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Relational contracts and global sourcing

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ABSTRACT

Relational contracts – informal agreements sustained by the value of future relationships – are integral parts of global production processes. This paper develops a repeated-game model of global sourcing in which final good producers decide whether to engage with their suppliers in relational contracting and whether to integrate a supplier into a firm's boundaries or deal with the latter at arm's-length. The model predicts that the relative prevalence of vertical integration increases in the long-term orientation of the headquarters' and suppliers' managers. It further suggests that the share of a foreign subsidiary owned by a final good producer increases in the headquarters' long-term orientation. Combining industry-level data from the U.S. Census Bureau's Related Party Trade database with measures for long-term orientation from Hofstede et al. (2010) and the World Management Survey, I find empirical evidence supportive of the positive link between the long-term orientation of cooperation parties and the relative prevalence of vertical integration. Using information on managerial composition of firms and ownership stakes from the Bureau van Dijk's Orbis database, I find that firms led by long-term oriented managers own higher shares of their foreign subsidiaries.

1. Introduction

When organizing production on a global scale, firms face the issue of contractual insecurity. In case of a dispute between cooperating parties, courts may be constrained in their ability to verify each party's deviation from the contract or unable to enforce verdicts upon subjects of different jurisdictions. Since an international arbitration process is also costly and time-consuming, firms often rely on relational contracts—informal long-term agreements sustained by the value of future relationship (Dixit, 2004; MacLeod, 2007). Yet, anecdotal evidence suggests that the ability of firms to engage in relational contracting hinges on the time preference rates of their managers.

One of the most widely documented examples in this context is the case study of two major automobile manufacturers, the Japanese corporation Toyota and the American enterprise General Motors (GM). The former is well known for making extensive use of relational contracts (see, e.g., Board, 2011 and Gibbons and Henderson, 2012). As attested in a comprehensive survey by Helper and Henderson (2014: 59), "as long as [Toyota's suppliers] make a good-faith effort to perform as they should, the assembler will ensure that they receive a reasonable return on their investment [...], and as long as the supplier continued to meet the automaker's expectations, the supplier could count on the relationship continuing indefinitely". In contrast, GM's cooperation with its suppliers is characterized by short-term – usually one-year – contracts focusing almost entirely on immediate financial results. The U.S. automobile manufacturer had been reportedly struggling to adopt its main competitor's relational governance approach, but with little success (see Helper and Henderson, 2014). Business practitioners and academic researchers generally agree that GM's inability to imitate Toyota's organizational practices can be traced back to inherent differences in time preference rates between long-term oriented Japanese managers and relatively short-term oriented American managers.

Albeit anecdotal in its nature, the case study of Toyota vs. GM suggests a general research question: Do differences in managerial long-term orientation, defined as the willingness of economic agents to forfeit instant gratification for the sake of long-term monetary benefits, have an impact on the organizational behavior of firms? This paper aims to shed some light on this question by studying the effect of time discounting on the global organization of production.

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More specifically, I investigate how managerial time preferences affect a multinational firm's decision to integrate a foreign supplier into firm boundaries or cooperate with the latter at arm's-length, thereby emphasizing the role of relational contracting. This paper argues, both theoretically and empirically, that the relative prevalence of vertical integration increases in the final good producers' and suppliers' level of long-term orientation.

The model presented in this paper embeds the seminal Property Rights Theory of a multinational firm by Antràs and Helpman (2004) into a repeated-game context along the lines of Baker et al. (2002). The rationale behind this approach lies in the notion that business cooperations involving relationship-specific investments are the ones in which long-term relationships may prevail. The mere possibility of a repeated interaction opens the door to relational contracting. More specifically, a final good producer and a supplier may commit at the outset to provide first-best investment levels in all subsequent periods of the game and sustain this agreement by the value of future relationship. It is well known from the Folk theorem, however, that the incentive compatibility of such an agreement crucially depends on the time preference rates of economic agents. More specifically, a supplier is willing to engage in relational contracting only if the final good producer is sufficiently long-term oriented. If the relational agreement is not self-enforcing, parties negotiate in each period 'on the spot' regarding the division of surplus and are stuck with the hold-up problems well-known from Antràs and Helpman (2004). The latter type of cooperation will be referred to throughout as spot contracting.

Regardless of whether parties are able to enter a relational agreement or negotiate in every period on the spot, final good producers face the make-or-buy decision, i.e., they choose whether to integrate a supplier into firm boundaries or source intermediate inputs at arm's-length. Overall, this paper allows for four organizational modes: spot integration, spot outsourcing, relational integration and relational outsourcing. The make-or-buy decision under spot contracting is analogous to Antràs and Helpman (2004): A final good producer integrates (outsources) manufacturing production if the importance of manufacturing components in the production process is low (high, respectively). This result is in the spirit of the canonical Property Rights Theory of the firm along the lines of Grossman and Hart (1986) and Hart and Moore (1990): In order to minimize ex-ante underinvestment, ownership rights over non-verifiable inputs are assigned to the party whose investment contributes relatively more to the value of the relationship.

The choice of the ownership form under relational contracting serves a different purpose. Since parties implicitly agree to provide the first-best amount of relationship-specific inputs, final good producers no longer aim at incentivizing ex-ante investment. Instead, the make-or-buy decision is made so as to minimize a supplier's incentives to renege on the relational agreement. The model shows that final good producers engaged in relational contracting are more likely to integrate their suppliers into firm boundaries as compared to those firms negotiating with their suppliers on the spot. Intuitively, if a final good producer possesses property rights over a supplier's assets, the supplier has a low bargaining position in the case of a deviation from an implicit agreement and the relational integration contract is self-enforcing for a greater range of parameter values.

Depending on both parties' time preference rates, a final good producer decides whether to enter a relational agreement or cooperate with a supplier on the spot. Since the prevalence of vertical integration vs. outsourcing is higher under relational contracting, and relational agreements will dominate spot contracts when both parties place sufficient weight on the future, the model delivers the following three testable predictions: First, the relative prevalence of vertical integration increases in the foreign suppliers' long-term orientation level. Second, suppliers are more likely to be integrated into firm boundaries the higher long-term orientation of final good producers.[1] Third, the share of a foreign subsidiary owned by a final good producer increases in the headquarter's long-term orientation.

The first two hypotheses are examined using industry-country-level data. To measure the relative prevalence of vertical integration, I follow the bulk of the recent empirical literature on multinational firm boundaries in using the U.S. Census Bureau's Related Party Trade data. In the absence of publicly available firm-level data, this industry-level dataset has become a workhorse tool in empirical studies of international make-or-buy decisions, cf. Antràs (2013, 2015). More specifically, I use the share of U.S. intra-firm imports in total U.S. imports as the dependent variable. To capture a foreign supplier's long-term orientation, I use two alternative proxies. The first measure is a country's index of long-term orientation, drawn from Hofstede et al. (2010).[2] As shown by Hofstede et al. (2010), individuals from long-term oriented cultures are willing to delay short-term material gratification in favor of long-term benefits, whereas individuals from short-term oriented cultures value immediate gratification more than long-term fulfillment. The second measure of long-term orientation is drawn from the World Management Survey (WMS) by Bloom and Van Reenen (2007). The advantage of the latter measure is that it is surveyed directly at the top management level and, therefore, is likely to reflect *managerial* (rather than a society's *average*) time preferences. Controlling for industry and country level characteristics, I find a positive relationship between both measures of foreign suppliers' long-term orientation and intra-firm imports.

To construct a measure of long-term orientation that varies across U.S. sectors, I proceed as follows. I use data from the U.S. Census 2000 to calculate the prevalence of managers and CEOs from a certain cultural background in a given U.S. industry. I then weigh these ethnic shares with the above-mentioned long-term orientation scores of the respective culture, drawn from Hofstede et al. (2010) and Bloom and Van Reenen (2007), to construct industry-specific indices of long-term orientation. In accordance with the model's second prediction, industries with a higher prevalence of long-term oriented managers have a higher share of intra-firm imports, after controlling for other industry-level characteristics and unobserved heterogeneity across source countries using country fixed effects. To avoid spurious correlations, I conduct several robustness checks. First, I control for a wide range of variables (e.g., managerial education, work ethics, institutional background), which may be correlated with the long-term orientation scores and potentially can affect a firm's make-or-buy decision through channels other than the one suggested in the current model. Second, I account for language ties, business network effects, etc. Third, I exploit genetic data from Gorodnichenko and Roland (2011) to construct an instrument based on genetic distance between managers in a given industry and one of the most long-term oriented countries, Japan. This instrument is highly correlated with the current levels of managerial long-term orientation, which reflects the fact that parents pass on not only their genes but also their cultural traits to offspring (see, e.g., Bisin and Verdier, 2010 and Spolaore and Wacziarg, 2015).[3] At the same time, since

[1] This prediction is well-aligned with the afore-mentioned case study of Toyota vs. GM. While Japanese managers are some of the most long-term oriented, U.S. managers are rather concerned with immediate rewards (see Hofstede et al. (2010) and World Management Survey). In line with the second prediction, GM's relationships with its suppliers were mostly characterized by arm's-length contracts, whereas Toyota has historically maintained a higher level of vertical integration, see Conybeare (2003) and Helper and Henderson (2014).

[2] Long-term orientation represents one of the key cultural dimensions identified by a sociologist Geert Hofstede to measure fundamental cultural differences. This score is generally recognized in the economic discipline as a valid proxy for the time preference rate, see, for instance, Galor and Özak (2014).

[3] To be clear, this approach does *not* presuppose a causal relationship between genes and cultural attributes such as long-term orientation, but rather exploits the correlation between the two.

managers are unlikely to make the integration decision based on their genetic distance to Japan, this instrument fulfills the exclusion restriction. Throughout specifications, I find that industries with a higher average long-term orientation have a significantly higher share of intra-firm imports.

Since the above-mentioned industry-level dataset does not contain information on equity stakes in foreign subsidiaries, I examine this paper's third testable hypothesis using firm-level Orbis data by Bureau van Dijk.[4] The dependent variable in this analysis is the percentage of a foreign subsidiary owned by a shareholder. To construct a measure of a headquarter's time preference rate, I exploit information on nationalities of managers employed by shareholders. More specifically, I assign to managers with reported nationalities respective long-term orientation scores from the above-mentioned WMS by Bloom and Van Reenen (2007) and then calculate the average long-term orientation of a firm. To account for potential confounding factors, I construct a wide range of firm-level proxies for human capital, education, work ethics, institutional backgrounds, etc. Controlling for these factors and performance measures of parent and daughter companies, accounting for language ties, business networks, as well as industry and country fixed effects, I find that firms with a higher prevalence of long-term oriented managers own a higher share of their foreign subsidiaries.

1.1. Related literature

This paper is not the first to embed the static Property Rights Theory of a multinational firm along the lines of Antràs and Helpman (2004) into a repeated game. Kukharskyy and Pflüger (2016) do so to study the effect of relational contracting on the economic well-being of nations and total factor productivity. Unlike the current paper, however, the authors conduct their analysis in a closed economy setting and do not focus on the make-or-buy decision.[5]

In their seminal contribution, Antràs and Helpman (2004) show that the optimal ownership share in a (foreign) subsidiary increases in the relative importance of headquarters' relationship-specific investments in the production process (henceforth, headquarter intensity). To the best of my knowledge, however, the link between the headquarter intensity and the *intensive* margin of ownership has not yet been empirically assessed. I verify that this relationship continues to hold in the current framework (both under spot and relational contracting) and bring it to the data. To this end, I construct a novel proxy for the headquarter intensity using information on a firm's intangible assets. In line with Antràs and Helpman (2004) and this paper's hypothesis, I find a positive correlation between headquarter intensity and the percentage of a foreign subsidiary owned by a given firm.

From the empirical perspective, this paper relates to two major literature strands. First, it is closely related to the literature using the U.S. Census Bureau's Related Party Trade data to test the key prediction of the static Property Rights Theory of a multinational firm, see Nunn and Trefler (2008, 2013) and Antràs (2015).[6] One of the key findings of this literature is the positive effect of an industry's research and development (R&D) intensity – a proxy for headquarter intensity – on its share of intra-firm trade. Consistent with both the existing evidence and this paper's theoretical results, I find a positive impact of an industry's R&D intensity on intra-firm trade, alongside the novel effect of long-term orientation emphasized in the current repeated-game version of the Property Rights Theory.

Second, this paper also relates to the burgeoning literature that aims to better understand the effect of culture on international trade and foreign direct investment. Using historically motivated instrumental variables, Siegel et al. (2011, 2013) find a negative effect of egalitarianism, defined as the belief that all people are of equal worth and should be treated equally in society, on foreign direct investment flows and mergers and acquisitions. Gorodnichenko et al. (2015) find a negative effect of cultural distance, measured as the difference in individualism scores, on intra-firm trade. Bloom et al. (2012) find that social capital, as proxied by trust, has a significant effect on a firm's decentralization decision. Guiso et al. (2009) construct a measure of bilateral trust between European countries and instrument it with religious, genetic, and somatic similarities to show that lower bilateral trust leads to less trade and less direct and portfolio investment between two countries. Using data from the Eurovision Song Context, Felbermayr and Toubal (2010) construct a measure of cultural proximity and show a strong positive effect of this measure on trade volumes. Yet, none of these empirical studies consider the effect of long-term orientation on intra-firm trade.

The remainder of the paper is structured as follows: Section 2 lays out the basic set-up. Section 3 describes the make-or-buy decision under spot and relational contracting and derives the key testable predictions. Section 4 presents industry- and firm-level econometric evidence supporting this paper's theoretical hypotheses. Section 5 concludes.

2. The set-up

The model economy consists of a home country, *N*, and a foreign country, *F*. Each country is populated by a unit measure of consumers, who are symmetric in terms of their preferences. Each consumer is endowed with a unit of inelastically supplied labor. A subset of individuals also possess entrepreneurial abilities, which allow them to become firm managers.

2.1. Demand

Along the lines of Antràs and Helpman (2004), the utility function is assumed to be:

$$U = x_0 + \mu \sum_{j=1}^{J} \ln X_j \,, \quad X_j = \left[\int x_j(v)^{\alpha} \mathrm{d}v \right]^{1/\alpha} \,, \quad \mu > 0 \,, \quad 0 < \alpha < 1, \tag{1}$$

where x_0 is consumption of a homogenous good, X_j is an index of aggregate consumption of differentiated goods in sector j, and $x_j(v)$ denotes consumption of a differentiated variety v in this sector. Parameter μ measures the intensity of preferences for differentiated goods and α is a parameter related to the elasticity of substitution between any two varieties, $\sigma = 1/(1-\alpha)$. The budget constraint reads $\sum_{j=1}^{J} P_j X_j + x_0 = Y$, where Y denotes a household's income, $P_j \equiv \left[\int p_j(v)^{1-\sigma} \mathrm{d}v \right]^{1/(1-\sigma)}$ is the price index of differentiated goods, and $p_j(v)$ represents the price of a single variety v in sector j. Utility maximization yields demand functions for the differentiated goods

[4] Conversely, since information on arm's-length relationships is unavailable in this firm-level database, it does not prove useful for the analysis of the first two hypotheses.

[5] A recent contribution by Defever et al. (2015) considers relational contracts in the international context, but its focus lies on the supplier turnover rather than the make-or-buy decision.

[6] This theory has been also verified using data from other countries and sources, see, e.g., Baker and Hubbard (2004), Corcos et al. (2013), Feenstra and Hanson (2005) and Kohler and Smolka (2009).

bundle, a single differentiated variety, and the homogenous good, respectively:[7]

$$X_j = \mu P_j^{-1} \quad , \quad x_j(v) = \mu p_j(v)^{-\frac{1}{1-\alpha}} P_j^{\frac{\alpha}{1-\alpha}} \quad , \quad x_0 = Y - \mu. \tag{2}$$

2.2. Production

The homogenous good is produced in both countries under constant returns to scale and perfect competition. Production of one unit of output requires a_N units of labor in the home country and $a_F > a_N$ labor units in a foreign country (i.e. workers in N are assumed to be relatively more productive). This numéraire good is assumed to be costlessly traded, implying the same (unitary) price in both countries. Without loss of generality, I normalize the wage rate in N to unity. Productivity differences across countries imply that the wage rate in the foreign destination, w is smaller than one.

Production technology of differentiated varieties draws on Antràs and Helpman (2004). Provision of each variety v requires two relationship-specific inputs: headquarter services $h_j(v)$ and manufacturing components $m_j(v)$, supplied by headquarter firms H and manufacturing suppliers M, respectively. Each intermediate input is produced with one unit of labor per unit of output. These inputs are combined to final goods according to the following Cobb–Douglas production function:[8]

$$x_j(v) = \left(\frac{h_j(v)}{\eta}\right)^{\eta} \left(\frac{m_j(v)}{1-\eta}\right)^{(1-\eta)}, \tag{3}$$

where parameter $\eta \in (0,1)$ captures the relative importance of headquarter services (henceforth, headquarter intensity) in the production process. In contrast to Antràs and Helpman (2004), I allow η to vary across firms within a given sector.

