CULTURE AND GLOBAL SOURCING*

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Abstract

This paper develops a model of global sourcing with culturally dissimilar countries. Production of goods requires the coordination of decisions between headquarters of multinational firms and managers of their component suppliers. We characterize the optimal allocation of decision rights across firms in the presence of cultural differences. Our model suggests that the incentive of a firm to integrate its input supply is decreasing in the cultural distance between the headquarters and suppliers. Combining data from the U.S. Census Bureau's Related Party Trade and the Bureau van Dijk with various measures for cultural distance, we find empirical evidence strongly supportive of this prediction.

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1 Introduction

Whenever managers of multinational companies are asked about the challenges of globalization to their businesses, keywords like 'cultural differences' or 'intercultural communication' are among the most frequently given answers. For instance, a global survey of 572 executives conducted by the Economist Intelligence Unit (2012) reports 'differences in cultural traditions' to be the greatest obstacle to productive cross-border collaboration. Not surprisingly, courses on intercultural cooperation have become indispensable components of most (if not all) business programs around the world and the impact of cultural differences on commercial transactions is widely explored in the business literature. Yet, the effect of cultural differences in international business transactions remains mostly ignored by economists.

To illustrate our point, consider the following two case studies of the well-known multinational companies. The Danish toy manufacturer Lego sources its components (bricks) both from a wholly-owned production facility in Czech Republic and an independent supplier in Singapore (Mols 2010). The state-of-the art answers to the question as to why Lego would integrate its input supply in the former and source it at arm's-length in the latter case include differences in institutions and transportation costs (Antràs 2015, Nunn and Trefler 2014). Yet, to the best of our knowledge, there is no well-established economic theory that would relate this case study to the fact that Denmark is culturally closer to Czech Republic than to Singapore, as measured, for instance, by Hofstede's well-known individualism vs. collectivism index. The second case study deals with the U.S. multinational corporation Coca-Cola. This company sources syrup concentrate and bottles from more than 250 subsidiaries all over the world (http://www.coca-colacompany.com). Using firm-level data from the Bureau van Dijk (see below), we identified some of those suppliers and calculated Coca-Cola's average ownership stake in its subsidiaries by country. Coca-Cola owns more than 90 percent of equity stake in its subsidiaries from Great Britain, New Zealand, Italy and France, whereas the ownership share in subsidiaries from Japan, Pakistan, Albania, and Mexico is smaller than 50 percent, on average. Once again, countries within the two groups widely differ in terms of their institutional and regulatory environment. The relevant question, however, is whether the fact that the U.S. is culturally closer to the countries from the first group (as measured, for instance, by Hofstede's individualism vs. collectivism index) might have played a role in Coca-Cola's make-or-buy decision, beyond institutional differences across countries.

This paper aims at shedding light, both theoretically and empirically, on the effects of difficulties of intercultural cooperation across countries on the organization of global sourcing. In particular, we investigate how cultural distance, defined as the extent to which shared values and norms differ across countries and firms, affects the managerial decision whether to integrate a foreign supplier into a multinational firm's boundaries or to cooperate with the latter at arm's-length. The basic trade-off analyzed in this paper is as follows: Integration leads to a better coordination of decisions across firm units and a higher monetary payoff to the headquarter manager, but is associated with a loss in the non-monetary job satisfaction due to disputes with the affiliate's manager about the right course of action. Given that these frictions are likely to be amplified by cultural differences, this paper argues that the prevalence of integration decreases in the cultural distance between firm managers.

It is particularly interesting to study the effect of culture in the context of multinational enterprises for two reasons. First, multinational firms play a major role in the global economy. According to the UNCTAD (2011) World Investment Report, multinational enterprises account for one-quarter of world GDP. Roughly one-third of the volume of world trade is intra-firm trade. Moreover, approximately another third of world trade is accounted for by transactions in which multinational firms are one of the two sides of the exchange, see UNCTAD (2000).[1] Second, and perhaps more importantly, since a multinational firm "controls and manages production establishments (plants) located in at least two countries" (Caves 2007, p. 1), managers of multinational firms are inevitably confronted with the issue of cross-cultural collaboration.

