)}\left(1+\delta_i\right)^{\frac{1}{1-\sigma}}\underline{k}_i^{\frac{\xi_i}{\sigma-1}}. \blacksquare$$

A.3 Proof of Proposition 2: Contracts

In equilibrium, the manager requires to receive a compensation of $r_i(k)$ in expectation and to obtain an expected indirect utility $r_i(k) P^{-1}G(\overline{e}) = r_i(k) P^{-1}$. Low effort $\underline{e}$ yields utility

$$\begin{aligned} E\left[w_i(k) P^{-1}G(\underline{e}) | \underline{e}\right] &= E\left[f + V((1-|\underline{e}|)\Pi)\right] P^{-1}G(\underline{e}) \\ &= E\left[f + V(\Pi) - |\underline{e}|^{\varepsilon_V} E\left[V(\Pi)\right]\right] P^{-1}\frac{1}{1-\lambda(e,\Psi_i)}. \end{aligned}$$

Hence, the manager exerts effort if $E\left[w_i(k) G(\overline{e}) | \overline{e}\right] \geq E\left[w_i(k) G(\underline{e}) | \underline{e}\right]$, i.e. when

$$r_i(k) \geq \frac{r_i(k) - |\underline{e}|^{\varepsilon_V} E\left[V(\Pi)\right]}{1-\lambda(e,\Psi_i)} \Leftrightarrow E\left[V(\Pi)\right] \geq r_i(k)\frac{\lambda(e,\Psi_i)}{|\underline{e}|^{\varepsilon_V}},$$

such that the share of equity ownership in total expected compensation $\triangle$ is given by

$$\triangle = \frac{\lambda(e,\Psi_i)}{|\underline{e}|^{\varepsilon_V}}. \blacksquare$$

A.4 Relation Between Firm Size and Equity Ownership

Consider the fraction of equity ownership in compensation $\triangle$. There are two distinct margins of adjustment for $\triangle$ when the expected firm surplus changes. First, private benefits $\lambda(\underline{e},\Psi_i)$ increase with the knowledge premium Ψ_i which makes stronger financial incentives necessary in larger firms to induce the manager to forego these private benefits. Second, for a given strike price the elasticity of the equity portfolio with respect to changes in the firm surplus ε_V falls when the expected surplus increases. Both margins, $\lambda(\underline{e},\Psi_i)\uparrow$ and $\varepsilon_V\downarrow$ let $\triangle$ increase.

Consider the relation between ε_V and firm surpluses. Suppose a manager's equity portfolio consists of a call option on the firm surplus Π (with $E[\Pi] = \pi$) with a strike price of S. Denote the standard deviation of realized firm surpluses by σ_Π. According to the Black-Scholes formula, the value V of that option is $V = \Pi\phi(d_1) - S_n\phi(d_2)$, where $\phi(.)$ is the cumulative distribution function of a standard normal variable and the terms d_1 and d_2 are defined as

$$\begin{aligned} d_1 &\equiv \frac{\ln(\Pi/S) + \sigma_\Pi^2/2}{\sigma_\Pi} \\ d_2 &\equiv \frac{\ln(\Pi/S) - \sigma_\Pi^2/2}{\sigma_\Pi}. \end{aligned}$$

The "delta" of the option (i.e. the derivative of V with respect to firm surplus Π) is given by $\frac{dV}{d\Pi} = \phi(d_1) > 0$ and an individual option's elasticity with respect to the firm's surplus equals

$$\varepsilon_V = \frac{dV}{d\Pi}\frac{\Pi}{V} = \frac{\Pi\phi(d_1)}{\Pi\phi(d_1) - S\phi(d_2)} > 1.$$

This elasticity is falling in the firm surplus Π and converges to one when the firm surplus approaches infinity:

$$\frac{d\varepsilon_V}{d\Pi} < 0, \quad \lim_{\Pi\to\infty}\varepsilon_V = 1.$$

Equivalently, the same argument can be made when the manager's equity ownership consists of $1, ..., n$

European call options on parts of the firm surplus such that ε_V becomes a weighted sum of individual elasticities each falling in firm surpluses. ■

A.5 Closing the Model

Zero Cutoff Earnings: Consider the marginal firm that just breaks even and does not engage in importing such that:

$$\frac{1}{\sigma}\left(\frac{\sigma}{\sigma-1}\right)^{1-\sigma} A_i \left(\left(\frac{Q_i}{N_i}\right)^{\kappa_i} \underline{k}_i^{\kappa_i+\mu_i}\right)^{\sigma-1} = 1,$$

which can be restated as follows using the price index from above leading to

$$X_i(\underline{k}_i) = \frac{\sigma N_i\left(1+\delta_i\right)}{\xi_i}\underline{k}_i^{-1}. ■$$

Effective Industry Size A_i: Using the zero cutoff earnings condition and the industry price index from above, the effective industry size can be stated as

$$A_i \quad = \quad X_i P_i^{\sigma-1} = \sigma\left(\frac{\sigma}{\sigma-1}\right)^{\sigma-1}\left(\frac{Q_i}{N_i}\right)^{-\kappa_i(\sigma-1)} \underline{k}_i^{\xi_i-1}. ■$$

Labor Market Clearing: Simplifying the labor market clearing condition yields

$$\frac{\sigma-1}{\sigma}\sum_{i=1}^{I} X_i \quad = \quad \sum_{i=1}^{I} N_i\left(1-\left(1+\delta_i\right)\underline{k}_i^{-1}\right).$$

Plugging in the $\underline{k}_i^{-1}$ from the zero cutoff earnings condition (12) then yields

$$\sum_{i=1}^{I} X_i \quad = \quad \sum_{i=1}^{I} \frac{\sigma}{\sigma-1+\xi_i} N_i. ■$$