Establishment of a firm (H or M) requires one entrepreneur as a fixed cost. Each entrepreneur is an owner–manager of the unit and reaps this unit's operating profit. As in Antràs and Helpman (2004), provision of headquarter services occurs strictly in N. Manufacturing suppliers, however, are located in the foreign country.[9] I assume that final assembly of manufacturing components and headquarter services into final goods takes place in N. International trade in manufacturing components is costly, as $\tau > 1$ units of m need to be shipped from the foreign country for one unit to arrive in N. Similarly, shipment of final goods from N to F is associated with identical iceberg transport cost, $\tau > 1$. Given the mill (fob.) price of final goods, $p_{Nj}(v)$, the price paid by consumers in F is $p_{Fj}(v) = \tau p_{Nj}(v)$. The price indices prevailing in N and F can be expressed as $P_{Nj} = (n_{Nj})^{-\frac{1-\alpha}{\alpha}} p_{Nj}(v)$ and $P_{Fj} = \tau P_{Nj}$, respectively, where n_{Nj} represents the number of final good producers in sector j. Combining these results with Eq. (2), yields total output of variety v, $x_j(v) = \mu p_{Nj}(v)^{-\frac{1}{1-\alpha}} P_{Nj}^{\frac{\alpha}{1-\alpha}} + \tau\mu(\tau p_{Nj}(v))^{-\frac{1}{1-\alpha}} (\tau P_{Nj})^{\frac{\alpha}{1-\alpha}}$. Using this expression together with Eq. (3) and the fact that $P_{Nj} = \mu X_{Nj}^{-1}$ yields total revenue from the final good production:

$$R_j(v) = \left(\frac{h_j(v)}{\eta_j}\right)^{\alpha\eta_j} \left(\frac{m_j(v)}{1-\eta_j}\right)^{\alpha(1-\eta_j)} \mu X_{Nj}^{-\alpha}. \tag{4}$$

The revenue positively depends on the preference parameter, μ, and negatively on the aggregate production level, X_{Nj}, which is exogenous from the viewpoint of a single producer, but determined endogenously in the industry equilibrium. To simplify the notation, I drop the variety index v and the sector index j from now on.

2.3. Contractual environment and organizational form

As in Antràs and Helpman (2004), the setting is one of incomplete contracts. That is, courts cannot verify the quality of intermediate inputs, and cooperating parties cannot sign ex-ante enforceable contracts specifying the purchase of relationship-specific manufacturing components for a certain price.[10] Against the backdrop of contractual incompleteness, a headquarter decides whether to integrate (I) the manufacturing supplier into firm boundaries or to outsource (O) manufacturing production to an independent supplier. The ex-ante stipulated organizational form, $k \in \{I, O\}$ is verifiable and enforceable by the courts.

In contrast to the one-shot game in Antràs and Helpman (2004), firms in the current model interact repeatedly. This alternative assumption aims at capturing the notion that business cooperations involving relationship-specific investments are the ones where long-term relationships predominate. It is well-known from the literature on repeated games (e.g., Baker et al., 2002) that the threat of discontinuing a long-term relationship may ensure some cooperation despite contractual incompleteness. However, the ability of cooperating parties to sustain a long-term cooperation depends on their time preference rates. Let $1/(1+\delta_H)$ denote the discount factor of a headquarter manager and $1/(1+\delta_M)$ the discount factor of a supplier manager, whereby δ_H and δ_M represent the respective rates of time preference (discount rates). I assume that (managers of) headquarter firms differ regarding their time preference rates, distributed according to a density function, $G(\delta_H)$.[11]

After a final good producer and a supplier match, both parties discover the time preference rate of the respective counterpart. Subsequently, H chooses one of the two governance modes: spot (s) vs. relational (r) contracting. Under a spot contract, parties bargain in each period with regard to the compensation of relationship-specific investments. This ex-post negotiation process takes place via Nash bargaining, whereby H obtains a fraction $\beta_k \in (0,1)$ of the revenue under ownership form $k \in \{I, O\}$. Following Antràs and Helpman (2004), I assume that headquarters obtain a greater share of surplus when the supplier is integrated into firm boundaries compared to the case when manufacturing production is outsourced to an independent supplier, i.e. $\beta_I > \beta_O$.[12] The intuition behind this assumption stems from the canonical Property Rights Theory of the firm along the lines of Grossman and Hart (1986): Integration gives H residual control rights over M's inputs, which in turn enhances the former's bargaining position and increases H's ex-post fraction of the revenue.

Under relational contracting, final good producers and their suppliers enter at the outset an informal agreement to provide the first-best level of inputs in all subsequent periods of the game. Furthermore, H commits to compensate M with an ex-post bonus B_k if the latter honors this agreement.[13] However, since the quality

[7] I assume sufficiently small preferences for differentiated goods (i.e., $\mu < Y$) to ensure positive consumption of the homogenous good in equilibrium.

[8] For simplicity, I refrain from modeling firm heterogeneity regarding productivity. However, this feature can be easily introduced into the current framework along the lines of Antràs and Helpman (2004) without qualitatively affecting its main results.

[9] This model can be easily extended by assuming that M are located both in N and F and allowing H to choose between domestic and foreign sourcing. However, given that domestic sourcing is not observable in the dataset used in the empirical part of the paper, it is ruled out at the outset.

[10] The assumption of complete incontractibility of intermediate inputs is undoubtedly specific. However, this model can be easily extended to incorporate both formal and informal contractibility in a unified framework following the methodologies of Antràs and Helpman (2008) and Battigalli and Maggi (2008).

[11] Since time preference differences across suppliers in a foreign country are unobservable in the data used in the empirical analysis, I refrain from modeling heterogeneity regarding suppliers' time horizons. I return to this issue in the Conclusion.

[12] In Section 3.3, I allow final good producers to choose their optimal revenue share from the continuum of values in $[0,1]$, rather than choosing from the pair $\{\beta_I, \beta_O\}$.

[13] As shown further below, equilibrium bonus depends on the choice of the ownership form $k \in \{I, O\}$.

of relationship-specific investment is not verifiable, such an agreement cannot be enforced by the courts. Hence, a supplier may renege on the relational contract by ex-ante underinvesting in manufacturing components. Similarly, a headquarter may provide a suboptimal level of headquarter activities and refuse to transfer the promised bonus to the supplier. In case any party reneges on the implicit contract, the implicit agreement is broken and the surplus in this period is shared according to the above-mentioned Nash-bargaining (with H obtaining a fraction β_k of the revenue).

Both parties' payoffs in the post-deviation periods depend on the applied trigger strategy. In the main text, I assume that the short-changed firm refuses to deal again with the deviating party and both firms' profits on the off-the-equilibrium path are equal to zero. Although this 'grim' trigger strategy is undoubtedly specific, I show that the key prediction of this paper remains unchanged if one allows firms to revert to spot contracting after one party reneged on the relational agreement. Since this alternative scenario no longer provides closed form solutions for all variables of interest, I relegate the discussion of this case to Appendix A.3.

2.4. Timing

Under a governance mode $g \in \{s, r\}$ and ownership form $k \in \{I, O\}$, the timing of events in a single period (product cycle) of the game can be summarized as follows.

If H selects spot contracting (s), the consequent timing reads:

- s_1: H and M simultaneously and independently invest in h_k and m_k, respectively.
- s_2: Headquarters and suppliers negotiate about the division of surplus, whereby H obtains the fraction β_k of the revenue.
- s_3: Final goods are produced and sold. The revenue is distributed between parties according to the sharing rule negotiated in s_2.

If H selects relational contracting (r), the consequent timing reads:

- r_1: Both parties commit to provide the first-best level of non-contractible inputs, h_k and m_k. H commits to pay a bonus B_k to M, if the latter adheres to this agreement.
- r_2: H and M simultaneously invest in h_k and m_k as agreed in r_1.
- r_3: The final goods are produced and sold. The revenue is distributed between parties according to the compensation rule agreed upon in r_1.

The product cycle stated above is repeated in all future periods of the game, $t = 1, \ldots, \infty$. The following section solves this game by backward induction.

Before describing the equilibrium of the game, it is worth pausing to briefly discuss this paper's assumption regarding the surplus sharing between two parties. Notice that the timing specified above does not include ex-ante lump-sum transfers, commonly assumed in the literature to ensure that the entire surplus from cooperation accrues to headquarters, see Antràs and Helpman (2004, 2008). As asserted by Antràs and Staiger (2012: 3148), "the feasibility of these transfers is particularly hard to defend in the international context [...], where such transfers and the obligations associated with them might be difficult to enforce." However, I show in Appendix A.4 that this paper's main results are robust to allowing for the ex-ante transfers.

3. Optimal organizational structure

3.1. Spot governance

To characterize the sub-game perfect Nash equilibrium of the game described above, consider first date s_2 under spot contracting. At this stage, H chooses h to maximize $\beta_k R(h,m) - h$, whereas M picks m to maximize $(1-\beta_k)R(h,m) - w\tau m$. Using Eq. (4), this maximization problem yields equilibrium investment levels

$$h_k^s = \beta_k \eta \alpha R_k^s \quad , \quad m_k^s = (1-\beta_k)\left(\frac{1-\eta}{w\tau}\right)\alpha R_k^s, \tag{5}$$

and the associated revenue under spot contracting

$$R_k^s = \left(\beta_k^\eta (1-\beta_k)^{(1-\eta)}\right)^{\frac{\alpha}{1-\alpha}} A, \tag{6}$$

where $A \equiv (w\tau)^{-\frac{\alpha(1-\eta)}{1-\alpha}} \mu^{\frac{1}{1-\alpha}} \alpha^{\frac{\alpha}{1-\alpha}} X_N^{-\frac{\alpha}{1-\alpha}}$ has been defined for notational simplicity. Using Eqs. (5) and (6) in maximization problems above, we obtain H's and M's profits under spot contracting

$$\begin{aligned} \pi_{Hk}^s &= \beta_k \left(\beta_k^\eta (1-\beta_k)^{(1-\eta)}\right)^{\frac{\alpha}{1-\alpha}} (1-\alpha\eta) A, \\ \pi_{Mk}^s &= (1-\beta_k)\left(\beta_k^\eta (1-\beta_k)^{(1-\eta)}\right)^{\frac{\alpha}{1-\alpha}} (1-\alpha(1-\eta)) A. \end{aligned} \tag{7}$$

Consider next the choice of organizational form in s_1. A headquarter decides to cooperate with a supplier under spot integration rather than spot outsourcing only if $\pi_{HI}^s > \pi_{HO}^s$, i.e., whenever

$$\Theta_H^s(\eta) \equiv \frac{\pi_{HI}^s}{\pi_{HO}^s} = \frac{\beta_I}{\beta_O} \frac{\left(\beta_I^\eta (1-\beta_I)^{(1-\eta)}\right)^{\frac{\alpha}{1-\alpha}}}{\left(\beta_O^\eta (1-\beta_O)^{(1-\eta)}\right)^{\frac{\alpha}{1-\alpha}}} \tag{8}$$

is larger than one. I prove in Appendix A.1 that the relative attractiveness of spot integration, as measured by $\Theta_H^s(\eta)$, is increasing in the headquarter intensity η. The intuition behind this result stems from the Property Rights Theory of the firm: If a supplier's contribution to the production process becomes less important, the need for incentivizing M's ex-ante investment via outsourcing decreases. Furthermore, Appendix A.1 proves that integration dominates outsourcing for sufficiently high headquarter intensities, i.e. $\Theta_H^s(\eta = 1) > 1$. For low headquarter intensities, however, outsourcing dominates integration if and only if $1 - \beta_I < \alpha$. Intuitively, if a supplier's revenue share under integration is sufficiently low, headquarters of production processes with greater importance of manufacturing inputs relinquish control over these inputs in order to restore M's investment incentives (recall that $1 - \beta_O > 1 - \beta_I$). In order to allow for the coexistence of both organizational forms, this paper imposes

Assumption 1. $\beta_I > 1 - \alpha$.

Under this assumption, we have

Lemma 1. *There exists a unique headquarter intensity $\hat{\eta} \in (0,1)$, such that headquarter profit is higher under spot outsourcing for $\eta < \hat{\eta}$ and higher under spot integration for $\eta > \hat{\eta}$.*

Proof. See Appendix A.1.

Although this result is well-known from Antràs and Helpman (2004), it can be considered as complementary given that it does not rely on the simplifying assumption of ex-ante transfers. In other words, while the organizational form in the original contribution is chosen so as to maximize *joint* profit from cooperation, headquarters in the current model choose the ownership structure which maximizes their own *fraction* of profits under spot contracting.

3.2. Relational governance

3.2.1. Equilibrium path

When H and M enter a relational contract, they implicitly agree to provide the level of investment that maximizes firm profit $\pi(h,m) = R(h,m) - h - w\tau m$. Using Eq. (4), this maximization problem yields equilibrium investment levels and the associated revenue

$$h^r = \eta\alpha R^r \quad , \quad m^r = \left(\frac{1-\eta}{w\tau}\right)\alpha R^r \quad , \quad R^r_k = A, \tag{9}$$

whereby A is defined as in Eq. (6). Comparing these results with Eq. (5), it immediately follows that investment levels under relational contracting are higher than under spot governance, i.e. $h^r > h^s_k$ and $m^r > m^s_k$. Intuitively, a relational contract eliminates the hold-up problem associated with ex-post bargaining and provides better ex-ante investment incentives compared to spot contracting. This immediately implies a higher revenue under relational governance mode, $R^r > R^s_k$. Given that h^r and m^r maximize joint firm profit, they will be referred to as first-best investment levels in what follows. If a supplier provides the first-best level of manufacturing components, m^r, the headquarter compensates him with a bonus B_k and both parties' profits are given by $\pi^r_{Hk} = R^r - h^r - B_k$ and $\pi^r_{Mk} = B_k - w\tau m^r$, respectively. Using Eq. (9) therein, profits on the equilibrium path under relational contracting read

$$\begin{aligned} \pi^r_{Hk} &= (1-\alpha\eta)A - B_k, \\ \pi^r_{Mk} &= B_k - \alpha(1-\eta)A. \end{aligned} \tag{10}$$

If the relational contract is self-enforcing, there exits a bonus B_k which ensures both parties' non-negative profits in equilibrium. As will be shown in the next section, this equilibrium bonus crucially depends on a supplier's profits on the deviation path, which, in turn, depend on the choice of the ownership form $k \in \{I, O\}$.

3.2.2. Off-the-equilibrium path

Since a relational contract is implicit and not verifiable by the courts, each party may renege on it. Consider first a supplier's deviation (D) incentives. M can renege on the relational agreement by delivering a sub-optimal level of manufacturing inputs, $m < m^r$. In this case, the relational contract is broken and the distribution of this period's revenue between H and M occurs according to ex-post bargaining with exogenous shares β_k and $(1-\beta_k)$, respectively. M's maximization problem on the deviation path is $\max_m (1-\beta_k)R(h^r, m) - m$, whereby h^r is H's first-best level of headquarter services from Eq. (9). This maximization problem implies the following investment level and revenue

$$m^D_k = (1-\beta_k)\left(\frac{1-\eta}{w\tau}\right)\alpha R^D_k \quad , \quad R^D_k = (1-\beta_k)^{\frac{\alpha(1-\eta)}{1-\alpha(1-\eta)}}A. \tag{11}$$

A simple comparison of Eqs. (11) and (9) implies a lower supplier investment on the deviation path as compared to the first-best level, i.e. $m^D_k < m^r$. Utilizing Eq. (11) in M's maximization problem, a supplier's equilibrium profit on the deviation path reads

$$\pi^D_{Mk} = (1-\beta_k)^{\frac{1}{1-\alpha(1-\eta)}}(1-\alpha(1-\eta))A. \tag{12}$$

Given the trigger strategy specified above, a supplier can reap these deviation profits only once and is 'punished' by non-cooperation in future periods of the game. A supplier honors the relational contract whenever the present value of his profits under relational contracting, $\pi^r_{Mk} + \sum_{t=1}^{\infty}\left(\frac{1}{1+\delta_M}\right)^t \pi^r_{Mk} = \pi^r_{Mk} + \frac{\pi^r_{Mk}}{\delta_M}$, is larger than his one-shot deviation profit, π^D_{Mk}. M's incentive compatibility constraint (ICC_M) thus reads

$$\pi^r_{Mk} + \frac{\pi^r_{Mk}}{\delta_M} \geq \pi^D_{Mk}, \tag{13}$$

whereby π^r_{Mk} and π^D_{Mk} are given by Eqs. (10) and (12), respectively. As long as this ICC_M is fulfilled, there exists a bonus B_k which induces the supplier's first-best investment in perpetuity. The headquarter has an incentive to stipulate the smallest possible bonus, which still fulfills the ICC_M. Manipulating Eq. (13), this bonus can be expressed as

$$B_k = \left[\alpha(1-\eta) + \frac{\delta_M}{1+\delta_M}(1-\beta_k)^{\frac{1}{1-\alpha(1-\eta)}}(1-\alpha(1-\eta))\right]A. \tag{14}$$

Utilizing Eq. (14) in Eq. (10), yields per-period profits of H and M on the equilibrium path under relational contracting

$$\begin{aligned} \pi^r_{Hk} &= \left[(1-\alpha) - \frac{\delta_M}{1+\delta_M}(1-\beta_k)^{\frac{1}{1-\alpha(1-\eta)}}(1-\alpha(1-\eta))\right]A, \\ \pi^r_{Mk} &= \frac{\delta_M}{1+\delta_M}(1-\beta_k)^{\frac{1}{1-\alpha(1-\eta)}}(1-\alpha(1-\eta))A. \end{aligned} \tag{15}$$

Notice that a supplier's profit is non-negative for all parameter values (i.e. M's participation constraint may be ignored). A headquarter's profit, however, is positive if and only if

$$(1-\alpha) > \frac{\delta_M}{1+\delta_M}(1-\beta_k)^{\frac{1}{1-\alpha(1-\eta)}}(1-\alpha(1-\eta)). \tag{16}$$

This condition crucially depends on the following factors (see Appendix A.2 for derivations). First, it is more likely to hold the lower headquarter intensity, η. Intuitively, when H's contribution to the relationship is low, M can hardly exert ex-post hold-up and the supplier's incentives to renege on the relational agreement decrease. Second, this condition is more likely to be fulfilled the lower the δ_M, i.e. the more long-term oriented the supplier. Intuitively, as the long-term orientation of a supplier increases, ICC_M can be satisfied with a smaller bonus and H's profits from relational contracting increase. Finally, condition (16) is more likely to hold the higher a headquarter's share of surplus from ex-post bargaining, β_k. Intuitively, a higher β_k reduces M's bargaining position on the deviation path and decreases the latter's one-shot deviation incentives, see Eq. (12). Since $\beta_I > \beta_O$, the ICC_M under relational integration can be satisfied with a smaller equilibrium bonus compared to relational outsourcing, $B_I < B_O$. This immediately implies

Lemma 2. *Headquarters strictly prefer relational integration over relational outsourcing. A headquarter is more likely to offer a relational contract to a supplier the higher the latter's level of long-term orientation and the higher a supplier's contribution to the relationship.*

Proof. See Appendix A.2.