Yet, to the best of our knowledge, the impact of culture – the set of values and beliefs, which are shared by a community and are usually strongly persistent over time – on the organization of multinational firms and on their outsourcing decisions has not been explored in the economics literature. To address this research question, one needs a theory of a multinational firm's boundaries that incorporates frictions between managers of different cultures. To this end, we develop a simple theoretical model of global sourcing that features vertical fragmentation of the production process as in Antràs and Helpman (2004), firm heterogeneity along the lines of Melitz (2003), managerial preferences as in Hart and Holmström (2010), and cross-country heterogeneity with regard to national cultural values. Production of final goods requires cooperation of two units: headquarters and manufacturing suppliers, which provide headquarter services and manufacturing components, respectively. Each unit is led by a single owner-manager, who is in charge of coordinating strategic decisions across units. It is assumed that managers of both units have strong beliefs about the right course of action and these beliefs differ. Hence, from a managerial perspective, coordination of decisions across units is associated with a fundamental trade-off. On the one hand, better coordination leads to a higher quality of final goods and larger managerial profits. On the other hand, deviation

[1] In case of the U.S., the role of multinationals is even more significant. Roughly 90 percent of U.S. exports and imports flow through multinational firms, and nearly one-half of U.S. imports are transacted within boundaries of multinational firms rather than across unaffiliated parties, see Antràs and Yeaple (2014).

from one's most preferred vision and convergence towards the decision of the cooperation partner reduces a manager's non-monetary job satisfaction. The decision-making process crucially depends on the firm's organization. If the two units are not integrated, each unit's manager makes decisions solely in his own unit. Under integration, the manager of the supply unit becomes a subordinate of the headquarter unit and has to follow the latter's instructions. Yet, to the extent that the enacted decision deviates from the supply unit manager's most preferred vision, the supply manager is aggrieved and the headquarter manager experiences a loss in non-monetary job satisfaction. From the viewpoint of the headquarter manager, the make-or-buy decision is thus associated with a simple trade-off: Integration leads to a better coordination of decisions across units and higher monetary profits at the expense of a non-monetary cost of enforcing decisions in the supply unit.

The decision by the headquarter manager whether to source components from an independent or from an integrated supplier depends on the effect of cross-cultural collaboration on his private non-monetary benefits. We show that component suppliers are less likely to be integrated into firm boundaries when their cultural distance to the headquarters is larger. Intuitively, as cultural distance increases, it becomes increasingly costly for a manager of an integrated firm to enact his most preferred decisions in a supply unit. If the associated loss in non-monetary job satisfaction outweighs the monetary benefit of integration stemming from better coordination of decisions, the headquarter manager will decide to cooperate with the supplier at arm's-length. Furthermore, we show that the negative effect of cultural distance on the relative likelihood of integration is less pronounced for more productive firms. Intuitively, high-productivity firms are able to invest into cultural training of their managers and, thereby reduce cultural frictions arising from cross-border collaborations.

So far, our central result – the effect of cultural distance on the international make-or-buy decision – has not been empirically analyzed on a systematic basis. We bring this prediction to the data in a three-pronged approach. First, we use highly disaggregated product-level data on U.S. intra-firm imports in total U.S. imports from the U.S. Census Bureau's Related Party Trade dataset.[2] A high share of intra-firm imports reflects a greater willingness of U.S. firms to obtain an ownership or control stake in foreign suppliers instead of buying intermediate goods at arm's-length. Our key explanatory cultural variable is Hofstede's (2001) well-known individualism-collectivism index, generally considered to be the main dimension of cultural variation (see, e.g., Heine, 2008).[3] Given that the U.S. is the most individualistic country according to Hofstede's measurement, and since we are looking at cultural distance

[2] In the absence of comprehensive firm-level data, this dataset has become the standard tool in empirical studies of international make-or-buy decisions, cf. Antràs (2013, 2015) and Nunn and Trefler (2008, 2013).

[3] Our empirical results continue to hold for broader measures of cultural distance.

between the U.S. and its trading partners, the individualism-collectivism index provides a convenient measure of cultural distance. Controlling for product fixed effects and a wide range of potentially confounding factors, we find a negative and significant relationship between a country's cultural distance to the U.S. and the share of intra-firm imports in total U.S. imports from this country.