Knowledge Premium: Plugging A_i into the formula for the knowledge premium and simplifying terms yields

$$\Psi_i\left(k\right) \quad = \quad \begin{cases} \frac{\mu_i}{\kappa_i+\mu_i}\left(Z_{iS}^{\sigma-1}\left(\frac{k}{\underline{k}_i}\right)^{1-\xi_i} - F_{iS} - 1\right) & \text{if } k_{iS} \leq k \\ \frac{\mu_i}{\kappa_i+\mu_i}\left(\left(\frac{k}{\underline{k}_i}\right)^{1-\xi_i} - 1\right) & \text{if } \underline{k}_i < k < k_{iS}. ■ \end{cases}$$

A.6 Proof of Proposition 3: Comparative Static with $dZ_{iS} > 0$

Change in the Importer Cutoff k_{iS}: Consider how an increase in Z_{iS} affects k_{iS}. First notice that $dZ_{iS} > 0$ raises the index of trade integration $\delta_i = \left(Z_{iS}^{\sigma-1} - 1\right)^{\frac{1}{1-\xi_i}} F_{iS}^{-\frac{\xi_i}{1-\xi_i}}$. Furthermore, from (12) and (13) it can be seen that $\underline{k}_i$ rises as well. Plugging $\underline{k}_i$ and δ_i into the indifference condition of

Figure A1: Industry Equilibrium Effects of Input Trade Globalization ($d\delta_i > 0$)

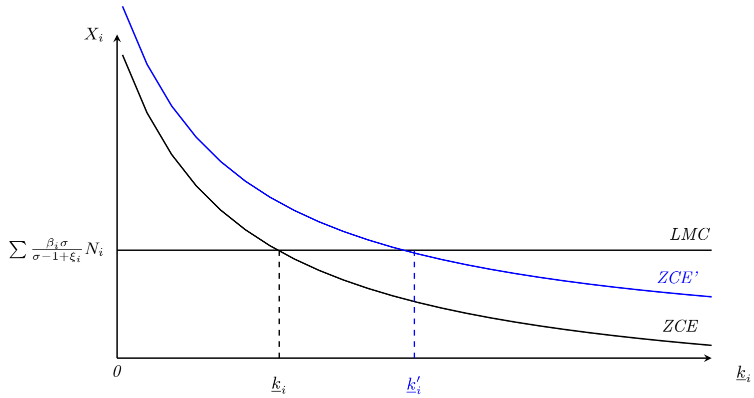
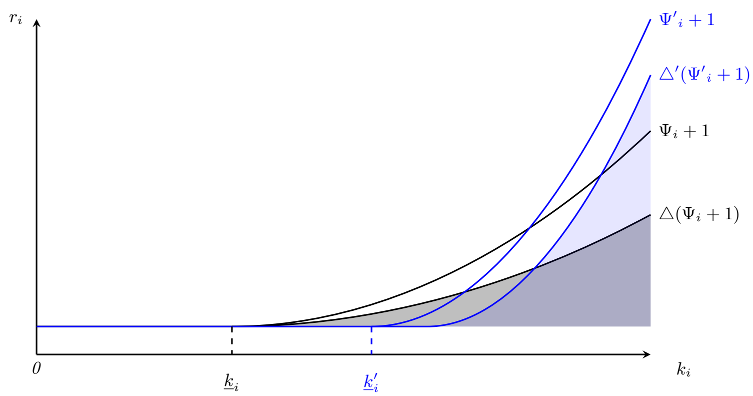


Figure A2: Input Trade Liberalization, Knowledge Premia and Equity Ownership



the marginal importer allows to see how the importer cutoff k_{iS} adjusts to this trade liberalization:

$$k_{iS} = \left(\left(Z_{iS}^{\sigma-1} - 1 \right)^{-\frac{1}{1-\xi_i}} F_{iS}^{\frac{1}{1-\xi_i}} + F_{iS} \right) \left(\frac{\sigma N_i}{\xi_i X_i} \right),$$

such that $\frac{dk_{iS}}{dZ_{iS}} < 0$.

Change in the Knowledge Premia $\Psi_i(k)$: Next, consider how an increase in Z_{iS} affects the knowledge premium. The derivative of $\Psi_i(k)$ with respect to Z_{iS} can be written as

$$\frac{d\Psi_i(k)}{dZ_{iS}} = \begin{cases} \frac{\mu_i(\sigma-1)}{\kappa_i+\mu_i} \left(\frac{k}{\underline{k}_i} \right)^{(\kappa_i+\mu_i)(\sigma-1)} Z_{iS}^{\sigma-1} \left(Z_{iS}^{-1} - (\kappa_i+\mu_i) \underline{k}_i^{-1} \frac{d\underline{k}_i}{dZ_{iS}} \right) > 0 & \text{if } k_{iS} \leq k \\ -\mu_i(\sigma-1) \left(\frac{k}{\underline{k}_i} \right)^{(\kappa_i+\mu_i)(\sigma-1)} \underline{k}_i^{-1} \frac{d\underline{k}_i}{dZ_{iS}} < 0 & \text{if } \underline{k}_i < k < k_{iS}, \end{cases}$$

such that the knowledge premium increases for managers of importing firms and falls for managers of domestic firms. ■