The key implication of Lemma 2 is that headquarters offer relational contracts only to integrated suppliers.[14] Relational integration by itself, however, is not yet a sufficient condition for an incentive

[14] The fact that relational outsourcing is strictly dominated by relational integration is a peculiarity of the grim trigger strategy assumed in the main text. As shown in Appendix A.3, relational outsourcing may arise in equilibrium if parties are allowed to revert to spot contracting after a relational contract has been broken. The key theoretical prediction of this paper, however, remains unchanged.

compatibility of the implicit agreement, since headquarters may as well deviate from it. A headquarter reneges on the relational agreement by underinvesting in h and refusing to provide the ex-post bonus B_I. H's maximization problem on the deviation path reads $\max_h \beta_I R(h, m^r) - h$, whereby m^r is the first-best level of manufacturing components from Eq.(9). This maximization problem implies the following investment and revenue on H's deviation path

$$h_I^D = \beta_I \eta \alpha R_I^D \quad , \quad R_I^D = \beta_I^{\frac{\alpha\eta}{1-\alpha\eta}} A. \tag{17}$$

A simple comparison of Eqs. (17) and (9) implies a lower headquarter investment on the deviation path as compared to the first-best level, i.e. $h_I^D < h^r$. Utilizing Eq. (17) in H's maximization problem, a headquarter's profit on the deviation path reads

$$\pi_{HI}^D = \beta_I^{\frac{1}{1-\alpha\eta}} (1 - \alpha\eta) A. \tag{18}$$

A headquarter complies with the relational integration contract if and only if the following incentive compatibility constraint is fulfilled

$$\pi_{HI}^r + \frac{\pi_{HI}^r}{\delta_H} \geq \pi_{HI}^D, \tag{19}$$

whereby π_{HI}^r and π_{HI}^D are given by Eqs. (15) and (18), respectively. A supplier is willing to participate in relational contracting only if this ICC_H holds. Otherwise, parties play a non-cooperative game discussed in Section 3.1.

The headquarter intensity η affects the ICC_H from Eq. (19) via two channels. On one hand, a decrease in η is associated with lower M's deviation incentives and, thereby, higher H's profits on the equilibrium path (cf. Lemma 2). Other things being equal, this effect increases the left-hand side of ICC_H. On the other hand, it is straightforward to show that a lower η is associated with a higher π_{HI}^D, which ceteris paribus increases the right-hand side of ICC_H. The intuition behind the latter effect is similar to the one provided in Lemma 2. When M's contribution to the relationship is relatively high (i.e., η is low), a headquarter can easily hold up a supplier ex-post and, therefore, H's deviation incentives increase. It can be shown that the overall effect of η on ICC_H depends on parameter values and cannot be assigned without ambiguity. Yet, it immediately follows from Eq. (19) that lower δ_H makes relational integration self-enforcing for a greater range of parameter values. We thus have

Lemma 3. *A supplier is more likely to accept a relational integration contract offered by a headquarter the higher the final good producer's long-term orientation.*

Proof. Follows immediately from Eq. (19).

Before deriving this paper's testable hypotheses, it is worth pausing to discuss one issue regarding the generality of the current framework. In the analysis presented above, headquarters choose the governance mode by comparing equilibrium profits under relational contracting (generated by means of both parties' first-best investment levels) with profits obtained under spot contracting. One might wonder whether headquarters who cannot sustain the first-best investment levels are better off by reducing the level of inputs agreed upon in the relational contract. It can be easily shown that this alternative strategy is strictly dominated by one of the two equilibrium strategies considered in the current paper.[15] Intuitively, by implicitly agreeing on providing a lower level of inputs, the headquarters would merely reduce their profits on the equilibrium path, without affecting the reneging incentives of the counterpart.

3.3. Testable predictions

Having calculated the equilibrium profits under relational and spot contracting, we can now turn to the headquarter's choice of the optimal governance mode and its implication for the international make-or-buy decision. Fig. 1 depicts the optimal ownership structure under a given governance mode as a function of headquarter intensity, η. Under spot contracting, final good producers with high η integrate their suppliers into firm boundaries, whereas those with low η cooperate with the latter at arm's-length (cf. Lemma 1). Firms engaged in relational contracting strictly prefer integration over outsourcing (cf. Lemma 2).[16]

Headquarters prefer relational integration over spot contracting whenever the former yields a higher present value of the profit flow, $\frac{(1+\delta_H)}{\delta_H}\pi_{HI}^r \geq \max\left\{\frac{(1+\delta_H)}{\delta_H}\pi_{HO}^s, \frac{(1+\delta_H)}{\delta_H}\pi_{HI}^s\right\}$, and it is self-enforcing. Formally, a final good producer decides in favor of relational contracting if

$$\pi_{HI}^r \geq \max\{\pi_{HO}^s, \pi_{HI}^s\}, \quad \text{s.t.} \quad \pi_{HI}^r + \tfrac{\pi_{HI}^r}{\delta_H} \geq \pi_{HI}^D \quad \text{and} \quad \pi_{MI}^r + \tfrac{\pi_{MI}^r}{\delta_M} \geq \pi_{MI}^D.$$

Recall from the discussion above that the equilibrium bonus, B_I always fulfills a supplier's ICC_M with equality (so that the latter may be ignored). Using Eqs. (15) and (18), the headquarter's ICC_H reads

$$\frac{1+\delta_H}{\delta_H}\left((1-\alpha) - \frac{\delta_M}{1+\delta_M}(1-\beta_I)^{\frac{1}{1-\alpha(1-\eta)}}(1-\alpha(1-\eta))\right) \geq \beta_I^{\frac{1}{1-\alpha\eta}}(1-\alpha\eta). \tag{20}$$

A simple differentiation of this inequality reveals that the left-hand side of Eq. (20) decreases in δ_H and δ_M. That is, an increase in the long-term orientation of the headquarter's or supplier's manager improves the incentive compatibility of a relational contract. Given that integration is a strictly dominant ownership form under relational contracting, while a fraction of final good producers engaged in spot contracting opt for outsourcing, we have

Lemma 4. *Final good producers are (weakly) more likely to integrate their foreign suppliers into firm boundaries the higher long-term orientation of the headquarters' or suppliers' managers.*

Proof. Follows immediately from Lemmas 1 through 3 and the discussion above.

The effect of time preference rate on the relative prevalence of integration is weak (rather than strict) since some final good producers that were previously engaged in spot integration may now choose relational contracting without changing the (integrated) ownership structure, see Fig. 1. Yet, some headquarters that were sourcing intermediate inputs from an independent supplier under a spot contract may switch to relational contracting due to a higher level of long-term orientation and, thereby, integrate a supplier into firm boundaries.

Notice that Lemma 4 establishes a link between the long-term orientation and the make-or-buy decision from the perspective of a

[15] Formally, this alternative scenario implies a lower left-hand side of the inequality (16) without having an effect on its right-hand side.

[16] See Appendix A.3 for an extension of the model which allows for relational outsourcing in equilibrium. The model's testable predictions continue to hold in this extended model.

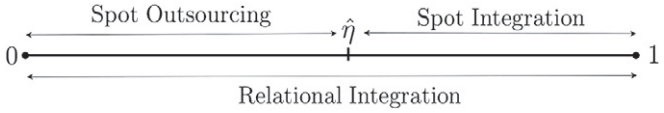

Fig. 1. Optimal ownership structure under a given governance mode.

single *firm*. Given that the relative likelihood of integration vs. outsourcing in the empirical section will be measured using *industry* data, I now show the implications of my model for the industry-level prevalence of integration. More specifically, I will follow Antràs (2015) and Nunn and Trefler (2008, 2013) in approximating the latter with the industry share of intra-firm imports in total imports. Intuitively, a higher share of imports sourced within firm boundaries reflects a greater willingness of firms to obtain an ownership or control stake in foreign suppliers and, thus, captures the relative attractiveness of integration vs. outsourcing. Formally, I employ the following

Definition. Let $IFIS_j \equiv \frac{V^s_{jI}+V^r_{jI}}{V^s_{jO}+V^s_{jI}+V^r_{jI}}$ denote industry j's intra-firm import share in total imports, whereby V^s_{jI} and V^s_{jO} represent, respectively, the value of intra-firm and arm's-length imports under spot contracting and V^r_{jI} is the value of intra-firm imports under relational contracting.

With this definition at hand, I prove in Appendix A.5 the following testable

Hypothesis 1. Intra-firm import share, $IFIS_j$ increases in the foreign country's long-term orientation level.

The intuition behind this hypothesis can be easily inferred from the following thought experiment. Consider an industry equilibrium along the lines of Fig. 1, in which there exists at least one final good producer (call her i) for whom the incentive compatibility from Eq. (20) is marginally *not* fulfilled. This firm imports intermediate inputs via spot contracting, either under outsourcing or integration. Assume that an exogenous shock increases the long-term orientation of this firm's supplier, such that relational integration becomes a payoff-dominant equilibrium strategy for the headquarter. If i was previously engaged in spot outsourcing, the change to relational integration immediately increases the industry share of inputs sourced within firm boundaries. If i switches to relational integration from spot integration, the share of intra-firm imports also increases (even though firm boundaries do not change). This results from the fact that the amount of manufacturing inputs imported under relational integration is strictly larger than under spot integration, $m^r_{jI} > m^s_{jI}$.

One can also imagine a different type of "shock" which increases the time horizon of a domestic producer i (e.g., due to an employment of a long-term oriented manager) and, thereby, raises the *average* long-term orientation of this firm's industry. As before, regardless whether producer i was previously active under spot outsourcing or spot integration, the change to relational integration increases the industry's intra-firm import share. In Appendix A.5, I formally derive the following testable.[17]

Hypothesis 2. Intra-firm import share, $IFIS_j$ increases in the average long-term orientation of headquarters in a given industry.

The previous analysis focused on the link between long-term orientation and the 'extensive margin' of the make-or-buy decision, i.e., the choice whether to integrate a supplier into firm boundaries or deal with the latter at arm's-length. In the following, I show that the final good producer's long-term orientation also affects the 'intensive margin' of integration, i.e., the decision about the ownership stake in the foreign subsidiary.[18] Similarly to Antràs and Helpman (2004), I tackle this issue by assuming that final good producers can freely choose their optimal revenue share β^* from the continuum of values in $[0,1]$, rather than choosing from the pair $\{\beta_I, \beta_O\}$. Intuitively, by acquiring a higher stake in the supplier's company, a headquarter improves his bargaining position and can negotiate a higher fraction of revenue during ex-post bargaining.

The choice of the optimal revenue share under spot contracting, β^{*s} is similar to Antràs and Helpman (2004). The first-order condition of π^s_{Hk} from Eq. (7) with respect to β yields the optimal revenue share under spot contracting, $\beta^{*s}(\eta) = 1 - \alpha(1-\eta)$. As in Antràs and Helpman (2004), $\beta^{*s}(\eta)$ is increasing in η, see Fig. 2.[19] The intuition behind this result is well-known from the Property Rights Theory of the firm by Grossman and Hart (1986) and Hart and Moore (1990): As headquarter intensity increases, final good producers prefer to retain a higher ex-post bargaining share in order to incentivize their own ex-ante investments into relatively more important headquarter services.

The choice of the optimal revenue share under relational contracting is more intricate. Final good producers choose β^{*r} that maximizes π^r_{Hk} from Eq. (15) subject to the ICC_H from Eq. (20). In contrast to the case of spot contracting, this constrained maximization problem does not deliver a closed-form solution for the optimal $\beta^{*r}(\eta)$. However, as shown in Appendix A.5, one can use the implicit function theorem to assess its properties. More specifically, I prove that $\beta^{*r}(\eta)$ is increasing in η, see Fig. 3. Although the behavior of $\beta^{*r}(\eta)$ resembles the one of $\beta^{*s}(\eta)$, the intuition behind the novel result is different. Given that self-enforcing relational contracts ensure both parties' first-best investment levels, $\beta^{*r}(\eta)$ no longer serves the purpose of maximizing ex-ante investments. Instead, final good producers choose the optimal revenue share so as to minimize ex-post deviation incentives. When η is small (i.e., M invests a lot into the relationship), H has the greatest incentive to deviate from the relational agreement and reap one-shot deviation profits. By choosing a low $\beta^{*r}(\eta)$, the headquarter minimizes his own reneging incentives, thereby signalizing his willingness to cooperate. Conversely, as η gets larger, M's deviation incentives increase and H chooses a higher $\beta^{*r}(\eta)$ in order to maintain the incentive compatibility of the relational contract.

The optimal revenue share under relational contracting also crucially depends on δ_H. Applying the implicit function theorem, I prove in Appendix A.5 that β^{*r} decreases in δ_H. Intuitively, as the long-term orientation of a headquarter manager decreases, this manager can credibly signal to the supplier manager his willingness to cooperate by relinquishing to the latter a higher fraction of revenue. Conversely, when the headquarter's long-term orientation increases (i.e., δ_H decreases), H retains a higher β^{*r} in equilibrium, see Fig. 3. To sum

[17] Of note, this hypothesis does not rely on specific assumptions regarding the distribution of final good producers' time preference rates. By imposing a functional form on $G(\delta_H)$, one can potentially obtain further insights into the effect of long-term orientation on intra-firm trade (see Conclusion). However, this would go beyond the scope of the current paper.

[18] Since suppliers' time preference rates are not observable in the firm-level data used in the following section, I do not analyze the effect of a supplier's long-term orientation on the ownership share.

[19] In contrast to Antràs and Helpman (2004), $\beta^{*s}(\eta)$ does not necessarily start in the point of origin. The reason behind this difference lies in the fact that the current model does not rely on the assumption of ex-ante transfers. Since final good producers maximize their fraction of profits (rather than joint profits), they are less willing to incentivize suppliers with a high revenue share when η is low.

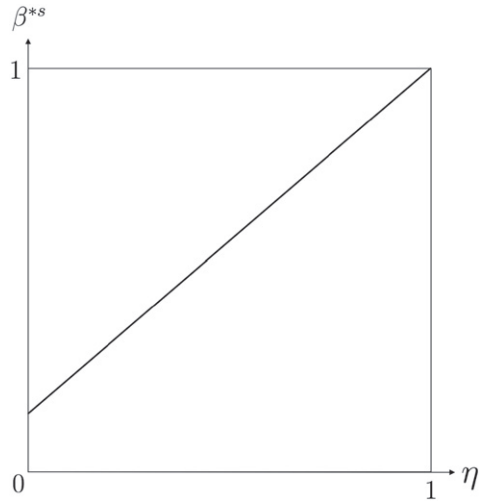

Fig. 2. Optimal revenue share (spot contracting).

up, both under spot and relational contracting, the optimal revenue share allocated to headquarters increases in headquarter intensity, η. In case of relational contracting, this share also positively depends on the headquarter's long-term orientation. Given that the optimal revenue share is proportional to the equity stake in the supplier's firm, we obtain the following testable

Hypothesis 3. The share of a foreign subsidiary owned by a final good producer is (weakly) increasing in the final good producer's long-term orientation and is increasing in the headquarter intensity.

The predicted effect of managerial long-term orientation is weak (rather than strict) since δ_H does not affect the ownership structure under spot contracting. Although we do not observe whether a firm engages in relational contracting or cooperates with its suppliers on the spot, the expected average effect of a final good producer's long-term orientation on the ownership stake in the supplier's company is positive. In the following section, I bring this paper's testable hypotheses to this data.

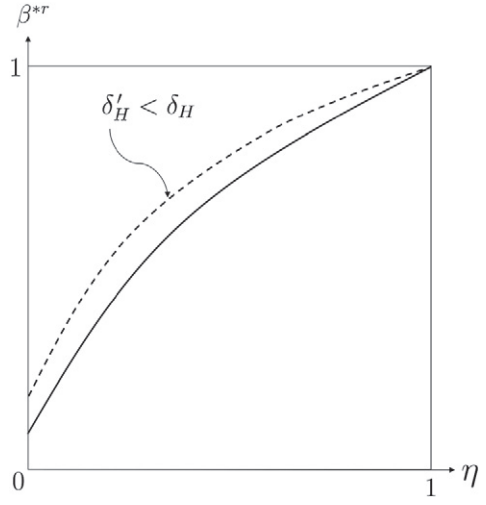

Fig. 3. Optimal revenue share (relational contracting).

4. Empirical implementation

4.1. Examining Hypothesis 1

4.1.1. Econometric specification and data

The baseline specification in the industry-level analysis of Hypothesis 1 takes the following form

$$IFIS_{j\ell} = \alpha \left(\frac{1}{\delta_M}\right)_\ell + \boldsymbol{\beta}\mathbf{X}_j + \boldsymbol{\gamma}\mathbf{X}_\ell + \varepsilon_{j\ell}, \tag{21}$$

whereby the dependent variable is the intra-firm import share, $IFIS_{j\ell}$ of a U.S. industry j sourcing from country ℓ, $\left(\frac{1}{\delta_M}\right)_\ell$ denotes the long-term orientation of foreign country ℓ, $\mathbf{X}_j$ and $\mathbf{X}_\ell$ are vectors of industry- and country-level controls, and $\varepsilon_{j\ell}$ is the error term. Since all explanatory variables are cross-sectional, I run my baseline regressions using a single year of data, 2005.