In the second step, we exploit variation in ethnic composition of managers across U.S. industries to construct an industry/country-specific measure of cultural distance. More specifically, we use the 2000 U.S. Census data to calculate for each industry the shares of managers with a given cultural background and then use these weights to compute industry/country-specific cultural scores. Hence, in contrast to our product-level regressions where cultural variables vary only across countries, we have a measure of cultural distance that varies across countries *and* industries. As a result, we can introduce country and industry fixed effects that absorb various country- and industry-specific factors. For example, country fixed effects effectively control for a number of possible omitted variables including the quality of foreign countries' institutions, an important alternative determinant of the make-or-buy decisions. We find that the estimated effect of cultural distance continues to be economically and statistically significant even after introducing a large set of fixed effects and industry/country-specific controls.

Third, we zoom even further into the link between cultural distance and the integration decision using firm-level Orbis database from the Bureau van Dijk (BvD). This database provides information on ownership stakes of firms from around 100 (developed and emerging) countries in their (foreign) affiliates, and the balance sheets and income statements of those firms. To construct a measure of cultural distance between a headquarter (parent) firm and its subsidiary, we use previously unexploited information on nationalities of managers employed by both companies and assign to each managerial nationality the respective individualism vs. collectivism score from Hofstede.[4] Since we observe in which countries firms are located and which industries they are active in, we can control for cross-country differences in the institutional environment as well as industry characteristics using country and industry fixed effects. Moreover, given that headquarters may have multiple subsidiaries in many countries, we can include parent company fixed effects. Controlling for a battery of fixed effects and a wide range of firm performance measures, we find that higher cultural distance between firms is associated with a lower ownership share in a foreign subsidiary. Furthermore, in line with our theoretical prediction, this effect is found to be weaker for more productive firms. To come even closer towards a casual inference of the effect of cultural distance, we exploit genetic distance as an instrument for cultural distance between managers, see Gorodnichenko

[4] As before, our results continue to hold for a wider definition of cultural distance.

and Roland (2011, 2015). This instrumental variables approach corroborates the negative link between cultural distance and the prevalence of integration predicted by our theoretical model.

Related literature. From a theoretical perspective, our paper is related to the seminal contribution by Antràs and Helpman (2004), who study the international make-or-buy decision in a framework with monopolistic competition, contractual incompleteness, and firm-level heterogeneity. While their framework is centered on the Property rights approach by Grossman and Hart (1986) and Hart and Moore (1990), we emphasize the effect of cultural distance between managers on the internalization decision, building on the novel theory of the firm by Hart and Holmström (2010). Our empirical findings suggest that both explanations of multinational firms' boundaries (ex-post hold-up and cultural distance) hold simultaneously. Our formalization of Hart and Holmström's (2010) theory draws on Conconi et al. (2012) and Legros and Newman (2013). Both the focus and the approach of the current paper, however, are different from these two studies. While the studies examine the effect of liberalization of product and factor markets on the organization of the firms, our objective is to understand the effect of cultural distance on the international make-or-buy decisions of multinational companies.

From an empirical perspective, our paper is related to the burgeoning literature that aims at understanding the effect of culture on international trade and foreign direct investment. 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. Siegel et al. (2011, 2012) find a negative causal effect of egalitarianism distance – defined as the belief that all people are of equal worth and should be treated equally in society – on foreign direct investment flows. Kukharskyy (2015) finds a positive link between a country's long-term orientation and intra-firm trade. 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. Yet, none of these empirical studies considers the effect of cultural distance on the international make-or-buy decision.

By putting managers into the center of our analysis, this paper is also related to the empirical literature that studies the impact of managers on firm and economy-wide performance. Several empirical studies have shown a causal effect of successful managerial practices on firm performance (see Bloom and Van Reenen 2010, Gibbons and Roberts 2013, and Syverson 2011). Bloom et al. (2015) also find that cross-country differences in managerial practices may explain a substantial fraction of heterogeneity in productivity across nations. We complement this literature by establishing a link between managerial culture and the make-or-buy decision.

The remainder of the paper is structured as follows. Section 2 lays out the basic set-up, discusses the equilibrium of the game and derives the theoretical predictions. Section 3 presents econometric evidence supporting this paper's key proposition: a negative relationship between cultural distance and the prevalence of integration. Section 4 concludes.