B Details on the Calibration

B.1 Derivations

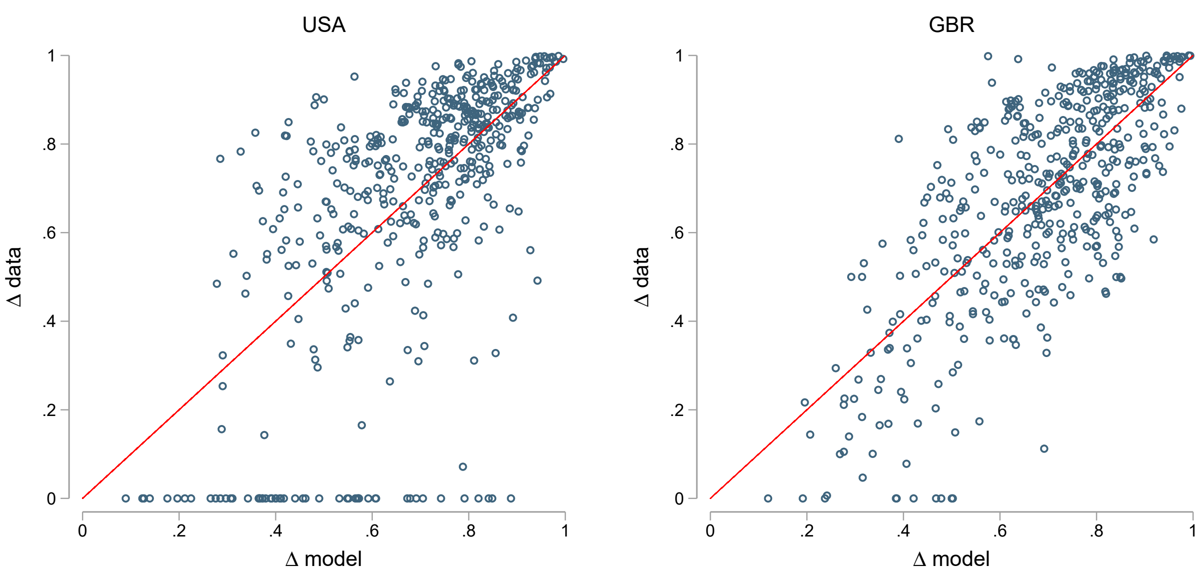
Stating Firm Sales and Knowledge Premia in Terms of Market Shares $\mathcal{M}$: Assuming that firms within the list of top 500 firms are importers[31] firm sales are $\sigma Z_{iS}^{\sigma-1}\left(\frac{k}{\underline{k}_i}\right)^{1-\xi_i}$, where the term $\frac{k}{\underline{k}_i}$ is unobservable. This term can be backed out from the market share of an individual firm using $\mathcal{M}\equiv\sigma Z_{iS}^{\sigma-1}\left(\frac{k}{\underline{k}_i}\right)^{1-\xi_i}X_i^{-1}$ such that

$$\mathcal{M}=\left(\frac{k}{\underline{k}_i}\right)^{1-\xi_i}\left(\frac{\xi_i\underline{k}_i Z_{iS}^{\sigma-1}}{N_i\left(1+\delta_i\right)}\right)\Leftrightarrow\left(\frac{k}{\underline{k}_i}\right)^{1-\xi_i}=\mathcal{M}\frac{N_i\left(1+\delta_i\right)}{\xi_i Z_{iS}^{\sigma-1}\underline{k}_i}\Leftrightarrow k=\left(\mathcal{M}\frac{N_i\left(1+\delta_i\right)}{\xi_i Z_{iS}^{\sigma-1}\underline{k}_i^{\xi_i}}\right)^{1/(1-\xi_i)}.$$

Stating the knowledge premium and sales as functions of $\mathcal{M}$ yields:

$$\begin{aligned} sales &= \sigma\mathcal{M}\frac{N_i\left(1+\delta_i\right)}{\xi_i\underline{k}_i} \\ knowledge\,premium &= \frac{\mu}{\kappa+\mu}\left(\mathcal{M}\frac{N_i\left(1+\delta_i\right)}{\xi_i\underline{k}_i}-\left(F_{iS}+1\right)\right) \end{aligned}$$

Figure B1: Equity Ownership in the Model and the Data



Notes: The Figure shows scatter plots of calibrated versus observed equity ownership shares △ for the U.S. (left graph) and the U.K. (right graph).

[31] This can be verified ex post by comparing the computed values for k with the calibrated value for k_{iS}.