The dependent variable is drawn from Antràs (2015), who constructs it using information on U.S. intra-firm trade from the U.S. Census Bureau's Related Party Trade Database. More specifically, $IFIS_{j\ell}$ is calculated as the share of related party imports in total (i.e., related and non-related) U.S. imports.[20] A higher $IFIS_{j\ell}$ reflects a greater willingness of U.S. firms to obtain an ownership or control stake in foreign suppliers and, thus, captures the relative attractiveness of integration vs. outsourcing. This data is available for 390 manufacturing industries, defined at six-digit North American Industry Classification System (NAICS) level, in the period 2000–2011.[21]

The key explanatory variable is the index of a country's long-term orientation, LTO_ℓ from Hofstede et al. (2010).[22] This measure is one of the key dimensions developed by Dutch sociologist Geert Hofstede to characterize fundamental cross-cultural differences. Hofstede et al. (2010: 239) define long-term orientation as the cultural value that "stands for the fostering of virtues oriented towards future rewards, in particular, perseverance and thrift" and show that this measure is positively correlated with the importance ascribed to receiving profits in the future rather than obtaining short-term benefits. In this respect, it is well-suited as an (inverse) proxy for a time preference rate. The *LTO* measure varies between 0 (short-term orientation) and 100 (long-term orientation). For easier comparability of results, it has been rescaled to the unit interval, see Table B.8 in Appendix B.

The vector of industry-level controls, $\mathbf{X}_j$ includes variables that have been suggested in the empirical literature as important explanatory factors of the intra-firm import share, cf. Antràs (2015). Following Nunn and Trefler (2008, 2013), I account for the key prediction of the static Property Rights Theory of the firm (Lemma 1) using research and development intensity of an industry, $\log(R\&D)_j$ as a proxy for the headquarter intensity, η. This proxy is constructed as a log of overall R&D expenditures divided by firm sales in each industry. Further determinants of $IFIS_{j\ell}$ have been drawn from Antràs (2015) (henceforth, Antràs-controls):[23] $\log(capital)_j$ and $\log(skill)_j$ are proxies for capital and skill intensity, calculated as the log of the real capital stock per worker and the log of the number of non-production workers divided by total employment, respectively; $freight_j$ and $tariffs_j$ are proxies for trade costs, calculated as the ratio of

[20] Census Bureau defines 'related parties' as firms "with various types of relationships including any person directly or indirectly, owning, controlling or holding power to vote, 6% of the outstanding voting stock or shares of any organization".

[21] Despite the fact that this dataset has become the standard working tool for the analysis of the international make-or-buy decision, one should also be aware of its limitations. Most importantly, it does not contain information on the ownership structure of firms. Hence, a high share of U.S. intra-firm imports from, say, Japan may reflect sourcing by U.S.-based affiliates of Japanese multinationals from their parent companies rather than the likelihood of U.S. final good producers to integrate their Japanese suppliers into firm boundaries.

[22] This score is publicly available at: http://www.geerthofstede.eu.

[23] See Antràs (2015) for the justification of the inclusion of each of these proxies.

CIF imports to FOB imports and average tariffs faced by an importing firm in a given U.S. industry, respectively; $dispersion_j$ is a measure of within-industry productivity dispersion, constructed as the standard deviation of log exports across U.S. port locations and destination countries; $elasticity_j$ is proxy for the elasticity of demand faced by the average buyer of the product being imported into the U.S. Although the current model does not deliver testable predictions for any of the Antràs-controls, they are included in the baseline specification to alleviate the omitted variables bias.

To avoid spurious correlations, I include a wide range of country-level controls, $\mathbf{X}_\ell$. To ensure that a supplier's long-term orientation does not capture a foreign country's economic development, I include the log of a country's GDP in 2005, $\log(GDP)_\ell$, from Penn World Tables as an additional regressor. The effect of long-term orientation might be also confounded by the willingness of economic agents to invest in education. To account for this alternative explanation, I control for $Educ_\ell$, the average years of country ℓ's tertiary schooling in 2005 from Barro and Lee (2013).[24] One might argue that a country's level of long-term orientation merely reflects the stability of its institutions. To account for this channel, I control for $GovStability_\ell$ from the International Country Risk Guide (ICRG), which measures both the government's ability to carry out its declared program(s), and its ability to stay in office, averaged over 1980 through 2000. In robustness checks, I also consider alternative institutional controls, introduced further below.

4.1.2. Results

As a first pass at the data, I regress the share of U.S. intra-firm imports ($IFIS_{j\ell}$) against the level of a country's long-term orientation, LTO_ℓ. As shown in specification (1) of Table 1, the correlation between these two measures is positive and highly significant. As I add all above-mentioned controls in columns (2)–(5), the coefficient on LTO_ℓ decreases but remains significant throughout specifications. A standard deviation change in the level of long-term orientation (22.9 points in the LTO_ℓ index) is associated with a 7.8 percentage point change in the share of intra-firm imports. This is an economically large effect given that the average share of intra-firm imports at the industry/country level is 25%. Estimates for the control variables are broadly in line with previous empirical studies of global sourcing, cf. Chapter 8 in Antràs (2015). In particular, $\log(R\&D)_j$ and $\log(capital)_j$ both have the predicted sign and are significant, while $\log(skill)_j$ is not significant. $IFIS_{j\ell}$ is negatively correlated with the trade costs and is positively associated with a foreign country's economic development, educational level, and institutional stability.

While these correlations are informative, one can pinpoint this paper's theoretical channel even further by exploring the differential impact of suppliers' long-term orientation on the make-or-buy decision in industries with various degrees of vulnerability towards ex-post hold-up. More specifically, one would expect no effect of relational contracting in industries producing homogenous goods (which can be easily verified and enforced by the courts) and a positive significant effect of long-term orientation on intra-firm trade in industries with a high degree of relationship-specificity (for which the hold-up problem is most severe). To examine this hypothesis, I draw from Nunn (2007) a measure of $Specificity_j$, which quantifies the proportion of an industry's intermediate inputs that are relationship-specific. A higher value of this proxy represents a higher share of differentiated inputs and, therefore, a greater vulnerability towards ex-post hold-up. Using this measure, I divide all industries into 5 quintiles, $q = 1,\ldots,5$, whereby $q = 1$ contains the least relationship-specific industries and $q = 5$ the most relationship-specific ones. Let $Q_{jq} = 1$ if industry j is in quintile q and $Q_{jq} = 0$ otherwise. To assess the differential impact of a foreign supplier's long-term orientation, I interact LTO_ℓ with quintile dummies and report the associated OLS estimates in Table 2. As can be seen from column (1), in industries that belong to the first two quintiles, the effect of LTO_ℓ is not significant. Yet, it becomes significant in industries that belong to the top three quintiles of $Specificity_j$. Similar pattern emerges in column (2), which additionally includes the vectors of industry- and country-level control variables used in Table 1.

One could argue that the LTO_ℓ-score describes merely the *average* long-term orientation of country ℓ and is ill-suited to capture differences in *managerial* long-term orientation across countries. To account for this critique, I use an alternative proxy for long-term orientation that has been surveyed directly at the top management level. This proxy stems from the 2004–2014 World Management Survey (WMS), conducted using the methodology by Bloom and Van Reenen (2007).[25] This dataset contains information on managerial practices from over 11,300 manufacturing firms across 34 countries. A manager's time horizon is identified as one of the key organizational practices and it is captured based on the following four questions: "What kind of time scale are you looking at with your targets?", "Which goals receive the most emphasis?", "How are long term goals linked to short term goals?", and "Could you meet all your short-run goals but miss your long-run goals?". The answers to those questions were scored from 1 (short-term) to 5 (long-term) and aggregated to a single index 'Target time horizon', such that higher

Table 1
Suppliers' long-term orientation and U.S. intra-firm import share, 2005.

	Dependent variable: $IFIS_{j\ell}$ in 2005				
	(1)	(2)	(3)	(4)	(5)
LTO_ℓ	0.086***	0.081***	0.051***	0.023**	0.034***
	(0.009)	(0.008)	(0.010)	(0.010)	(0.010)
$\log(R\&D)_j$		0.026***	0.026***	0.026***	0.026***
		(0.005)	(0.005)	(0.005)	(0.004)
$\log(capital)_j$		0.022***	0.021**	0.020**	0.021**
		(0.008)	(0.008)	(0.008)	(0.008)
$\log(skill)_j$		−0.006	−0.006	−0.006	−0.006
		(0.019)	(0.019)	(0.019)	(0.020)
$freight_j$		−0.860***	−0.886***	−0.887***	−0.879***
		(0.149)	(0.150)	(0.151)	(0.149)
$tariffs_j$		−0.001**	−0.001**	−0.001**	−0.002**
		(0.001)	(0.001)	(0.001)	(0.001)
$dispersion_j$		−0.000	−0.000	−0.001	−0.000
		(0.012)	(0.013)	(0.013)	(0.013)
$elasticity_j$		−0.001*	−0.001	−0.001	−0.001
		(0.000)	(0.000)	(0.000)	(0.000)
$Log(GDP)_\ell$			0.016***	0.015***	0.015***
			(0.002)	(0.003)	(0.003)
$Educ_\ell$				0.002***	0.002***
				(0.000)	(0.000)
$GovStability_\ell$					0.014**
					(0.006)
Observations	20,437	20,437	20,000	19,670	19,384
R^2	0.004	0.051	0.057	0.057	0.059

Note: The dependent variable is U.S. intra-firm imports as a share of total U.S. imports in 2005. LTO_ℓ denotes a foreign country's long-term orientation. $log(R\&D)_j$, $log(capital)_j$, $log(skill)_j$, $freight_j$, $tariffs_j$, $dispersion_j$, and $elasticity_j$ are proxies for R&D-, capital- and skill-intensity of industry j, freight cost, tariffs, productivity dispersion and demand elasticity, respectively. $Log(GDP)_\ell$, $Educ_\ell$, and $GovStability_\ell$ are proxies for a foreign country's economic development, education, and institutional stability. Robust standard errors are clustered at the country level and presented in brackets.
*** Indicates significance at the 1% level.
** Indicates significance at the 5% level.
* Indicates significance at the 10% level.

[24] Since the focus of this paper lies on *managerial* long-term orientation, this papers uses tertiary (rather than primary or secondary) schooling as a measure of education. I verify, however, that the results are robust to measuring $Educ_\ell$ as an average of primary, secondary and tertiary schooling.

[25] This data is publicly available at http://worldmanagementsurvey.org

Table 2
LTO_ℓ, $Specificity_j$ and U.S. intra-firm import share, 2005.

	Dependent variable: $IFIS_{j\ell}$ in 2005	
	(1)	(2)
LTO_ℓ interacted with		
Q_{j1}	0.046	0.003
	(0.049)	(0.038)
Q_{j2}	0.022	0.024
	(0.065)	(0.047)
Q_{j3}	0.090**	0.051**
	(0.040)	(0.023)
Q_{j4}	0.083*	0.033
	(0.046)	(0.026)
Q_{j5}	0.073**	0.059**
	(0.034)	(0.030)
Quintile fixed effects	Yes	Yes
Vector of controls	No	Yes
Observations	20,437	19,384
R^2	0.004	0.057

Note: The dependent variable is U.S. intra-firm imports as a share of total U.S. imports in 2005. Q_{jq} is an indicator variable that is equal to one if industry j is in the qth quintile of relationship-specificity. Vector of controls includes country- and industry-level variables used in Table 1. Robust standard errors are clustered at the country level and presented in brackets.
** Indicates significance at the 5% level.
* Indicates significance at the 10% level.

value of this index reflects more long-term oriented managers. The mean value of this index across all managers from country ℓ will be referred henceforth as $Horizon_\ell$. As shown in Fig. 4, this score is positively and significantly correlated with the long-term orientation index, LTO_ℓ from Hofstede et al. (2010).

Table 3 reports the results of OLS regressions along the lines of Eq. (22), which use $Horizon_\ell$ (instead of LTO_ℓ) as the key explanatory variable. Consistent with the first hypothesis, coefficients on $Horizon_\ell$ are positive and highly significant throughout specifications.[26] The coefficients on control variables are very similar to the ones from Table 1, apart from the fact that all country-level controls lose their significance. In column (6), I include the Rule of Law from the Worldwide Governance Indicators (averaged over 2000–05) as an alternative proxy for institutional quality. While the effect of this institutional measure is insignificant, the coefficient on $Horizon_\ell$ remains positive and highly significant. A standard deviation change in foreign managers' time horizons is associated with a 9.4 percentage point change in the share of intra-firm imports. Once again, this is an economically sizeable effect.

4.2. Examining Hypothesis 2

4.2.1. Econometric specification and data

The baseline specification for testing Hypothesis 2 takes the following form:

$$IFIS_{j\ell} = \alpha\left(\frac{1}{\delta_H}\right)_j + \boldsymbol{\beta}\mathbf{X}_j + \lambda_\ell + \varepsilon_{j\ell}, \tag{22}$$

whereby $IFIS_{j\ell}$ is defined analogously to the previous section, $\left(\frac{1}{\delta_H}\right)_j$ represents the average long-term orientation of headquarter managers in a given U.S. industry, $\mathbf{X}_j$ is a vector of industry-level controls, λ_ℓ are country fixed effects and $\varepsilon_{j\ell}$ is the error term. As before, I run my baseline regressions using a single year of data, 2005.

To construct a measure of managerial long-term orientation that varies across U.S. industries, I proceed as follows. In the first step, I

[26] The number of observations is smaller in Table 3 compared to Table 1 since $Horizon_\ell$-score is available for a lower number of countries.

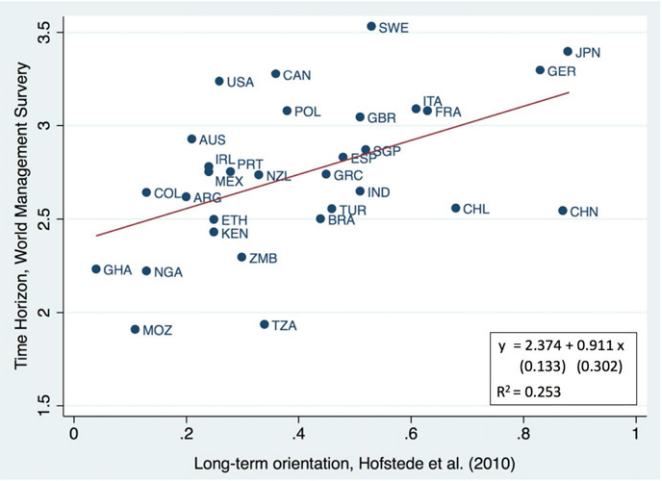

Fig. 4. Time horizon$_\ell$ and long-term orientation, LTO_ℓ.

use information on the ancestry of U.S. citizens from the 2000 U.S. Census to estimate the ethnic composition of U.S. sectors. In this census, 80.1% of the population reported their ethnic origin, 58% of which specified a single ancestry, and 22% provided two ancestries. For the construction of the measure, I use the first ancestry indicated by an individual.[27] Since the theoretical model presented above emphasizes the effect of *managerial* long-term orientation on the make-or-buy decision, my baseline measures for cultural composition of a sector include only those individuals who indicated their occupation as 'Manager' or 'C.E.O'.[28] Next, I weigh ethnic shares of managers in a given industry with the long-term orientation scores of their (ancestor's) country of origin to obtain industry-specific measures of long-term orientation:

$$lto_j = \sum_\ell S_{\ell j} LTO_\ell, \tag{23}$$

where $S_{\ell j}$ is the share of managers belonging to ethnic group ℓ in industry j and LTO_ℓ is the long-term orientation of this ethnic group. The intuition behind this approach builds on the recent empirical evidence that cultural traits are (partly) inherited from the ancestors (cf. Algan and Cahuc, 2010, 2014). Table B.9 in Appendix B presents the ten industries with the lowest and highest levels of this score.[29] In view of this paper's theoretical proposition, one would expect a higher fraction of intra-firm imports in industries with a higher prevalence of long-term orientated managers.

The vector of controls, $\mathbf{X}_j$ includes two groups of variables. The first group comprises all industry-level controls introduced in the previous section: $\log(R\&D)_j$, $\log(capital)_j$, $\log(skill)_j$, $freight_j$, $tariffs_j$, $dispersion_j$, and $elasticity_j$. The second group of industry-level controls comprises potential confounding factors of the link between long-term orientation and intra-firm trade. To allow for the possibility that long-term oriented managers invest more in education, I control for $educ_j = \sum_\ell S_{\ell j} T_\ell$, whereby T_ℓ denotes average years of country ℓ's tertiary schooling in 2005 from Barro and Lee (2013) and $S_{\ell j}$ is the share of managers from country ℓ in industry j, cf. Eq. (23).

[27] The results are robust to construction of an index that incorporates a person's first and second ancestry.
[28] The list of ancestries in this sample comprises 95 countries. U.S. industries are generally very diverse in terms of their ethnic composition, with a mean of 39 managerial ancestries by industry.
[29] To be clear, this approach merely exploits the distribution of long-term oriented managers across industries and does *not* posit inherent differences in long-term orientation between them. In fact, one of the analysis presented below exploits the cross-industry variation in long-term orientation over time.

Table 3
Suppliers' time horizon and U.S. intra-firm import share, 2005.