C Empirical Appendix

C.1 Variable Descriptions

- *Labor Income:* variable `TotalAnnualCompensation` from BoardEx U.K. or variable `tdc2` from ExecuComp for the U.S. in nominal Thd. $ (in logs); Source: BoardEx, ExecuComp
- *Equity Ownership:* variable `TotalWealth` from BoardEx U.K. or variable `firm_related_wealth` from Coles et al. (2006) using ExecuComp for the U.S. in nominal Thd. $ (in logs); Source: BoardEx, ExecuComp, Coles et al. (2006)
- *Equity-Linked Income:* variable `TotalEquityLinkedCompensation` from BoardEx U.K. or variable `tdc2` from ExecuComp net of `salary` and `bonus` for the U.S. in nominal Thd. $ (in logs); Source: BoardEx, ExecuComp
- *Sales:* variable `sale` from Compustat in nominal Mio. $, winsorized at the 99th percentile (in logs); Source: Compustat North America, Compustat Global
- *Employment:* variable `emp` from Compustat in Thd., winsorized at the 99th percentile (in logs); Source: Compustat North America, Compustat Global
- *Capital Intensity:* ratio of variables `at` and `emp`, both winsorized at the 99th percentile (in logs); Source: Compustat North America, Compustat Global
- *Firm-Size Quintiles:* order firms into quintiles by their average sales or employment during the years 2000 to 2002 within their country of location; Source: Compustat North America, Compustat Global
- *Stock Price:* annual arithmetic mean of daily closing stock prices `prccd` in nominal $ (in logs); Source: Compustat North America, Compustat Global (Security Daily Files)
- *Labor Expenses:* variable `xlr` from Compustat in nominal Thd. $, winsorized at the 99th percentile (in logs); Source: Compustat North America, Compustat Global
- *Import Share:* expenditure on imported intermediates relative to total expenditures on intermediate inputs for a country-industry-year, industries matched to firms' main SIC industry; Source: WIOD
- *Industry Output:* gross output in nominal Mio. $ for a country-industry-year (in logs), industries matched to firms' main SIC industry; Source: WIOD Socio-Economic Accounts
- *Industry TFP:* TFP index for a country-industry-year, year 2000 is normalized to 100 (in logs), industries matched to firms' main SIC industry; Source: WIOD Socio-Economic Accounts
- *Offshorability:* measures prevalence of occupations that do not involve face-to-face interaction and can be done off site for an industry (see C.2 for details), standardized (s.d. = 1) at the industry level, industries matched to firms' primary 3-digit SIC level industry; Source: O*NET version 20.3, BLS OES from the year 2000, Acemoglu and Autor (2011), Blinder (2009), Bretscher (2019)
- *Trade Transport Margins:* wedge between input import and output export trade margins defined as in Equation (17) using the variable `IntTTM` in WIOD and input level country-industry specific input coefficients based on WIOD in the year 2000; Source: WIOD

- *World Export Supply:* aggregate sum of log input trade in the rest of the world defined as in Equation (18) using input level country-industry specific input coefficients based on WIOD in the year 2000; Source: WIOD

C.2 Details on the Data

C.2.1 Calculating Offshorability

I use data from the U.S. Department of Labor O*NET program on occupational task contents and the U.S. BLS Occupational Employment Statistics to calculate offshorability.[32] O*NET provides information about the tools, technology, knowledge, skills, work values, education, experience and training needed for various occupations. Following Acemoglu and Autor (2011), I calculate an offshorability score at the occupation level in the first step which aims to capture how well each individual occupation is offshorable. Acemoglu and Autor (2011) argue that occupations requiring a lot of face-to-face interactions and that need to be carried out on site are less likely to be offshorable. They conclude to focus on the seven occupational characteristics listed in Table C1 to determine offshorability at the occupation level. The first six of these work are listed as "activities" and provide values for their respective "importance" "level" while there is no "importance" score for the work context characteristic "Face-to-Face Discussions". Following Blinder (2009) and Bretscher (2019), I assign a Cobb-Douglas weight of 2/3 to "importance" and 1/3 to "level" and multiply the relative frequency for "Face-to-Face Discussions" by the level to obtain the offshorability score at the occupation level j:

$$off_j = \frac{1}{\sum_{a=1}^{6} I_{aj}^{2/3} L_{aj}^{1/3} + I_{cj} L_{cj}}. \tag{19}$$

In a second step, I aggregate the scores off_j at the industry level according to industry-specific employment shares:

$$OFF_i = \sum_j off_j \times \frac{emp_{j,i}}{\sum_{j,i} emp_{j,i}}, \tag{20}$$

which I standardize at the industry level such that it is centered around a zero mean and has a standard deviation equal to one. Generally, high values for OFF_i indicate that there are many employees within industry i whose occupations do not involve face-to-face interaction and can be done off site.

Table C1: Occupational Characteristics in O*Net Defining Offshorability

Task	*Description*
4.A.4.a.5	Assisting and Caring for Others
4.A.4.a.8	Performing for or Working Directly with the Public
4.A.1.b.2	Inspecting Equipment, Structures, or Material
4.A.3.a.2	Handling and Moving Objects
4.A.3.b.4	Repairing and Maintaining Mechanical Equipment (*0.5)
4.A.3.b.5	Repairing and Maintaining Electronic Equipment (*0.5)
4.C.1.a.2.l	Face-to-Face Discussions

[32] I use version O*NET 20.3 available from https://www.onetonline.org and the BLS OES from the year 2000.

C.2.2 Instrumental Variables

I compute Rotemberg weights as a measure of sensitivity-to-misspecification suggested by Goldsmith-Pinkham et al. (2018). Since input sourcing imp_{ict} varies at the country-industry-year level, I collapse my data to that level and obtain the Rotemberg weights for both instruments, world export supply wes_{ict} and ttm_{ict}. I use the number of managers within a country-industry-year cell as analytical weight. By definition, the sum of these weights aggregates to 1 and weights can be negative. The upper part of Table C2 summarizes the fraction of positive and negative weights. In the bottom part of the Table, I list the five shock level country-industry pairs $\hat{i}\hat{c}$ that have the largest sensitivity-to-misspecification and the fraction of their Rotemberg weights in the total sum of positive weights. The mining industry has a strong sensitivity to misspecification for the world export supply instrument. For the transport margin instrument, manufacturing of computers and related products matter most.

To assess the robustness regarding the choice of instruments I present results based on two alternative instrument pairs. First, I calculate alternative instruments wes_{ict} and ttm_{ict} where I exclude the industries from Table C2 to evaluate how the country-industry pairs with the largest Rotemberg weights affect my estimations. Second, I calculate a second version of alternative instruments where I omit elements from the diagonal of the input-output matrix to prevent omitted variable bias coming from industry-specific technology shocks that are correlated across countries.

I reestimate effects across firm-size quintiles and by importer status. The results in Table C3 suggest that results are robust to altering the instruments since estimates are quantitatively similar to those with the default instruments.