	Dependent variable: $IFIS_{j\ell}$ in 2005					
	(1)	(2)	(3)	(4)	(5)	(6)
$Horizon_\ell$	0.270***	0.266***	0.245***	0.224***	0.224***	0.247***
	(0.043)	(0.044)	(0.051)	(0.052)	(0.052)	(0.065)
$log(R\&D)_j$		0.026***	0.026***	0.026***	0.026***	0.026***
		(0.003)	(0.003)	(0.003)	(0.003)	(0.002)
$log(capital)_j$		0.028***	0.027***	0.026***	0.026***	0.026***
		(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
$log(skill)_j$		−0.000	0.000	−0.001	−0.001	−0.001
		(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
$freight_j$		−0.838***	−0.847***	−0.855***	−0.856***	−0.859***
		(0.124)	(0.126)	(0.127)	(0.128)	(0.129)
$tariffs_j$		−0.002***	−0.002***	−0.002***	−0.002***	−0.002***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$dispersion_j$		−0.004	−0.004	−0.004	−0.004	−0.004
		(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
$elasticity_j$		−0.001	−0.001	−0.001	−0.001	−0.001
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Log(GDP)_\ell$			0.014	0.016	0.016	0.015
			(0.013)	(0.013)	(0.013)	(0.012)
$Educ_\ell$				0.001	0.001	0.002
				(0.002)	(0.002)	(0.003)
$GovStability_\ell$					−0.002	
					(0.034)	
$RuleLaw_\ell$						−0.020
						(0.048)
Observations	8559	8559	8559	8418	8418	8418
R^2	0.082	0.137	0.140	0.138	0.138	0.139

Note: The dependent variable is U.S. intra-firm imports as a share of total U.S. imports in 2005. $Horizon_\ell$ denotes a foreign country's time horizon. $log(R\&D)_j$, $log(capital)_j$, $log(skill)_j$, $freight_j$, $tariffs_j$, $dispersion_j$, and $elasticity_j$ are proxies for R&D-, capital- and skill-intensity of industry j, freight cost, tariffs, productivity dispersion and demand elasticity, respectively. $Log(GDP)_\ell$, $Educ_\ell$, and $GovStability_\ell$ are proxies for a foreign country's economic development, education, institutional stability, and the rule of law. Robust standard errors are clustered at the country level and presented in brackets.
*** Indicates significance at the 1% level.

Since long-term orientation may also reflect managerial work ethic, I control for $hardwork_j = \sum_\ell S_{\ell j} W_\ell$, whereby W_ℓ is the percentage of population in country ℓ that picked "Hard Work" as the answer to the 2005–2009 World Values Survey (WVS) question "What should children be taught at home?". Managers from long-term oriented cultures may also have a different understanding of (legal) institutions. To control for this possibility, I include $rulelaw_j = \sum_\ell S_{\ell j} R_\ell$, whereby R_ℓ is country ℓ's index of Rule of Law from the Worldwide Governance Indicators, averaged over 2000–05. In the robustness checks discussed further below, I also consider alternative proxies for institutions and further potential confounders of lto_j (e.g., savings, trust, management quality).

Inclusion of the above-mentioned control variables does not yet account for the fact that long-term orientation is not the only cultural value that is passed on from parents to children. Moreover, managerial long-term orientation may be endogenous to the economic or social environment in which an individual was socialized. To pinpoint the specific role of lto_j emphasized in the current paper and to better understand if the relationship between managerial long-term orientation and the make-or-buy decision is causal, I apply an instrumental variables approach. Using data from Gorodnichenko and Roland (2011), I construct two instruments that exploit genetic distance of a given population to Japan. The choice of Japan as a benchmark country is motivated by the fact that this country has the second-highest *LTO*-score and Japanese managers are widely known for their tendency to engage in relational contracting (cf. the case of Toyota discussed in the introduction).[30] The first instrument is $edist_j = \sum_\ell S_{\ell j} E_\ell$, whereby E_ℓ represents Euclidian distance between the frequency of blood types in a given country and the frequency of blood types in Japan. The second instrument takes into account the covariance between blood type frequencies and is given by $mdist_j = \sum_\ell S_{\ell j} M_\ell$, whereby M_ℓ represents Mahalanobis distance between the frequency of blood types in a given country and the frequency of blood types in Japan.[31] The intuition behind these instruments builds on the fact that parents transmit to descendants not only their culture but also their genes (see Bisin and Verdier, 2010, and Spolaore and Wacziarg, 2015). Hence industries consisting of managers that are more genetically distant to Japan are expected to have a lower level of long-term orientation. As shown in Figs. 5 and 6, both instruments are indeed negatively correlated with lto_j, with a very high goodness of fit ($R^2 = 0.517$ for $edist_j$ and $R^2 = 0.517$ for $mdist_j$).[32] At the same time, given that blood types are 'neutral' genetic markers (i.e., they have no impact on individual's physical or cognitive abilities), these instruments are likely to satisfy the exclusion restriction.

4.2.2. Results

As a first pass at the data, I regress the share of U.S. intra-firm imports in 2005 against lto_j. As shown in column (1) of Table 4, the

[30] The country with the highest *LTO*-index is South Korea. Yet, an instrument based on the genetic distance to South Korea exhibits a significantly smaller goodness of fit. To avoid biases associated with weak instruments, I use Japan as a benchmark country.

[31] Formally, $E_\ell = [(f_{A,Japan} - f_{A,\ell})^2 + (f_{B,Japan} - f_{B,\ell})^2]$, where $f_{t,\ell}$ denotes the frequency of blood type $t \in \{A, B\}$ in country ℓ. Mahalanobis distance between a vector x and y picked from distributions X is generally defined as $M(x,y) = \left[(x-y)' \sum_X^{-1} (x-y)\right]^{1/2}$, where $\sum_X$ is the covariance matrix for X. In the current context, $\sum_X = \text{var}(f_{A,\ell}, f_{B,\ell})$. Table B.8 in Appendix B reports the scores for E_ℓ and M_ℓ.

[32] Importantly, these figures do *not* postulate a causal relationship between genes and cultural attributes such as long-term orientation. Instead, if parents transmit not only genes, but also their cultural values to their offspring, populations that are genetically close will also happen to be culturally close.

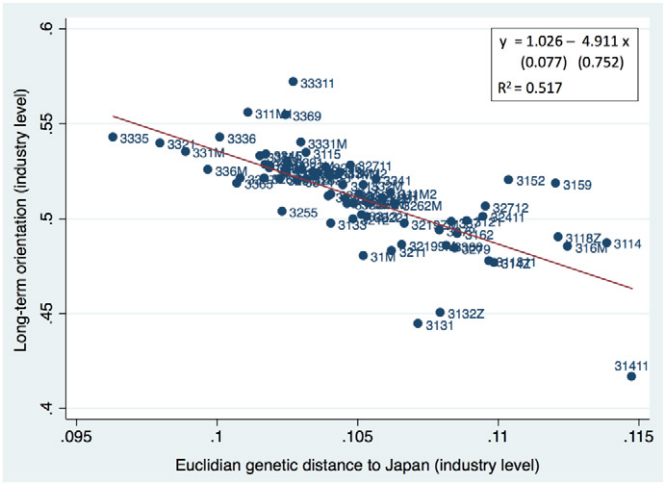

Fig. 5. lto_j and Euclidian genetic distance, $edist_j$.

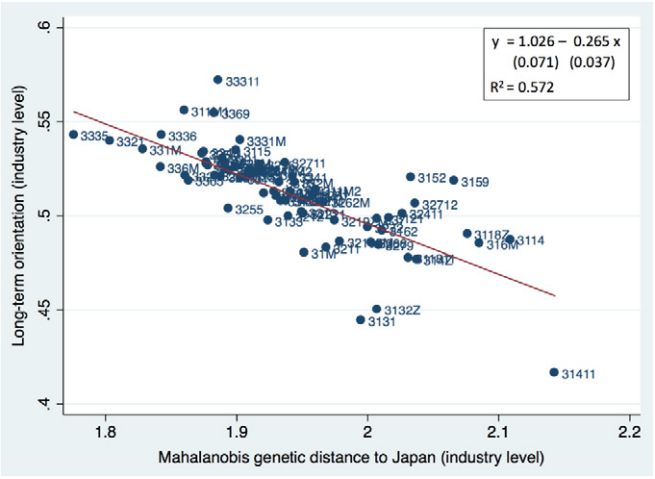

Fig. 6. lto_j and Mahalanobis genetic distance, $mdist_j$.

two measures are positively correlated. As I add all above-mentioned industry-level controls in column (2), the coefficient on lto_j slightly decreases, but remains highly significant. Similarly, the coefficient on lto_j marginally decreases but remains consistent with the key prediction after inclusion of country fixed effects in column (3). A standard deviation change in lto_i is associated with a 13.9 percentage point change in the ownership share. This is an economically large effect. The effect of long-term orientation remains robust after instrumenting lto_j with $edist_j$ and $mdist_j$ in specifications (4) and (5), respectively.[33] A high first-stage *F*-statistic on the excluded instrument (39.36 and 40.11 when lto_j is instrumented with $edist_j$ and $mdist_j$, respectively) and a high first-stage partial R^2 reassure that instruments are relevant and not weak. Consistently with the static Property Rights Theory of the firm (Lemma 1), R&D intensity is positively and significantly correlated with the share of intra-firm trade in all specifications. Although the current model does not provide theoretical predictions for other industry-level controls, their estimated coefficients may be interesting in their own right. For instance, $tariffs_j$ continue to have a negative impact on intra-firm trade. Managerial $educ_j$ or $hardwork_j$ (potential confounding factors of the link between lto_j and intra-firm trade) are also correlated with the relative prevalence of integration, but the sign of their effects is opposite to the one of lto_j. Industries with a higher prevalence of managers from countries with a high Rule of Law tend to have a higher share of intra-firm trade.

In the following, I conduct a range of robustness checks.[34] First, to show that my results are not limited to one year (2005), I rerun the above-mentioned regressions using panel data for the entire available period, 2000–2011, and controlling for country-*year* fixed effects. As can be seen from Table B.10, the coefficients on lto_j are throughout positive, highly significant, and comparable to the ones using a single year of data. Second, I rerun regressions from Table 4 using two alternative versions of the lto_j index. Index lto_{2j} is constructed by analogy to Eq. (23), but it assigns the U.S. *LTO*-score to all managers who did not report their ancestry and were omitted during the construction of lto_j. The idea behind this robustness check is that managers without reported ancestry are less likely to be "bearers" of the long-term orientation of their (ancestors') countries of origin and the exclusion of those individuals might lead to a potential upward bias of the estimated effect. To ensure that my results do not merely reflect common language ties, business or ethnic networks (Rauch, 1999), I construct a third index, lto_{3j}. During the construction of this index for industry *j* sourcing from country ℓ, I consider only managers stemming from countries other than ℓ. For example, to calculate the lto_{3j} of industry *j* that imports from Germany, I exclude all German managers in this industry.[35] Using the subsets of U.S. Census underlying the construction of lto_{2j} (lto_{3j}), I also create the corresponding instruments $edist_{2j}$ and $mdist_{2j}$ (respectively, $edist_{3j}$ and $mdist_{3j}$). Table B.11 in Appendix reports the results of these robustness checks. Both lto_{2j} and lto_{3j} are positive and significant in all specifications. Notice that the coefficient on lto_{2j} (which assigns the U.S. *LTO*-score to all respondents who did not report their ancestry) is slightly smaller than the coefficient on lto_j in Table 4. This is not surprising given that the U.S. *LTO*-score belongs to the lowest quartile in the long-term orientation rank. Furthermore, notice that the OLS coefficient on lto_{3j} (which considers only managers from countries other than the respective trading partner) is even smaller in magnitude compared to lto_{2j}. This suggests that language or ethnic ties may play an independent role in the make-or-buy decision, alongside the effect of long-term orientation emphasized in the current paper.

I further verify the validity of my results in a wide range of unreported robustness checks. First, to account for "zeros" in the intra-firm trade data, I rerun regressions from Table B.10 using generalized linear models (fractional logit and probit), see Papke and Wooldridge (1996). Second, in *each* of the above-mentioned robustness checks, I experiment with alternative measures for institutions (using International Country Risk Guide or World Bank's Doing Business data), human capital (using data from Penn World Table 8.1), work ethics (using Barro's (2003) data on the prevalence of Protestants in 1900 and 2000 to account for Max Weber's (1930) seminal argument), and include further controls for potential confounders of LTO_ℓ, for instance, saving rates (using World Bank data) or the level

[33] First-stage coefficients from all IV regressions are reported in Table B.12 in Appendix B.

[34] In all robustness checks, I report only the estimates of lto_j and $log(R\&D)_j$ and refrain from reporting the coefficients of other control variables, for which the current model delivers no testable predictions.

[35] I also experiment with different variants of this index using CEPII data on language and colonial ties from Mayer and Zignago (2011). In the above-mentioned example, for the construction of the lto_{3j}-index of industry *j* importing from Germany I successively exclude managers from countries in which German is the official or primary language (Austria, Switzerland, Luxembourg, and Lichtenstein) or spoken by a substantial fraction of population (e.g., Belgium), or managers from former German colonies (e.g., Namibia). The coefficient on lto_{3j} remains robust across specifications.

Table 4
Buyers' long-term orientation and U.S. intra-firm import share, 2005.

	Dependent variable: $IFIS_{j\ell}$ in 2005				
	OLS			IV	
	(1)	(2)	(3)	(4)	(5)
lto_j	1.689***	1.444**	1.524***	1.640**	1.607**
	(0.318)	(0.682)	(0.608)	(0.722)	(0.706)
$log(R\&D)_j$		0.030***	0.031***	0.031***	0.031***
		(0.012)	(0.012)	(0.012)	(0.012)
$log(capital)_j$		0.005	−0.000	−0.000	−0.000
		(0.013)	(0.012)	(0.012)	(0.012)
$log(skill)_j$		−0.042	−0.041	−0.042	−0.041
		(0.037)	(0.037)	(0.037)	(0.037)
$freight_j$		−0.225	−0.231	−0.224	−0.226
		(0.452)	(0.438)	(0.432)	(0.432)
$tariffs_j$		−0.002***	−0.002***	−0.002***	−0.002***
		(0.000)	(0.000)	(0.000)	(0.000)
$dispersion_j$		0.019	0.028	0.030	0.029
		(0.032)	(0.032)	(0.031)	(0.031)
$elasticity_j$		−0.001	−0.001	−0.001	−0.001
		(0.001)	(0.001)	(0.001)	(0.001)
$educ_j$		−1.099	−1.200*	−1.162*	−1.172*
		(0.668)	(0.671)	(0.642)	(0.644)
$hardwork_j$		−0.418**	−0.479**	−0.483**	−0.482**
		(0.237)	(0.234)	(0.232)	(0.232)
$rulelaw_j$		0.823**	0.838**	0.831***	0.833***
		(0.340)	(0.329)	(0.321)	(0.321)
Country FEs	No	No	Yes	Yes	Yes
Observations	7114	7114	7114	7114	7114
R^2	0.024	0.054	0.227	0.227	0.227
First stage					
$edist_j$				−4.601***	
				(0.230)	
$mdist_j$					−0.233***
					(0.011)
F-stat of excl. instrument				39.36	40.11
F-test, *p*-value				0.0000	0.0000
Partial R^2				0.801	0.803

Note: The dependent variable is U.S. intra-firm imports as a share of total U.S. imports in 2005. The table reports OLS estimates in specifications (1)–(3). In specifications (4) and (5), managerial long-term orientation, lto_j is instrumented, respectively, with Euclidian ($edist_j$) and Mahalanobis ($mdist_j$) genetic distance to Japan. $log(R\&D)_j$ is R&D intensity of industry j. $log(capital)_j$, $log(skill)_j$, $freight_j$, $tariffs_j$, $dispersion_j$, and $elasticity_j$ are proxies for capital- and skill-intensity, freight cost, tariffs, productivity dispersion and demand elasticity, respectively. $educ_j$, $hardwork_j$, and $rulelaw_j$ are proxies for composition of industries regarding managerial tertiary education, hard work ethics, and institutional background, respectively. Robust standard errors are clustered at the industry level and presented in brackets.

*** Indicates significance at the 1% level.
** Indicates significance at the 5% level.
* Indicates significance at the 10% level.

of trust (using data from the World Values Survey). Third, I verify that my results are robust to jointly instrumenting lto_j with $edist_j$ and $mdist_j$ and testing for overidentification.

The fact that ethnic composition of U.S. industries changes over time allows us to explore the effect of long-term orientation on U.S. intra-firm trade in a dynamic setting. More specifically, I use the 2010 U.S. Census to construct a measure of buyers' long-term orientation in 2010, $lto_{j,2010}$ and take the difference between the 2010 and 2000 values, $\Delta lto_j = lto_{j,2010} - lto_{j,2000}$ as a proxy for an increase in managerial long-term orientation in a given industry. Similarly, I let $\Delta educ_j = educ_{j,2010} - educ_{j,2000}$, $\Delta hardwork_j = hardwork_{j,2010} - hardwork_{j,2000}$, and $\Delta rulelaw_j = rulelaw_{j,2010} - rulelaw_{j,2000}$ denote changes in managerial composition with respect to education, hardworkingness, and institutional backgrounds in a given industry. Table 5 presents the results of a first difference specification, which regresses an increase in the U.S. intra-firm import share from 2005 to 2010, $\Delta IFIS_{j\ell} = IFIS_{j\ell,2010} - IFIS_{j\ell,2005}$ against the above-mentioned proxies. Throughout specifications, a rise in long-term orientation of a industry's managers is positively correlated with an increase in the intra-firm import share. This effect persists after including time-invariant industry controls ($log(R\&D)_j$, $log(capital)_j$, $log(skill)_j$, $freight_j$, $tariffs_j$, $dispersion_j$, and $elasticity_j$) in column (3) and country fixed effects in column (4).

As in the previous section, one could argue that the lto_j index (which is based on the Hofstede's LTO_ℓ score) is ill-suited to capture *managerial* (rather than a society's average) long-term orientation. To account for this criticism, I construct an alternative index of an industry's time $horizon_j = \sum_\ell S_{\ell j} Horizon_\ell$, whereby $Horizon_\ell$ is the *managerial* time horizon score from the World Management Survey (see previous section) and $S_{\ell j}$ is the share of managers in industry j belonging to ethnic group ℓ. Similarly to lto_j, this index comprises only managers who reported their ancestry. By analogy to lto_{2j} and lto_{3j}, I construct two alternative versions of this index, by assigning the average time horizon of U.S. managers to all managers who did not report their ancestry, $horizon_{2j}$ and considering only managers stemming from countries other than the respective source destination, $horizon_{3j}$. As can be seen from specifications (1)–(3) of Table 6, all three measures are positively correlated with intra-firm import shares. To mitigate the omitted variables bias, specifications (4)–(6) include control variables from Table 4 and country fixed effects. To ensure that managerial time horizons are not confounded by management practices, I add to the list of industry-level controls a further variable $mquality_j = \sum_\ell S_{\ell j} Q_\ell$, whereby Q_ℓ is the average score

Table 5
First differences in buyers' long-term orientation and U.S. intra-firm import share.