Table C2: Rotemberg Weights of the Instruments

(a) Negative and Positive Rotemberg Weights

	WES Instrument		*TTM Instrument*	
	Share	Mean	Share	Mean
Positive	0.44	0.003	0.63	0.065
Negative	0.56	-0.002	0.37	-0.107

(b) Top 5 Rotemberg Weight Country-Industries

WES Instrument	
Country-Industry:	Share Pos. Weight
Rest of World - Mining and quarrying	0.26
Norway - Mining and quarrying	0.17
Canada - Mining and quarrying	0.10
Mexico - Mining and quarrying	0.02
Rest of World - Manufacture of chemicals	0.02
TTM Instrument	
Country-Industry:	Share Pos. Weight
Rest of World - Manufacture of computer products	0.08
Rest of World - Accommodation and food services	0.04
Spain - Administrative and support service activities	0.03
Korea - Manufacture of computer products	0.03
Taiwan - Manufacture of computer products	0.03

Table C3: Robustness: Alternative Instruments - Excluding Shocks with High Rotemberg Weights or Diagonal Elements on the IO Table

	Equity Ownership					
	(1)	(2)	(3)	(4)	(5)	(6)
	Rotemberg Weights			*Diagonal Elements*		
	By Sales	*By Empl.*		*By Sales*	*By Empl.*	
Import Share by Firm-Size Quintile						
Import Share × Q1	-7.221**	-1.103		-5.803*	0.609	
	(3.009)	(4.119)		(3.326)	(4.042)	
Import Share × Q2	-1.474	0.0697		0.286	1.549	
	(3.141)	(3.357)		(3.052)	(3.166)	
Import Share × Q3	1.226	3.181		3.366	5.099	
	(2.949)	(3.454)		(2.887)	(3.268)	
Import Share × Q4	3.045	7.119***		4.701**	8.903***	
	(2.344)	(2.038)		(2.272)	(1.982)	
Import Share × Q5	8.727***	10.68***		10.21***	12.75***	
	(1.542)	(2.244)		(1.512)	(2.067)	
Import Share by Importer Status						
Import Share × Non-Importer			-0.323			2.131
			(6.881)			(6.530)
Import Share × Importer			5.092**			6.821***
			(2.331)			(2.231)
Match F.E.	yes	yes	yes	yes	yes	yes
Country-Year F.E.	yes	yes	yes	yes	yes	yes
Observations	130,175	127,253	124,032	130,175	127,253	124,032
Cluster Groups	95	95	94	95	95	94
Firms	3,071	2,792	2,822	3,071	2,792	2,822
Individuals	24,295	23,454	22,834	24,295	23,454	22,834

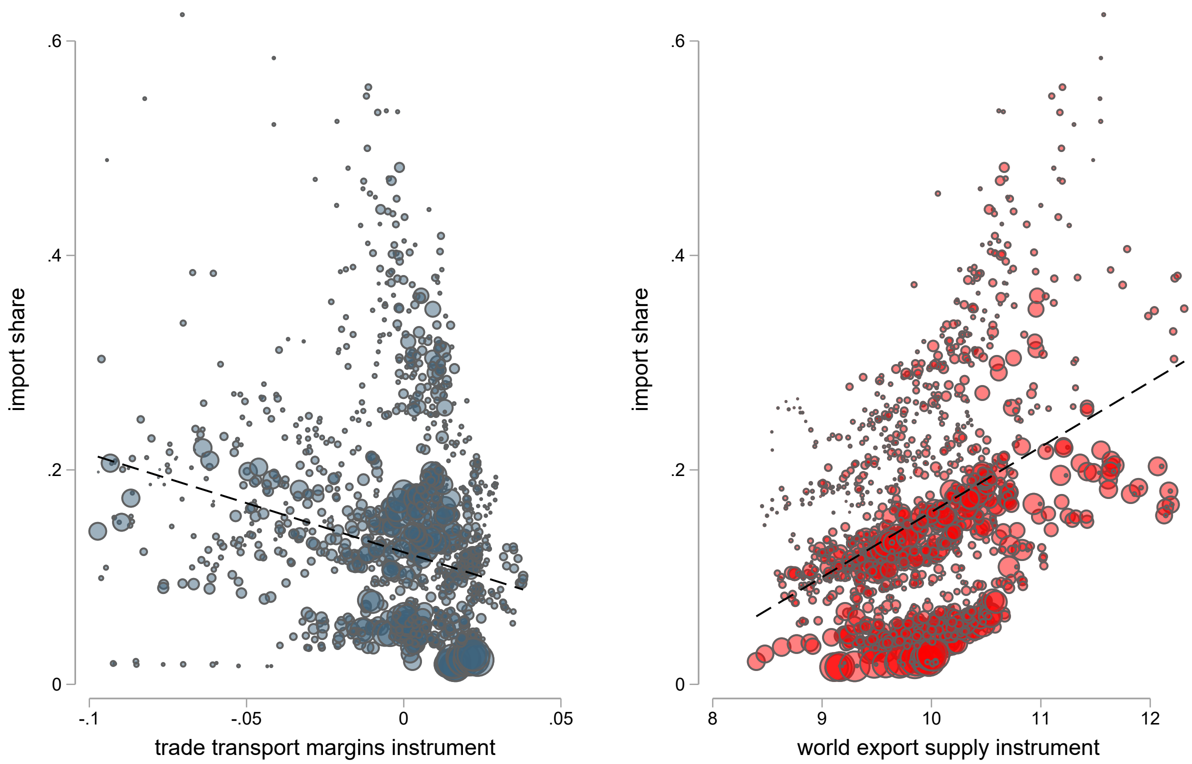
Notes: The Table replicates specifications (2) and (5) from Table 7 and specification (2) from Table 8 with alternative instruments. The alternative instruments in columns (1) - (3) exclude shocks from the five input-supplying country-industry pairs with the largest Rotemberg weights listed in Table C2. The alternative instruments in columns (4) - (6) exclude shocks from diagonal elements of the IO table.

Table C4: Relevance of the Instruments

	Import Share			
	(1)	(2)	(3)	(4)
			Weighted Regressions	
Trade Transport Margins	-0.0462***	-0.0450***	-0.0617***	-0.0583***
	(0.00870)	(0.00794)	(0.0153)	(0.0150)
World Export Supply	0.0808***	0.111***	0.0371**	0.0487*
	(0.0292)	(0.0324)	(0.0172)	(0.0256)
Country-Industry F.E.	yes	yes	yes	yes
Country-Year F.E.	yes	yes	yes	yes
Industry Controls	no	yes	no	yes
Observations	1,431	1,431	204,339	204,339
Cluster Groups	96	96	96	96

Notes: The dependent variable *Import Share* is the expenditure share on foreign inputs measured at the country-industry-year level based on WIOD data. Industry controls include country-industry-year level *Output* and a *TFP* index (output suppressed). All estimations include fixed effects for country-industry pairs and country-years. *International Trade Margins* and *World Export Supply* are described in subsection 3.3. Standard errors are cluster-robust at the country-industry pair level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Figure C1: Relevance of the Trade and Transport Margins and the World Export Supply Instruments



Notes: The Figure depicts a scatter plot of the two instrumental variables with import shares. The size of the markers indicates the frequency of each country-industry-year pair in the regressions. For optical reasons, I have omitted outliers of trade and transport margins from the graph. These are included in the regression samples of Table C4.

C.3 Additional Results and Robustness

Table C5: Annual Transition Matrix across Firm-Size Quintiles

Size Quintile in t	*Size Quintile in t+1*				
	1	2	3	4	5
			By Sales		
1	**88.08**	11.54	0.25	0.10	0.03
2	5.86	**80.50**	13.43	0.20	0.01
3	0.19	7.17	**81.69**	10.90	0.04
4	0.04	0.18	6.29	**87.22**	6.27
5	0.03	0.00	0.12	4.27	**95.58**
			By Employment		
1	**90.2**	9.47	0.25	0.06	0.03
2	5.28	**83.99**	10.43	0.29	0.01
3	0.17	5.91	**85.02**	8.85	0.04
4	0.03	0.21	5.36	**89.23**	5.16
5	0	0.04	0.1	3.34	**96.53**

Table C6: Robustness: Importing and Equity Ownership Across Firms - Controlling for Equity Prices

	Equity Ownership					
	(1)	(2)	(3)	(4)	(5)	(6)
	By Sales			*By Employment*		
Import Share by Firm-Size Quintile						
Import Share × Q1	-4.018***	-6.685***	-4.696*	-3.750***	0.0754	2.908
	(1.402)	(2.036)	(2.663)	(1.264)	(2.636)	(4.058)
Import Share × Q2	-1.080	0.0498	0.410	-1.824**	0.585	1.074
	(0.727)	(1.923)	(3.048)	(0.781)	(2.306)	(2.942)
Import Share × Q3	-1.144	0.923	2.259	0.247	3.267	4.652
	(0.758)	(2.538)	(3.735)	(0.837)	(3.206)	(3.951)
Import Share × Q4	1.340*	2.412	1.556	1.989**	6.396***	6.121*
	(0.679)	(2.482)	(3.507)	(0.786)	(2.156)	(3.364)
Import Share × Q5	3.391***	7.558***	9.312***	3.742***	9.451***	10.11***
	(0.725)	(1.450)	(2.502)	(0.867)	(1.753)	(2.910)
Equity Price	0.744***	0.740***	0.748***	0.740***	0.732***	0.744***
	(0.0194)	(0.0192)	(0.0219)	(0.0210)	(0.0207)	(0.0212)
Match F.E.	yes	yes	yes	yes	yes	yes
Country-Year F.E.	yes	yes	yes	yes	yes	yes
First-Stage						
KP F-test		11.36	9.684		14.50	12.40
Overident. (p-value)		0.587	0.493		0.254	0.0900
Sample	All	All	CEOs	All	All	CEOs
Observations	124,833	124,833	24,766	122,048	122,048	23,960
Cluster Groups	95	95	95	95	95	95
Firms	2,955	2,955	2,804	2,680	2,680	2,584
Individuals	23,313	23,313	5,067	22,504	22,504	4,807

Notes: The Table replicates Table 7 but additionally controls for equity prices. The dependent variable *Equity Ownership* is an individual manager's total ownership of equity (in logs) linked to the employer's stock price. Equity ownership comprises the total value of all equity-linked compensation that an individual has earned over the career that is linked to the equity of the employing firm. Outstanding rewarded options are priced according to Black-Scholes formula. *Import Share* is the expenditure share on foreign inputs measured at the country-industry-year level based on WIOD data. *Equity Price* is the average annual price of a firm's main security (in logs). All specifications include firm level *Capital Intensity* and country-industry-year level *Output* and a *TFP* index (output suppressed). All estimations include fixed effects for individual manager-firm matches and country-years. Instrumental variables are international trade and transport margins and world export supply described in subsection 3.3. Firm-size quintiles are based on the average firm sales or employment during the first 3 sample years and order the sample firms within the same country. Standard errors are cluster-robust at the country-industry pair level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table C7: Testing for Inequality Across Firm-Size Quintiles

	Importing and Equity Ownership Inequality Across Firms					
	(1)	(2)	(3)	(4)	(5)	(6)
i. $H0: Q1 = Q5$	< 0.001	< 0.001	< 0.001	0.002	< 0.001	0.023
ii. $H0: Q2 = Q4$	0.016	0.173	0.388	< 0.001	0.003	0.027
iii. $H0: Qi$ const.	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.001

Notes: The Table reports p-values for hypotheses tests based on Table 7 and tests for unequal effects of importing across firm-size quintiles.