	Dependent variable: $\Delta IFIS_{j\ell}$			
	(1)	(2)	(3)	(4)
Δlto_j	0.248***	0.281**	0.312**	0.253**
	(0.097)	(0.126)	(0.132)	(0.126)
$\Delta educ_j$		0.172*	0.231**	0.146
		(0.103)	(0.117)	(0.128)
$\Delta hardwork_j$		0.030	0.058**	0.053
		(0.033)	(0.034)	(0.038)
$\Delta rulelaw_j$		−0.015	−0.039	−0.022
		(0.039)	(0.048)	(0.051)
Industry controls	No	No	Yes	Yes
Country FEs	No	No	No	Yes
Observations	5314	5314	5314	5314
R^2	0.001	0.001	0.002	0.079

Note: The dependent variable is an increase in U.S. intra-firm imports from 2005 to 2010. Δlto_j, $\Delta educ_j$, $\Delta hardwork_j$, and $\Delta rulelaw_j$ represent increases in industry j's managerial long-term orientation, education, hardworkingness and institutional backgrounds. Industry controls are $log(R\&D)_j$, $log(capital)_j$, $log(skill)_j$, $freight_j$, $tariffs_j$, $dispersion_j$, and $elasticity_j$. Robust standard errors are clustered at the industry level and presented in brackets.

*** Indicates significance at the 1% level.

** Indicates significance at the 5% level.

* Indicates significance at the 10% level.

across all organizational dimensions (apart from $Horizon_\ell$) from the WMS.[36] As asserted by Bloom and Van Reenen (2007), higher value of this score is associated with better overall management quality. The coefficient on $horizon_j$ loses in magnitude but continues to be positively and significantly correlated with intra-firm import shares. The fact that $horizon_{3j}$ is significant only at the 10% level suggests the presence of language and/or business ties in global sourcing. The coefficients on unreported control variables are very similar to the ones from Table 4. In particular, $\log(R\&D)_j$ is positively and significantly correlated with the relative prevalence of integration.

4.3. Examining Hypothesis 3

4.3.1. Econometric specification and data

To empirically assess the third hypothesis, I test the following econometric model:

$$S_{i\iota} = \alpha\, horizon_i + \beta\, \eta_i + \boldsymbol{\gamma}\mathbf{X}_i + \boldsymbol{\zeta}\mathbf{X}_\iota + \lambda_\ell + \lambda_j + \lambda_l + \lambda_\nu + error, \quad (24)$$

whereby $S_{i\iota}$ denotes the share of a foreign subsidiary ι owned by a firm i; $horizon_i$ is the average time horizon of company i; η_i denotes the headquarter intensity of this firm; $\mathbf{X}_i$ and $\mathbf{X}_\iota$ are vectors of firm i's and subsidiary ι's characteristics, respectively; λ_ℓ and λ_j represent, respectively, headquarter i's country and industry fixed effects (henceforth, H's Ctr&Ind FEs); λ_l and λ_ν represent, respectively, subsidiary ι's country and industry fixed effects (henceforth, M's Ctr&Ind FEs).

The dependent variable is constructed using the Orbis database by Bureau van Dijk. This database provides firm-level data covering around 100 (developed and emerging) countries since 2005. In my analysis, I consider only industrial companies and discard firms of other types (e.g., banks, insurance companies). This database records not only whether a company has a foreign subsidiary, but also, in roughly three out of four cases, contains information on the percentage of a foreign subsidiary ι directly owned by a parent company i, $S_{\iota i}$ (henceforth, ownership share). $S_{i\iota}$ is a continuous variable, with the lowest value of 0.01, the highest value equal to 100 and the mean of 76.91. In the data extraction available to the author, ownership information is available for a single year, 2014. I further observe the 4-digit NAICS industry of the parent and daughter company. Given that the theoretical model presented above deals with vertical (rather than horizontal) relationships, I restrict my baseline sample to firm pairs active in different industries.[37] To sum up, the dependent variable in this section is the share of a foreign industrial company, owned in 2014 by an industrial firm, which is active in a different 4-digit NAICs industry. This yields 113,623 observations of ownership stakes in foreign subsidiaries from 77 countries.

To construct a firm-level proxy for managerial time horizons, I exploit information on nationalities of more than 2.2 million managers of 190 nationalities that are currently (as of 2013), or were previously (before 2013), employed by the above-mentioned subset of firms. More specifically, I assign the above-mentioned WMS score of managerial time preference rate, $Horizon_\ell$ to each manager with a reported nationality and calculate for each firm i the average time horizon of its current and previous managers, $horizon_i$.[38] This leaves me with 77,338 firm pairs for which we know the time horizon of headquarter managers (time horizon of suppliers is not observable in the data). In view of this paper's third hypothesis, firms with a higher value of $horizon_i$ are expected to have a higher ownership share in a foreign subsidiary compared to firms managed by short-term oriented individuals.

As suggested by Hypothesis 3, the ownership share is also increasing in the headquarter intensity, η_i. Using Orbis data, I construct a novel proxy for the headquarter intensity which, to the best of my knowledge, has not yet been exploited in the empirical literature on the Property Rights Theory of the firm.[39] I construct this proxy as a ratio of a firm's intangible fixed assets in 2013, defined as "all intangible assets such as formation expenses, research expenses, goodwill, development expenses and all other expenses with a long term effect", over employment in the same year (henceforth, $intangible_i$). Given that this measure is likely to reflect the relative importance of specific investments provided by headquarters, one would expect a positive relationship between $intangible_i$ and $S_{i\iota}$. As argued by Antràs (2003, 2015), headquarter intensity can also be approximated by a firm's capital intensity. To account for this suggestion, I consider a ratio of a firm's tangible assets in 2013, defined as "all tangible assets such as buildings and machinery", over employment in the same year (henceforth, $tangible_i$) as an alternative proxy for the headquarter intensity, η_i.[40]

The vector of controls, $\mathbf{X}_i$ includes two groups of variables. The first group comprises the following firm-level characteristics: a firm's $size_i$ (proxied by employment in 2013), age_i (difference

[36] I also run robustness checks by separately including each of the WMS dimensions in the regressions.

[37] As shown by Lanz and Miroudot (2011), subsidiaries in the same industries as their parent companies are more likely to reflect horizontal foreign direct investment. I verify, however, that my results are robust to considering firms pairs that are active in the same industries.

[38] I choose $Horizon_\ell$ rather than LTO_ℓ as a relevant proxy for managerial time preference rates since the former has been observed at the top management level whereas the latter describes a society's average. Information on managerial nationality is missing for roughly 20% of individuals in my sample. I verify that my results are robust to assigning the $Horizon_\ell$ score of the country in which a manager is employed to managers with unreported nationalities.

[39] In the available data extraction, less then 1% of observations contain information on a firm's R&D expenditures. This precludes a construction of a proxy for R&D intensity similar to the one used in the industry-level analysis.

[40] Nunn and Trefler (2013) argue, however, that overall capital intensity is an imperfect proxy for headquarter intensity since it lumps together both relationship-specific (e.g. machinery) and not relationship-specific (e.g. buildings) components of headquarters' investments. Given that the available data does not allow to disentangle these factors, the coefficient on $tangible_i$ should be interpreted with caution.

Table 6
Buyers' time horizons and U.S. intra-firm import share, 2005.

	Dependent variable: $IFIS_{j\ell}$ in 2005					
	(1)	(2)	(3)	(4)	(5)	(6)
$horizon_j$	2.700***			0.909**		
	(0.419)			(0.445)		
$horizon_{2j}$		1.857***			0.608**	
		(0.296)			(0.321)	
$horizon_{3j}$			1.594***			0.549**
			(0.271)			(0.325)
Country FEs	No	No	No	Yes	Yes	Yes
Industry controls	No	No	No	Yes	Yes	Yes
Observations	7114	7114	7114	7114	7114	7114
R^2	0.089	0.088	0.086	0.216	0.216	0.216

Note: The table reports OLS estimates. The dependent variable is U.S. intra-firm imports as a share of total U.S. imports in 2005. $horizon_j$, $horizon_{2j}$, and $horizon_{3j}$ are different versions of a proxy aimed to capture managerial time horizons in industry j. Industry controls include $log(R\&D)_j$, $log(capital)_j$, $log(skill)_j$, $freight_j$, $tariffs_j$, $dispersion_j$, $elasticity_j$, $educ_j$, $hardwork_j$, $rulelaw_j$, and $mquality_j$. Robust standard errors are clustered at the industry level and presented in brackets.
*** Indicates significance at the 1% level.
** Indicates significance at the 5% level.

between 2013 and the year of incorporation), and total factor productivity in 2013, TFP_i, constructed following the methodology by Levinsohn and Petrin (2003).[41] The second group of controls includes the above-mentioned potential confounding factors of the long-term orientation: $educ_i$, $hardwork_i$ and $rulelaw_i$, which are constructed by assigning to managers with nationality ℓ the average levels of tertiary educational attainment in country ℓ from Barro and Lee (2013), the percentage of population in country ℓ that picked "Hard Work" as the answer to the WVS question "What should children be taught at home?", and the Rule of Law index of country ℓ, respectively. Using information on managerial genders, I construct a further control variable, $male_i$ as a proportion of male vs. female managers employed by a firm i. This proxy aims to control for the possibility that male and female managers may differ regarding their time preference rates.

The only information on subsidiaries available to the author are ι's $size_\iota$ (as measured by the number of employees in 2013), and total (intangible and tangible) assets in 2013, $assets_\iota$. In line with the above-mentioned reasoning, a subsidiary's assets are likely to reflect the importance of its investments in the production process and the extent to which it is exposed towards the ex-post hold-up. Hence, one can use $assets_\iota$ as an *inverse* proxy for the headquarter intensity in the production process. According to Hypothesis 3, one would expect a negative coefficient on $assets_\iota$. Apart from $size_\iota$ and $assets_\iota$, I include a subsidiary's country and industry fixed effects.

4.3.2. Results

Table 7 presents the results of the baseline regressions. As shown in column (1), the ownership share in a foreign subsidiary ι is positively correlated with the time horizon of headquarters' managers, controlling for H's country and industry fixed effects. As one adds firm i's characteristics in column (2), the coefficient on $horizon_i$ remains positive and highly significant. Consistent with Hypothesis 3, $S_{i\iota}$ is positively correlated with a proxy for headquarter intensity, $intangible_i$. Furthermore, it is positively associated with a firm's tangible assets and size, and negatively related to a firm's age and total factor productivity.[42] Among potential confounding factors of managerial time horizons ($educ_i$, $hardwork_i$, and $rulelaw_i$, and $male_i$), only the managerial composition regarding the Rule of Law index appears to be positively and significantly correlated with the ownership share. In columns (4) and (5), I further include dummies for countries and industries in which subsidiaries are located and control for ι's size and assets. Consistent with Hypothesis 3, subsidiary's $assets_\iota$ are negatively correlated while headquarters' $intangible_i$ and $tangible_i$ assets are positively correlated with the ownership share in the foreign subsidiary. Throughout specifications, the coefficients on $horizon_i$ are positive and highly significant. In column (5), a standard deviation change in the level of $horizon_i$ is associated with a 6.9 percentage point change in the ownership share. This is an economically large effect.

To ensure that the link between long-term orientation and the make-or-buy decision is not confounded by language or ethnic ties, I rerun my regressions using an alternative proxy for managerial long-term orientation, $horizon_{2i}$. To construct this measure, I exclude all managers of a firm stemming from the country in which this firm has a subsidiary.[43] As can be seen from Table B.13 in Appendix, the coefficients on $horizon_{2i}$ are positive and highly significant in all specifications. Furthermore, the proxy for headquarter intensity, $intangible_i$ continues to be positively associated with a firm's likelihood to have a foreign subsidiary.

I further conduct a range of unreported robustness checks. First, I construct firm averages by assigning to managerial nationalities alternative proxies for institutions and further potential confounders of managerial time horizons (e.g., savings, trust, management quality, religion). Second, since a firm's ownership structure in 2014 is itself a result of a long-run decision-making process, one could argue that it is best explained by the long-term orientation of a firm's past rather than previous *and* current managers. To account for this possibility, I construct a measure $horizon_{3i}$ using solely previous firm managers (who resigned before 2013). Throughout specifications, the percentage of a foreign subsidiary owned by a headquarter firm is increasing in the final good producer's long-term orientation and the headquarter intensity.

5. Conclusion

This paper presents a repeated game model of global sourcing in which final good producers decide whether to engage

[41] While I report only the coefficients of firm-level controls from the year 2013, I verify that my results hold after including controls from *any* year within the available time span 2005-2014, or taking averages.

[42] The latter effect is perhaps somewhat surprising, given that firms engaged in foreign vertical integration generally appear to be more productive compared to the ones undertaking foreign outsourcing, see, for instance, Corcos et al. (2013) for France, Kohler and Smolka (2009) for Spain, and Tomiura (2007) for Japan. Note, however, that the current approach focuses on the intensive (rather than extensive) ownership margin, which to the best of my knowledge has not yet been explored in the literature.

[43] Similar to the approach sketched in Footnote 34, I also verify that my results are robust to the exclusion of managers stemming from countries having the same official or spoken language.

Table 7
Managerial time horizons and ownership share in 2014.

	Dependent variable: $S_{i\iota}$ in 2014				
	(1)	(2)	(3)	(4)	(5)
$horizon_i$	8.268***	9.808***	8.496***	8.833***	10.626**
	(1.032)	(2.294)	(2.559)	(3.426)	(4.543)
$intangible_i$		0.621***	0.628***	0.467***	0.464**
		(0.102)	(0.103)	(0.147)	(0.212)
$tangible_i$		0.585***	0.626***	1.490***	3.024***
		(0.162)	(0.163)	(0.236)	(0.360)
$size_i$		1.711***	1.682***	2.303***	4.064***
		(0.152)	(0.153)	(0.215)	(0.351)
age_i		−0.060***	−0.060***	−0.054***	−0.043***
		(0.009)	(0.009)	(0.012)	(0.016)
TFP_i		−0.681***	−0.709***	−1.484***	−1.146**
		(0.240)	(0.244)	(0.347)	(0.513)
$educ_i$			0.959	−2.384	4.515
			(2.953)	(4.000)	(5.448)
$hardwork_i$			−1.824	−2.533	1.143
			(1.140)	(1.550)	(2.226)
$rulelaw_i$			4.091**	3.722*	2.866
			(1.416)	(1.915)	(2.604)
$male_i$			0.002	−0.506	0.495
			(1.001)	(1.453)	(2.105)
$size_\iota$					−0.297
					(0.367)
$assets_\iota$					−2.823***
					(0.330)
H's Ctr&Ind FEs	Yes	Yes	Yes	Yes	Yes
M's Ctr&Ind FEs	No	No	No	Yes	Yes
Observations	77,338	28,381	27,988	14,022	6,868
R^2	0.062	0.070	0.070	0.179	0.234

Note: The table reports OLS estimates. The dependent variable is firm *i*'s ownership share in a foreign subsidiary ι in 2014. $horizon_i$ represents time horizon of firm *i*'s current (as of 2013) and previous managers. $intangible_i$ ($tangible_i$) is the ratio of firm's intangible (respectively, tangible) assets over employment in 2013. $size_i$, age_i, and TFP_i, are proxies for a firm's size, age, and total factor productivity in 2013. $educ_i$, $hardwork_i$, and $rulelaw_i$ are proxies for composition of firms regarding managerial tertiary education, hard work ethics, and institutional background, respectively, and $male_i$ represents the proportion of male managers employed by a firm *i*. Robust standard errors are presented in brackets.
*** Indicates significance at the 1% level.
** Indicates significance at the 5% level.
* Indicates significance at the 10% level.

in relational contracting and whether to integrate their suppliers into firm boundaries or deal with the latter at arm's-length. This framework delivers the following three testable predictions: First, the relative prevalence of integration (as measured by the industry share of intra-firm imports) increases in the foreign suppliers' long-term orientation. Second, the intra-firm import share increases in the average long-term orientation of importing firms. Third, the percentage of a foreign subsidiary owned by a final good producer increases in the headquarter's long-term orientation.

This paper finds strong empirical support for all hypotheses. Combining industry-level data on U.S. intra-firm imports with various proxies for long-term orientation, controlling for a wide range of potential confounding factors, and accounting for the issue of endogeneity, I find that both long-term orientation of foreign suppliers and the average long-term orientation of domestic importers are positively associated with the intra-firm import share. To test the third key prediction, I use information on the managerial composition of firms in the Orbis database. Controlling for performance measures of parent companies and their subsidiaries, both firms' industry and country fixed effects, and a wide range potential confounding factors, I find that firms with a higher prevalence of long-term oriented managers own a higher share in their foreign subsidiaries. Although one cannot rule out that time-preference rates affect the integration decision via channels other than the ones suggested in the current model, this paper's empirical results shed new light on the role of managerial long-term orientation in the international organization of production.

This paper leaves several questions open for future investigation. In the current empirical analysis, foreign suppliers' time preference rates were approximated by *country*-level scores from Hofstede et al. (2010) and Bloom and Van Reenen (2007). Once extensive *firm*-level data on the long-term orientation of suppliers' managers become available, the results of the current paper should be reassessed. Furthermore, this paper would significantly benefit from a large-scale survey of time preference rates across countries (see Dohmen et al. (2015) for the first attempt in this direction). Once these data become available, one could infer the actual distribution of time preferences in a given market and incorporate this information into the current model by imposing specific functional forms on the distribution of time preference rates. This would provide further insights into the effects of long-term orientation on the international make-or-buy decision.

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Appendix A. Mathematical appendix

A.1. Proof of Lemma 1

Consider first the slope of $\Theta_H^s(\eta)$. Simple differentiation of Eq. (8) with respect to η yields

$$\frac{\partial \Theta_H^s(\eta)}{\partial \eta} = \frac{\alpha}{1-\alpha}\Theta_H^s\left([\ln\beta_I - \ln\beta_O] + [\ln(1-\beta_O) - \ln(1-\beta_I)]\right) > 0,$$

whereby the positive sign of the derivative results from the fact that expressions in squared brackets are greater than zero for all $\beta_I > \beta_O$.

Consider next the corner solutions of $\Theta_H^s(\eta)$. If $\eta = 1$, spot integration strictly dominates spot outsourcing, since $\Theta_H^s|_{\eta=1} = (\beta_I/\beta_O)^{\frac{1}{1-\alpha}} > 1$ when $\beta_I > \beta_O$. If $\eta = 0$, the sign of

$$\Theta_H^s|_{\eta=0} = \frac{\beta_I}{\beta_O}\left(\frac{1-\beta_I}{1-\beta_O}\right)^{\frac{\alpha}{1-\alpha}}$$

is ambiguous. The sign of the first order derivative of this expression with respect to β_{hI}

$$\frac{\partial \Theta_H^s|_{\eta=0}}{\partial \beta_I} = \frac{[1-\beta_I-\alpha]}{\beta_O(1-\beta_I)(1-\alpha)}\left(\frac{1-\beta_I}{1-\beta_O}\right)^{\frac{\alpha}{1-\alpha}}$$

depends on the sign of the term in the squared brackets. If $1-\beta_I < \alpha$, this term is negative and $\Theta_H^s|_{\eta=0}$ is decreasing in β_I. That is, if $\Theta_H^s(0) \leq 1$ for the lowest possible $\beta_I = \underline{\beta_I}$, it holds $\Theta_H^s|_{\eta=0} < 1$ a fortiori for all $\beta_I > \underline{\beta_I}$. Recall that $\underline{\beta_I} = \beta_O$. It can be immediately seen that $\Theta_H^s|_{\eta=0} = 1$ for $\beta_I = \beta_O$. Hence, $\Theta_H^s|_{\eta=0} < 1$ for all $\beta_I > \beta_O$. In contrast, if $1-\beta_I > \alpha$, we have $\partial\Theta_H^s|_{\eta=0}/\partial\beta_I > 0$ and spot outsourcing is never chosen as the organizational form (since $\Theta_H^s|_{\eta=0} > 1$ and $\Theta_H^s(\eta)$ is increasing in η). In order to allow for both organizational forms in equilibrium, I impose Assumption 1 in the main text.

A.2. Proof of Lemma 2

Denote the right-hand side of Eq. (16) by *RHS*. Differentiating *RHS* with respect to η yields

$$\frac{\partial RHS}{\partial \eta} = \frac{\alpha(1-\beta_k)^{\frac{1}{1-\alpha(1-\eta)}}(1-\alpha(1-\eta)-\ln(1-\beta_k))}{1-\alpha(1-\eta)}\frac{\delta_M}{1+\delta_M} > 0.$$

A simple differentiation of *RHS* with respect to δ_M yields

$$\frac{\partial RHS}{\partial \delta_M} = \frac{(1-\beta_k)^{\frac{1}{1-\alpha(1-\eta)}}(1-\alpha(1-\eta))}{(1+\delta_M)^2} > 0,$$

whereas the first-order derivative of *RHS* with respect to β_k immediately implies

$$\frac{\partial RHS}{\partial \beta_k} = -(1-\beta_k)^{\frac{\alpha(1-\eta)}{1-\alpha(1-\eta)}}\frac{\delta_M}{1+\delta_M} < 0.$$

A.3. Extension 1: spot contracting after deviation

This section explores the robustness of the paper's key result to an alternative trigger strategy. Unlike in the main text, I now assume that parties revert to spot contracting in all post-deviation periods of the game. The organizational form on the off-the-equilibrium path is chosen so as to maximize π_{Hk}^s. As known from Lemma 1, headquarters with $\eta < \hat{\eta}$ ($\eta > \hat{\eta}$) will choose spot outsourcing (respectively, spot integration) on the deviation path. M's incentive compatibility constraint in the former (respectively, latter) case is now given by

$$\pi_{Mk}^r + \frac{\pi_{Mk}^r}{\delta_M} \geq \pi_{Mk}^D + \frac{\pi_{MO}^s}{\delta_M} \quad \text{and} \quad \pi_{Mk}^r + \frac{\pi_{Mk}^r}{\delta_M} \geq \pi_{Mk}^D + \frac{\pi_{MI}^s}{\delta_M},$$

whereby $k \in \{I, O\}$ represents the organizational form chosen under a relational contract. Using Eqs. (7), (10), and (12), one obtains equilibrium bonus B_k. Plugging this bonus back in Eq. (10), one can derive H's per-period profits on the equilibrium path under relational contracting.[44] These profits, however, are now case-specific:

[44] As in the main text, the equilibrium bonus satisfies M's participation constraint ($\pi_{Mk}^r \geq 0$).

Case 1: $\eta > \hat{\eta}$. H's profits under relational integration and outsourcing are given by

$$\pi^r_{HI} = \left[(1-\alpha) - \left(\frac{\delta_M}{1+\delta_M}(1-\beta_I)^{\frac{1}{1-\alpha(1-\eta)}} + \frac{1}{1+\delta_M}(1-\beta_I)\left(\beta_I^{\eta}(1-\beta_I)^{(1-\eta)}\right)^{\frac{\alpha}{1-\alpha}}\right)(1-\alpha(1-\eta))\right]A,$$
$$\pi^r_{HO} = \left[(1-\alpha) - \left(\frac{\delta_M}{1+\delta_M}(1-\beta_O)^{\frac{1}{1-\alpha(1-\eta)}} + \frac{1}{1+\delta_M}(1-\beta_I)\left(\beta_I^{\eta}(1-\beta_I)^{(1-\eta)}\right)^{\frac{\alpha}{1-\alpha}}\right)(1-\alpha(1-\eta))\right]A.$$

By analogy to Lemma 2, H's profits under relational integration are strictly larger than under relational outsourcing, i.e. $\pi^r_{HI} > \pi^r_{HO}$ for all parameter values. Furthermore, as in Lemma 2, a headquarter is more likely to offer a relational integration contract to a supplier the higher the latter's level of long-term orientation. To prove this, notice that $\pi^r_{HI} > 0$ if

$$(1-\alpha) > \left(\frac{\delta_M}{1+\delta_M}(1-\beta_I)^{\frac{1}{1-\alpha(1-\eta)}} + \frac{1}{1+\delta_M}(1-\beta_I)\left(\beta_I^{\eta}(1-\beta_I)^{(1-\eta)}\right)^{\frac{\alpha}{1-\alpha}}\right)(1-\alpha(1-\eta)).$$

A tedious but straightforward analysis shows that the right-hand side of this inequality increases in δ_M. Hence, this inequality is more likely to be fulfilled the lower δ_M.

Case 2: $\eta < \hat{\eta}$. H's profits under relational integration and outsourcing are given by

$$\pi^r_{HI} = \left[(1-\alpha) - \left(\frac{\delta_M}{1+\delta_M}(1-\beta_I)^{\frac{1}{1-\alpha(1-\eta)}} + \frac{1}{1+\delta_M}(1-\beta_O)\left(\beta_O^{\eta}(1-\beta_O)^{(1-\eta)}\right)^{\frac{\alpha}{1-\alpha}}\right)(1-\alpha(1-\eta))\right]A,$$
$$\pi^r_{HO} = \left[(1-\alpha) - \left(\frac{\delta_M}{1+\delta_M}(1-\beta_O)^{\frac{1}{1-\alpha(1-\eta)}} + \frac{1}{1+\delta_M}(1-\beta_O)\left(\beta_O^{\eta}(1-\beta_O)^{(1-\eta)}\right)^{\frac{\alpha}{1-\alpha}}\right)(1-\alpha(1-\eta))\right]A.$$

In contrast to the previous case, $\pi^r_{HI} > \pi^r_{HO}$ no longer holds for all parameter values. To evaluate the relative prevalence of relational integration vs. relational outsourcing in this case, I resort to numerical simulations using the mathematical software Maple. More specifically, I compare π^r_{HI} and π^r_{HO} subject to incentive compatibility constraints, $\pi^r_{Mk} + \frac{\pi^r_{Mk}}{\delta_M} \geq \pi^D_{Mk} + \frac{\pi^s_{MO}}{\delta_M}$ and $\pi^r_{Hk} + \frac{\pi^r_{Hk}}{\delta_H} \geq \pi^D_{Hk} + \frac{\pi^s_{HO}}{\delta_H}$, and Assumption 1. I find that for low headquarter intensities, outsourcing is a dominant organizational form under relational contracting. Intuitively, if η is small (i.e., M's investments are high), H has the greatest incentive to cheat on the relational agreement and reap one-shot deviation profits. By relinquishing property rights over manufacturing components, the headquarter minimizes his own reneging incentives, thereby signalizing his willingness to cooperate. Conversely, when η gets larger, M's operating profits on the deviation path increase. For a high enough η, it becomes optimal to integrate the supplier into firm boundaries in order to minimize the latter's deviation incentives.

Let $\hat{\eta}^r$ denote the cutoff, such that relational outsourcing (integration) is a dominant organizational form for $\eta < \hat{\eta}^r$ (respectively, $\eta > \hat{\eta}^r$). Numerical simulations show that this cutoff lies strictly to the left of the cutoff $\hat{\eta}$, which governs the choice of the organizational form under spot contracting. This implies a range $\eta \in (\hat{\eta}^r, \hat{\eta})$, for which headquarters engaged in relational contracting prefer integration while those contracting on the spot choose outsourcing, cf. Fig. A.7. The existence of this range ensures that this paper's key testable predictions continue to hold in the extended model. More specifically, redefining the intra-firm import share from Section 3.3 as $IFIS_j \equiv \frac{V^s_{jI}+V^r_{jI}}{V^s_{jO}+V^r_{jO}+V^s_{jI}+V^r_{jI}}$ and applying the approach from Appendix A.5, one can easily prove the Hypothesis 1. Similarly, Hypothesis 2 can be formally derived following the approach from Appendix A.5.

A.4. Extension 2: ex-ante transfers

This section explores the robustness of the paper's key result to an alternative contracting assumption. Following Antràs and Helpman (2004, 2008), I assume that the ex-ante contract includes an upfront participation fee T_k, that has to be paid by a supplier. Assuming an infinitely elastic supply of M, M's profits from spot contracting net of ex-ante transfer is equal to a supplier's outside option, ω_m. In equilibrium, we thus have $\pi^s_{Mk} - T_k = \omega_m$. It is well-known from Antràs and Helpman (2004, 2008) that the presence of ex-ante transfers has no effect on both

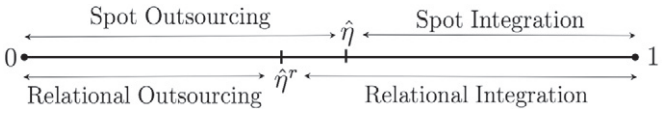

Fig. A.7. Optimal ownership structure and governance mode in the extended game.

parties' investment levels and the resulting profits from ex-post bargaining. We thus can use the results from Eq. (7) to derive the equilibrium transfer

$$T_k = (1-\beta_k)\left(\beta_k^{\eta}(1-\beta_k)^{(1-\eta)}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha(1-\eta))A - \omega_m. \tag{A.1}$$

If the transfers were allowed, the entire surplus from the relationship accrues to H. Combining π_{Hk}^s from Eq. (7) with the above transfer, we obtain the overall profit under spot contracting

$$\pi_k(\eta) = \left(\beta_k^{\eta}(1-\beta_k)^{(1-\eta)}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha[\beta_k\eta+(1-\beta_k)(1-\eta)])A - \omega_m. \tag{A.2}$$

As in the case without transfers, the choice of organizational form crucially depends on the headquarter intensity η. A headquarter decides to cooperate with a supplier under spot integration rather than spot outsourcing whenever

$$\Theta^s(\eta) \equiv \frac{\left(\beta_I^{\eta}(1-\beta_I)^{(1-\eta)}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha[\beta_I\eta+(1-\beta_I)(1-\eta)])}{\left(\beta_O^{\eta}(1-\beta_O)^{(1-\eta)}\right)^{\frac{\alpha}{1-\alpha}}(1-\alpha[\beta_O\eta+(1-\beta_O)(1-\eta)])}$$

is larger than one. Following the approach discussed in Appendix A.1, one can derive the result analogous to Lemma 1: There exists a unique headquarter intensity $\hat{\eta} \in (0,1)$, such that headquarter profit is higher under spot outsourcing (integration) for $\eta < \hat{\eta}$ (respectively, $\eta > \hat{\eta}$). Unlike Lemma 1, however, this result does not require Assumption 1.

Consider now the case of relational contracting. In the presence of ex-ante transfers, investments on the equilibrium path are still described by Eq. (9). The competitive fringe of suppliers in the presence of ex-ante transfers, implies, however, that a supplier's profits net of up-front payment and of ex-post bonus are driven down to M's outside option, i.e. $\pi_{Mk}^r - T_k = \omega_m$, whereby π_{Mk}^r and T_k are given by Eqs. (10) and (A.1), respectively. On the off-the-equilibrium path, investments are still given by Eq. (11) and a supplier's one-shot deviation profits net of the ex-ante transfer reads

$$\pi_{Mk}^D - T_k = (1-\beta_k)\left[(1-\beta_k)^{\frac{\alpha(1-\eta)}{1-\alpha(1-\eta)}} - \beta_k^{\frac{\alpha\eta}{1-\alpha}}(1-\beta_k)^{\frac{\alpha(1-\eta)}{1-\alpha}}\right](1-\alpha(1-\eta))A. \tag{A.3}$$

Notice that M's profit on the deviation path is positive if the expression in the squared brackets is larger than zero. Given that $\beta_k^{\frac{\alpha\eta}{1-\alpha}} < 1$, it is sufficient to show that $(1-\beta_k)^{\frac{\alpha(1-\eta)}{1-\alpha(1-\eta)}} > (1-\beta_k)^{\frac{\alpha(1-\eta)}{1-\alpha}}$ in order to ensure that $\pi_{Mk}^D - T_k$ is positive. The latter inequality is in fact fulfilled since $1-\alpha(1-\eta) > 1-\alpha$ for all parameter values. Hence, as in the case without ex-ante transfers, M can reap positive profits by reneging on the relational agreement.

The headquarter is willing to engage in relational contracting only if a supplier's incentive compatibility constraint is fulfilled. In the presence of ex-ante transfers, this ICC_M reads

$$\frac{(1+\delta_M)\omega_m}{\delta_M} \geq \pi_{Mk}^D - T_k, \tag{A.4}$$

whereby $\pi_{Mk}^D - T_k$ is given by Eq. (A.3). As in Lemma 2, the ICC_M is more likely to hold under relational integration rather than relational outsourcing. To prove this, I differentiate the right-hand side of Eq. (A.4) with respect to β_k and obtain after simplification

$$\frac{\partial(\pi_{Mk}^D - T_k)}{\partial\beta_k} = -\frac{A}{\beta_k(1-\alpha)}\left[(1-\alpha)\beta(1-\beta_k)^{\frac{\alpha(1-\eta)}{1-\alpha(1-\eta)}} + (1-\alpha(1-\eta))(\alpha\eta-\beta)\beta_k^{\frac{\alpha\eta}{1-\alpha}}(1-\beta_k)^{\frac{\alpha(1-\eta)}{1-\alpha}}\right].$$

This first order derivative is negative if and only if the expression in squared brackets is positive. A tedious but straightforward analysis shows that the latter expression is larger than zero for all parameter values. Hence, headquarters strictly prefer relational integration over relational outsourcing. Furthermore, as in Lemma 2, H is more likely to offer a relational contract to M the higher the latter's level of long-term

orientation (i.e., the lower δ_M).[45] Finally, if the transfers were allowed, a supplier is willing to accept a relational integration contract offered by a headquarter only if H's incentive compatibility constraint is fulfilled

$$\frac{1+\delta_H}{\delta_H}\left[(1-\alpha)A-\omega_m\right] \geq \pi_{Hl}^D + T_k,$$

whereby π_{Hl}^D and T_k are given by Eqs. (18) and (A.1), respectively. As in Lemma 3, a supplier is more likely to engage in relational integration the higher a headquarter's long-term orientation (i.e., the lower δ_H). To sum up, the key result of the benchmark model continues to hold under the assumption of ex-ante transfers.