Table C8: Robustness: Multinational Firms

	Equity Ownership			
	(1)	(2)	(3)	(4)
	Non-MNE	*MNE*	*Non-MNE*	*MNE*
	By Sales		*By Employment*	
Import Share by Firm-Size Quintile				
Import Share × Q1	-3.797	-9.655**	6.036	-4.341
	(4.589)	(3.993)	(4.607)	(5.101)
Import Share × Q2	0.342	0.538	1.102	-2.817
	(4.596)	(3.983)	(3.289)	(2.903)
Import Share × Q3	0.398	2.485	6.770**	0.671
	(2.998)	(3.179)	(2.600)	(2.804)
Import Share × Q4	4.992**	1.822	5.203**	6.958***
	(2.155)	(2.517)	(2.198)	(2.282)
Import Share × Q5	6.155***	9.194***	9.898***	9.465***
	(2.172)	(2.450)	(2.753)	(2.637)
Match F.E.	yes	yes	yes	yes
Country-Year F.E.	yes	yes	yes	yes
First Stage				
KP F-test	10.09	18.64	16.05	11.97
Overident. (p-value)	0.369	0.304	0.607	0.630
Observations	50,990	53,126	49,615	52,447
Cluster Groups	94	93	92	93
Firms	1,563	1,356	1,401	1,265
Individuals	10,214	10,603	9,762	10,381

Notes: The dependent variable *Equity Ownership* is an individual manager's total ownership of equity (in logs) linked to the employer's stock price. Equity ownership comprises the total value of all equity-linked compensation that an individual has earned over the career that is linked to the equity of the employing firm. Outstanding rewarded options are priced according to Black-Scholes formula. *Import Share* is the expenditure share on foreign inputs measured at the country-industry-year level based on WIOD data. Firms are defined to be *MNE* if they report any foreign-owned assets based on Thompson WorldScope data. All specifications include firm level *Capital Intensity* and country-industry-year level *Output* and a *TFP* index (output suppressed). All estimations include fixed effects for individual manager-firm matches and country-years. Instrumental variables are international trade and transport margins and world export supply described in subsection 3.3. Firm-size quintiles are based on the average firm sales or employment during the first 3 sample years and order the sample firms within the same country. Standard errors are cluster-robust at the country-industry pair level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table C9: Robustness: Controlling for Import Competition

	Equity Ownership				Equity Ownership Share			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	By Sales		*By Employment*		*By Sales*		*By Employment*	
Import Share by Firm-Size Quintile								
Import Share × Q1	-0.639	-6.918	1.421	3.282	-0.715***	-1.019	-0.240	0.595
	(1.871)	(4.311)	(1.336)	(3.969)	(0.244)	(0.637)	(0.202)	(0.476)
Import Share × Q2	-0.000370	0.621	0.869	3.549	0.0861	0.478	-0.170	0.162
	(0.978)	(3.581)	(0.853)	(2.660)	(0.144)	(0.390)	(0.118)	(0.319)
Import Share × Q3	0.0278	2.575	0.550	2.910	-0.0224	0.478	0.000822	0.0613
	(1.128)	(4.106)	(1.083)	(3.425)	(0.156)	(0.572)	(0.134)	(0.397)
Import Share × Q4	1.936**	2.685	2.887**	6.250***	0.0364	0.0270	0.182	0.664**
	(0.921)	(2.536)	(1.152)	(1.643)	(0.127)	(0.315)	(0.174)	(0.296)
Import Share × Q5	4.708***	9.034***	4.902***	11.29***	0.305**	0.606**	0.405***	0.933***
	(0.934)	(1.351)	(1.189)	(1.655)	(0.150)	(0.267)	(0.144)	(0.296)
Import Penetration by Firm-Size Quintile								
IP × Q1	-2.179	0.515	-2.751	-3.147	0.150	0.293	-0.0996	-0.404
	(1.541)	(2.385)	(2.091)	(2.681)	(0.158)	(0.320)	(0.240)	(0.327)
IP × Q2	-1.037	-1.059	-2.333***	-3.073***	-0.123	-0.257	-0.121	-0.221
	(1.144)	(1.692)	(0.744)	(1.163)	(0.119)	(0.176)	(0.0871)	(0.144)
IP × Q3	0.330	-0.529	0.441	-0.0468	-0.116	-0.302	-0.0818	-0.0647
	(1.039)	(1.979)	(1.014)	(1.569)	(0.0952)	(0.238)	(0.101)	(0.176)
IP × Q4	0.504	0.426	0.879	-0.0842	-0.0667	-0.0425	-0.0228	-0.175
	(1.066)	(1.358)	(0.992)	(1.082)	(0.112)	(0.156)	(0.114)	(0.152)
IP × Q5	-0.0421	-1.765*	0.376	-1.989*	-0.0827	-0.192	-0.115	-0.300*
	(0.943)	(0.944)	(0.938)	(1.044)	(0.130)	(0.163)	(0.120)	(0.155)
Match F.E.	yes	yes	yes	yes	yes	yes	yes	yes
Country-Year F.E.	yes	yes	yes	yes	yes	yes	yes	yes
First Stage								
KP F-test		10.58		11.37		10.03		11.38
Overident. (p-value)		0.301		0.226		0.521		0.421
Observations	130175	130175	127253	127253	129349	129349	127009	127009
Cluster Groups	95	95	95	95	95	95	95	95
Firms	3071	3071	2792	2792	3031	3031	2780	2780
Individuals	24295	24295	23454	23454	24205	24205	23480	23480

Notes: The dependent variable *Equity Ownership* is an individual manager's total ownership of equity (in logs) linked to the employer's stock price. Equity ownership comprises the total value of all equity-linked compensation that an individual has earned over the career that is linked to the equity of the employing firm. Outstanding rewarded options are priced according to Black-Scholes formula. *Import Share* is the expenditure share on foreign inputs measured at the country-industry-year level based on WIOD data. *Import Penetration* is imports over domestic absorption at the country-industry-year level based on WIOD data. All specifications include firm level *Capital Intensity* and country-industry-year level *Output* and a *TFP* index (output suppressed). All estimations include fixed effects for individual manager-firm matches and country-years. Instrumental variables are international trade and transport margins and world export supply described in subsection 3.3. Firm-size quintiles are based on the average firm sales or employment during the first 3 sample years and order the sample firms within the same country. Standard errors are cluster-robust at the country-industry pair level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table C10: Robustness: Recession Years

	Equity Ownership					
	(1)	(2)	(3)	(4)	(5)	(6)
	By Sales			*By Employment*		
Import Share by Firm-Size Quintile						
Import Share × Q1	-3.307	-8.968***	-6.328	-2.495	-2.787	1.312
	(2.614)	(3.315)	(4.152)	(2.273)	(3.686)	(4.660)
Import Share × Q2	-1.845	-3.840	-2.966	-1.451	-1.364	0.241
	(1.487)	(3.239)	(4.042)	(1.176)	(2.841)	(3.288)
Import Share × Q3	-0.136	-0.324	2.724	0.625	1.196	3.239
	(0.832)	(2.238)	(3.385)	(0.872)	(3.023)	(3.685)
Import Share × Q4	1.933**	1.154	0.115	3.497***	6.642***	5.965**
	(0.873)	(1.936)	(3.021)	(1.135)	(1.723)	(2.841)
Import Share × Q5	4.513***	8.019***	10.17***	4.888***	10.84***	13.13***
	(0.904)	(1.469)	(2.302)	(1.020)	(2.119)	(2.960)
Match F.E.	yes	yes	yes	yes	yes	yes
Country-Year F.E.	yes	yes	yes	yes	yes	yes
First-Stage						
KP F-test		12.11	12.10		13.23	11.46
Overident. (p-value)		0.364	0.313		0.308	0.119
Sample	All	All	CEOs	All	All	CEOs
Observations	109,749	109,749	21,754	108,141	108,141	21,238
Cluster Groups	95	95	95	95	95	95
Firms	3,044	3,044	2,883	2,782	2,782	2,677
Individuals	23,011	23,011	4,989	22,333	22,333	4,769

Notes: The Table replicates Table 7 but omits observations from recession years 2008 and 2009. The dependent variable *Equity Ownership* is an individual manager's total ownership of equity (in logs) linked to the employer's stock price. Equity ownership comprises the total value of all equity-linked compensation that an individual has earned over the career that is linked to the equity of the employing firm. Outstanding rewarded options are priced according to Black-Scholes formula. *Import Share* is the expenditure share on foreign inputs measured at the country-industry-year level based on WIOD data. Estimations omit recession years 2008 and 2009. All specifications include firm level *Capital Intensity* and country-industry-year level *Output* and a *TFP* index (output suppressed). All estimations include fixed effects for individual manager-firm matches and country-years. Instrumental variables are international trade and transport margins and world export supply described in subsection 3.3. Firm-size quintiles are based on the average firm sales or employment during the first 3 sample years and order the sample firms within the same country. Standard errors are cluster-robust at the country-industry pair level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table C11: Robustness: More Granular I-O Table for Manufacturing Industries

	Equity Ownership		
	(1)	(2)	(3)
		By Sales	*By Empl.*
Imports	0.730***		
	(0.263)		
Import Share by Firm-Size Quintile			
Imports × Q1		0.220	0.231
		(0.257)	(0.237)
Imports × Q2		0.545**	0.537*
		(0.254)	(0.285)
Imports × Q3		0.825***	0.728**
		(0.281)	(0.301)
Imports × Q4		0.742***	0.943***
		(0.278)	(0.260)
Imports × Q5		0.914***	0.955***
		(0.260)	(0.279)
Match F.E.	yes	yes	yes
Country-Year F.E.	yes	yes	yes
Sample	Manuf.	Manuf.	Manuf.
Observations	55,052	52,015	50,410
Cluster Groups	188	183	178
Firms	1,332	1,161	1,068
Individuals	10,434	9,728	9,362

Notes: The dependent variable *Equity Ownership* is an individual manager's total ownership of equity (in logs) linked to the employer's stock price. Equity ownership comprises the total value of all equity-linked compensation that an individual has earned over the career that is linked to the equity of the employing firm. Outstanding rewarded options are priced according to Black-Scholes formula. *Imports* is the log industry expenditure on foreign inputs measured at the country-industry-year level based on Comtrade import data and the 1992 U.S. Benchmark I-O Table from the U.S. Bureau of Economic Analysis transposed at the 3-digit SIC level. Estimations include firms with primary industries in manufacturing only. All specifications include firm level *Capital Intensity*. All estimations include fixed effects for individual manager-firm matches and country-years. Firm-size quintiles are based on the average firm sales or employment during the first 3 sample years and order the sample firms within the same country. Standard errors are cluster-robust at the country-industry pair level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$