A.5. Derivation of the testable hypotheses

In the industry equilibrium, firms self-select into the following three groups (see Fig. 1): Final good producers for whom the incentive compatibility constraint from Eq. (20) is fulfilled choose relational integration; firms that cannot sustain relational agreements play either spot outsourcing (if $\eta < \hat{\eta}$) or spot integration (if $\eta > \hat{\eta}$). Assume that this equilibrium is disturbed by one of the following "shocks". In the first case, the time preference rate of foreign suppliers, δ_M increases (i.e., suppliers become more short-term oriented). In the second scenario, the time preference rate of a single domestic producer, δ_H rises, increasing thereby the *average* time preference rate of the industry. Bearing in mind that an increase in δ_M or δ_H decreases the left-hand side of inequality (20), a rise in $\delta \in \{\delta_M, \delta_H\}$ has the following effects on the value of imports across final good producers in a given industry j that are active under ownership structure $k \in \{I, O\}$ and governance mode $g \in \{r, s\}$:

$$V_{jI}^r{}'(\delta) \leq 0 \quad , \quad V_{jO}^s{}'(\delta) \geq 0 \quad , \quad V_{jI}^s{}'(\delta) \geq 0 \quad , \quad \left|V_{jI}^r{}'(\delta)\right| \geq \left|V_{jI}^s{}'(\delta)\right| \tag{A.5}$$

The first relationship indicates that the industry value of imports under relational integration is non-increasing in the impatience of final good producers or their suppliers, whereby the relationship is strictly negative if an increase in $\delta \in \{\delta_M, \delta_H\}$ causes at least one firm to switch from relational to spot contracting. The next two relationships show that the industry value of spot imports (sourced either at arm's-length, O or within firm boundaries, I) is non-decreasing in both parties' time preference rates, whereby the relationship is strictly positive when at least one firm switches from relational to spot contracting due to an increase in δ. The fourth relationship indicates that an increase in either party's time preference rate leads to a marginally larger change in relational rather than spot intra-firm imports. This follows immediately from the fact that the amount of manufacturing inputs imported under relational integration is higher than under spot integration, $m_{jI}^r > m_{jI}^s$ (cf. Eqs. (5) and (9)). Using the definition of $IFIS_j$ in the main text and the relationships established in Eq. (A.5), yields

$$\frac{\partial IFIS_j}{\partial \delta} = \frac{\left[V_{jI}^s{}'(\delta) + V_{jI}^r{}'(\delta)\right]V_{jO}^s(\delta) - \left[V_{jI}^s(\delta) + V_{jI}^r(\delta)\right]V_{jO}^s{}'(\delta)}{\left(V_{jO}^s(\delta) + V_{jI}^s(\delta) + V_{jI}^r(\delta)\right)^2} \leq 0,$$

whereby the sign of this first-order derivative is strictly negative if at least one firm switches the governance mode due to a change in δ_M or δ_H. Note that this result holds for all parameter values and does not require any specific assumptions on the distribution of time preference rates in a given industry. This implies Hypotheses 1 and 2 in the main text.

Consider now the proof of Hypothesis 3. As mentioned in the main text, the optimal revenue share under spot contracting is given by $\beta^{*s}(\eta) = 1-\alpha(1-\eta)$ and it is strictly increasing in η. To obtain the optimal share under relational contracting, final good producers maximize π_{Hk}^r from Eq. (15) subject to the incentive compatibility constraint from Eq. (20). The resulting first-order condition yields β^{*r} as an implicit function of η and δ_H. Applying the implicit function theorem, I obtain after simplification the following first-order derivative:

$$\frac{\partial \beta^{*r}(\cdot)}{\partial \eta} = \frac{\beta^{*r}(1-\beta^{*r})^{\frac{1}{1-\alpha(1-\eta)}}[-\ln(1-\beta^{*r})](1-\alpha\eta)^2\delta_M(\lambda+\delta_H(\lambda+A)) + (\beta^{*r})^{\frac{1}{1-\alpha\eta}}(1-\beta^{*r})[-\ln(\beta^{*r})]\delta_H(1+\delta_M)\lambda(1-\alpha(1-\eta))^2}{\beta^{*r}(1-\beta^{*r})^{\frac{1}{1-\alpha(1-\eta)}}(1-\alpha\eta)(1-\eta)\delta_M((\lambda+\delta_H(\lambda+A)) + (\beta^{*r})^{\frac{1}{1-\alpha\eta}}(1-\beta^{*r})^2\eta(1-\alpha(1-\eta))\lambda\delta_H(1+\delta_M)}$$
$$\times \frac{\beta^{*r}(1-\beta^{*r})}{(1-\alpha\eta)(1-\alpha(1-\eta))} > 0,$$

whereby the sign follows immediately from the fact that the terms in squared brackets are positive. Similarly, differentiating the implicit function β^{*r} with respect to δ_H yields:

$$\frac{\partial \beta^{*r}(\cdot)}{\partial \delta_H} = -\frac{\beta^{*r}(1-\beta^{*r})^{\frac{1}{1-\alpha(1-\eta)}}(1-\alpha\eta)(1-\alpha(1-\eta))\lambda\delta_M}{\left(\beta^{*r}(1-\beta^{*r})^{\frac{\alpha(1-\eta)}{1-\alpha(1-\eta)}}(1-\alpha\eta)(1-\eta)\delta_M((\lambda+A)\delta_H+\delta) + (\beta^{*r})^{\frac{\alpha\eta}{1-\alpha\eta}}(1-\beta)\eta\lambda\delta_H(1+\delta_M)(1-\alpha(1-\eta))\right)\alpha\delta_H} < 0.$$

This completes the proof of Hypothesis 3.

[45] The effect of headquarter intensity η on the likelihood of relational contracting shown in Lemma 2 holds only under certain parameter restrictions, which can be provided upon request.

Appendix B. Tables

Table B.8
Level of long-term orientation, Euclidian and Mahalanobis distance to Japan.

Country	LTO_ℓ	E_ℓ	M_ℓ	Country	LTO_ℓ	E_ℓ	M_ℓ
Albania	.61	.113	1.878	Latvia	.69	.018	.324
Algeria	.26	.130	2.479	Lithuania	.82	.078	1.476
Argentina	.2	.106	1.956	Luxembourg	.64	.124	2.213
Armenia	.61	.089	1.478	Macedonia	.62	.050	.895
Australia	.21	1.110	2.987	Malaysia	.41	.107	1.840
Austria	.60	.075	1.356	Mali	.20	.129	2.317
Azerbaijan	.61	.055	.968	Mexico	.24	.189	3.607
Bangladesh	.47	.120	2.028	Moldova	.71	.039	.695
Belarus	.81	.039	.754	Morocco	.14	.141	2.690
Belgium	.82	.120	2.185	Netherlands	.67	.113	2.078
Bosnia	.70	.054	.973	New Zealand	.33	.111	2.082
Brazil	.44	.097	1.797	Nigeria	.13	.147	2.717
Bulgaria	.69	.049	.859	Norway	.35	.116	2.023
Burkina Faso	.27	.130	2.307	Pakistan	.50	.127	2.120
Canada	.36	.107	1.997	Peru	.25	.235	4.463
Chile	.31	.174	3.319	Philippines	.27	.112	2.077
China	.87	.090	1.573	Poland	.38	.031	.595
Colombia	.13	.144	2.731	Portugal	.28	.118	2.082
Croatia	.58	.045	.826	Romania	.52	.040	.705
Czech Republic	.70	.034	.605	Russia	.81	.023	.439
Denmark	.35	.097	1.763	Rwanda	.18	.145	2.694
Dominican Rep.	.13	.097	1.839	Saudi Arabia	.36	.136	2.483
Egypt	.07	.036	.627	Serbia	.52	.053	.935
El Salvador	.20	.192	3.652	Singapore	.72	.096	1.663
Estonia	.82	.040	.762	Slovak Republic	.77	.020	.378
Finland	.38	.054	.945	Slovenia	.49	.058	1.063
France	.63	.114	2.060	South Africa	.34	.111	2.075
Georgia	.38	.090	1.719	Spain	.48	.111	1.984
Germany	.83	.084	1.516	Sweden	.53	.097	1.707
Ghana	.04	.138	2.503	Switzerland	.74	.091	1.640
Greece	.45	.081	1.520	Tanzania	.34	.163	3.049
Hungary	.58	.035	.595	Thailand	.32	.131	2.245
Iceland	.28	.149	2.831	Trinidad & Tobago	.13	.121	2.135
India	.51	.128	2.156	Turkey	.46	.055	.948
Indonesia	.62	.112	1.938	United Kingdom	.51	.113	2.101
Iran	.14	.062	1.110	U.S.A.	.26	.101	1.912
Iraq	.25	.063	1.117	Uganda	.24	.117	2.124
Ireland	.24	.143	2.729	Ukraine	.86	.030	.568
Israel	.38	.049	.940	Uruguay	.26	.093	1.716
Italy	.61	.102	1.886	Venezuela	.16	.134	2.546
Japan	.88	0	0	Vietnam	.57	.132	2.280
Jordan	.16	.070	1.334	Zambia	.30	.120	2.238
Korea South	1	.064	1.073	Zimbabwe	.15	.134	2.499

Table B.9
Ten industries with the highest and lowest prevalence of long-term orientated managers.

lto	10 industries with lowest long-term orientation	*lto*	10 industries with highest long-term orientation
.424	Carpet and rug mills	.552	Motor vehicles and motor vehicle equipment
.430	Animal slaughtering and processing	.555	Dairy products
.449	Apparel accessories and other apparel	.556	Other transportation equipment
.464	Fruit and vegetable preserving	.557	Household appliances
.465	Fabric mills, except knitting	.565	Agricultural chemicals
.477	Fiber, yarn, and thread mills	.566	Metalworking machinery
.478	Textile and fabric finishing and coating mills	.568	Engines, turbines, and power transmission
.480	Bakeries, except retail	.576	Animal food, grain and oilseed milling
.482	Textile product mills except carpets and rugs	.577	Construction mining and oil field machinery
.489	Leather tanning and products, except footwear	.596	Agricultural implements

Table B.10
Buyers' long-term orientation and U.S. intra-firm import shares, 2000–2011.

	Dependent variable: $IFIS_{j\ell}$ in 2000–2011				
	OLS			IV	
	(1)	(2)	(3)	(4)	(5)
lto_j	1.627***	1.389**	1.438***	1.461**	1.424**
	(0.308)	(0.624)	(0.539)	(0.628)	(0.614)
$\log(R\&D)_j$		0.029***	0.030***	0.030***	0.030***
		(0.011)	(0.011)	(0.010)	(0.010)
Industry controls	No	Yes	Yes	Yes	Yes
Country FEs	No	No	Yes	Yes	Yes
Observations	83,486	83,486	83,486	83,486	83,486
R^2	0.022	0.053	0.225	0.202	0.202
First stage					
$edist_j$				−4.600***	
				(0.066)	
$mdist_j$					−0.233***
					(0.003)
F-stat of excl. instrument				39.64	40.54
F-test, *p*-value				0.0000	0.0000
Partial R^2				0.799	0.803

Note: The dependent variable is U.S. intra-firm imports as a share of total U.S. imports in 2000-2011. The table reports OLS estimates in specifications (1)–(3). In specifications (4) and (5), managerial long-term orientation, lto_j is instrumented, respectively, with Euclidian ($edist_j$) and Mahalanobis ($mdist_j$) genetic distance to Japan. $log(R\&D)_j$ is R&D intensity of industry j. Industry controls are $log(capital)_j$, $log(skill)_j$, $freight_j$, $tariffs_j$, $dispersion_j$, $elasticity_j$, $educ_j$, $hardwork_j$, and $rulelaw_j$. Robust standard errors are clustered at the industry level and presented in brackets.
*** Indicates significance at the 1% level.
** Indicates significance at the 5% level.

Table B.11
Buyers' long-term orientation and U.S. intra-firm import shares: robustness checks.

	Dependent variable: $IFIS_{j\ell}$ in 2005					
	OLS	IV		OLS	IV	
	(1)	(2)	(3)	(4)	(5)	(6)
lto_{2j}	1.448***	1.516**	1.489**			
	(0.550)	(0.648)	(0.634)			
lto_{3j}				1.318***	2.324**	2.280**
				(0.493)	(1.079)	(1.070)
$\log(R\&D)_j$	0.031***	0.031***	0.031***	0.030**	0.026**	0.026**
	(0.012)	(0.012)	(0.012)	(0.012)	(0.011)	(0.011)
Industry controls	Yes	Yes	Yes	Yes	Yes	Yes
Country FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7114	7114	7114	7114	7114	7114
R^2	0.228	0.228	0.228	0.223	0.219	0.219
First stage						
$edist_{2j}$		−4.290***				
		(0.314)				
$mdist_{2j}$			−0.218***			
			(0.015)			
$edist_{3j}$					−4.232***	
					(0.841)	
$mdist_{3j}$						−0.217***
						(0.042)
F-stat of excl. instrument		18.36	18.54		25.00	25.48
F-test, *p*-value		0.0000	0.0000		0.0000	0.0000
Partial R^2		0.763	0.766		0.420	0.423

Note: The dependent variable is U.S. intra-firm imports as a share of total U.S. imports in 2005. The table reports OLS estimates in specifications (1) and (4). In specifications (2) and (3), lto_{2j} is instrumented with $edist_{2j}$ and $mdist_{2j}$, respectively. In specifications (5) and (6), lto_{3j} is instrumented with $edist_{3j}$ and $mdist_{3j}$, respectively. $log(R\&D)_j$ is R&D intensity of industry j. Industry controls are $log(capital)_j$, $log(skill)_j$, $freight_j$, $tariffs_j$, $dispersion_j$, $elasticity_j$, $educ_j$, $hardwork_j$, $rulelaw_j$. Robust standard errors are clustered at the industry level and presented in brackets.
*** Indicates significance at the 1% level.
** Indicates significance at the 5% level.

Table B.12
First-stage 2SLS estimates from Tables 4, B.10 and B.11.

	Table 4		Table B.10		Table B.11		Table B.11	
	(4)	(5)	(4)	(5)	(2)	(3)	(5)	(6)
$edist_j$	−4.601***		−4.600***					
	(0.230)		(0.066)					
$mdist_j$		−0.233***		−0.223***				
		(0.011)		(0.003)				
$edist_{2j}$					−4.290***			
					(0.314)			
$mdist_{2j}$						−0.213***		
						(0.017)		
$edist_{3j}$							−4.232***	
							(0.841)	
$mdist_{3j}$								−0.217***
								(0.042)
$\log(R\&D)_j$	−0.000	−0.000	−0.000	−0.000	−0.000	−0.000	−0.000**	−0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
$\log(capital)_j$	0.000	0.000	0.000*	0.000*	0.001	0.001	0.001***	0.001***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
$\log(skill)_j$	−0.004	−0.004	−0.004***	−0.005***	−0.010***	−0.010**	−0.004***	−0.004***
	(0.004)	(0.004)	(0.001)	(0.001)	(0.004)	(0.004)	(0.000)	(0.000)
$freight_j$	0.054**	0.054**	0.053***	0.053***	0.051**	0.052**	0.041***	0.041***
	(0.021)	(0.022)	(0.006)	(0.006)	(0.025)	(0.026)	(0.004)	(0.004)
$tariffs_j$	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$dispersion_j$	0.002	0.002	0.002**	0.002**	0.002	0.002	0.002***	0.002***
	(0.003)	(0.003)	(0.001)	(0.000)	(0.003)	(0.003)	(0.000)	(0.000)
$elasticity_j$	−0.000	−0.000	−0.000	−0.000	−0.000	−0.000	−0.000***	−0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$educ_j$	−0.449***	−0.415***	−0.452***	−0.418***	−0.203**	−0.176**	−0.438***	−0.401***
	(0.086)	(0.085)	(0.025)	(0.024)	(0.088)	(0.088)	(0.012)	(0.012)
$hardwork_j$	−0.076***	−0.065**	−0.077***	−0.066***	−0.093**	−0.082**	−0.075***	−0.064***
	(0.027)	(0.027)	(0.008)	(0.008)	(0.029)	(0.029)	(0.003)	(0.003)
$rulelaw_j$	−0.027	−0.029	−0.027**	−0.028***	−0.044	−0.047	−0.023***	−0.027***
	(0.037)	(0.036)	(0.010)	(0.010)	(0.043)	(0.043)	(0.005)	(0.005)
Observ.	7114	7114	83,486	83,486	7114	7114	7114	7114
R^2	0.937	0.938	0.936	0.937	0.889	0.890	0.589	0.586

Note: The table reports first-stage coefficients of IV regressions from Tables 4, B.10 and B.11. Dependent variables are lto_j in Tables 4 and B.10; lto_{2j} in columns (2) and (3) of Table B.11, and lto_{3j} in columns (5) and (6) of Table B.11. $edist_j$, $edist_{2j}$, and $edist_{3j}$ represent different variants of the instrument Euclidian genetic distance of managers in industry j to Japan. $mdist_j$, $mdist_{2j}$, and $mdist_{3j}$ are different variants of the instrument Mahalanobis genetic distance of managers in industry j to Japan. First-stage *F-stat* of excluded instrument and partial R^2 are reported in the respective Table.
*** Indicates significance at the 1% level.
** Indicates significance at the 5% level.
* Indicates significance at the 10% level.

Table B.13
Managerial time horizons and ownership share in 2014.

	Dependent variable: $S_{i\iota}$ in 2014				
	(1)	(2)	(3)	(4)	(5)
$horizon_{2i}$	7.910***	10.606***	10.901***	7.761**	8.760**
	(0.970)	(2.141)	(2.337)	(3.070)	(4.094)
$intangible_i$		0.604***	0.607***	0.422***	0.449**
		(0.102)	(0.103)	(0.148)	(0.213)
$tangible_i$		0.623***	0.652***	1.543***	3.019***
		(0.163)	(0.164)	(0.237)	(0.361)
Firm controls	None	Yes	Yes	Yes	Yes
H's Ctr&Ind FEs	Yes	Yes	Yes	Yes	Yes
M's Ctr&Ind FEs	No	No	No	Yes	Yes
Observations	76,149	28,220	27,810	13,910	6804
R^2	0.063	0.070	0.070	0.180	0.234

Note: The dependent variable is firm i's ownership share in a foreign subsidiary ι in 2014. $horizon_{2i}$ represents time horizon of firm i's current and previous managers from countries other than a firm's subsidiary. Firm controls are included in the same order as in Table 7 and they comprise: $size_i$, age_i, TFP_i, $educ_i$, $hardwork_i$, $rulelaw_i$, $male_i$, $size_\iota$, and $assets_\iota$. Robust standard errors are presented in brackets.
*** Indicates significance at the 1% level.
** Indicates significance at the 5% level.

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