2 The Model

2.1 Set-up

Our model economy consists of a home country, N, and a foreign country, F. Each country is populated by a unit measure of consumers, whose preferences are identical across countries. Each consumer is endowed with a unit of inelastically supplied labor. A subset of individuals also possess managerial abilities which allow them to become entrepreneurs (managers). There are two types of firms: headquarters (final good producers) and manufacturing suppliers. Headquarters are located in the home country, while manufacturing suppliers are located in foreign countries.[5] Each firm is operated by a single owner-manager.

Preferences. Preferences of an individual i in any country are represented by the following utility function:

$$U_i = z_i + \mu \ln X_i + \mathbf{1}_{i=H,\,M} \left(j_i^{int} + j_i^{ext} \right), \tag{1}$$

where z_i denotes consumption of a homogenous numeraire-good, X_i is an index of aggregate consumption of differentiated varieties $v \in V$, and μ is a parameter governing the intensity of preferences for differentiated goods. Aggregate consumption of differentiated varieties has the following form:

$$X_i = \left[\int_{v \in V} q(v)^{\frac{1}{\sigma}} x(v)^{\frac{\sigma-1}{\sigma}} \mathrm{d}v \right]^{\frac{\sigma}{\sigma-1}}, \tag{2}$$

where $x(v)$ and $q(v)$ denote, respectively, the quantity and quality of differentiated varieties and $\sigma > 1$ represents the elasticity of substitution between any two varieties. As shown further below, this preference structure implies a linear relationship between consumer's income and indirect utility.

Following Hart and Holmström (2010), we assume that managers derive their utility not only from the monetary payoff but also from a non-monetary job satisfaction.[6] This notion is reflected through $\mathbf{1}_{i=H,M}$, an indicator function which takes the value one if an individual i is a manager and zero otherwise, where H denotes a manager of a headquarter unit and M

[5] This model can be easily extended along the lines of Antràs and Helpman (2004) by assuming that suppliers are located both in the domestic market and in the foreign country and allowing headquarters to choose between domestic and foreign sourcing. However, given that domestic sourcing is not observable in the industry-level dataset used in the empirical part of the paper, it is ruled out at the outset.

[6] Although we confine our analysis of non-monetary benefits strictly to managers, our model can be extended so as to incorporate employees' job satisfaction as well.

represents a manager of a supplier firm (see below). The expression in parentheses denotes private job satisfaction. This private benefit can be divided into two components: intrinsic, j_i^{int}, and extrinsic, j_i^{ext}.[7] The intrinsic component of job satisfaction stems from the pleasure a manager gets from working on the task itself and from the feeling of accomplishment, whereas its extrinsic component stems from the factors bestowed upon an individual by peers (e.g., a friendly working atmosphere, respect of co-workers, etc.). Both components of the non-monetary job-satisfaction are assumed to enter a manager's utility function in a linearly additive way.[8] Unlike Hart and Holmström (2010), we endogenize the job satisfaction and introduce functional forms for j_i^{int} and j_i^{ext} further below.

An individual's budget constraint reads $PX_i + z_i = Y_i$, where Y_i denotes an individual i's income, $P = \left(\int_{v \in V} p(v)^{1-\sigma} q(v) \mathrm{d}v\right)^{\frac{1}{\sigma-1}}$ is a quality-adjusted price index, and $p(v)$ is the price of variety $v \in V$. Standard utility maximization yields equilibrium demand functions for the homogeneous good, a bundle of differentiated varieties, and the inverse demand function for each differentiated variety, respectively:[9]

$$z_i = Y_i - \mu \quad , \quad X_i = \mu P^{-1} \quad , \quad p(v) = q(v)^{\frac{1}{\sigma}} x(v)^{-\frac{1}{\sigma}} \mu^{\frac{1}{\sigma}} P^{\frac{\sigma-1}{\sigma}}. \tag{3}$$

Plugging these results back in (1), we obtain an individual's indirect utility:

$$W_i = Y_i + \mathbf{1}_{i=H,M} \left(j_i^{int} + j_i^{ext}\right) - \kappa, \tag{4}$$

where $\kappa \equiv \mu \ln P - \mu(\ln \mu - 1)$. Since κ is constant across individuals and does not affect the equilibrium results, we normalize it to zero (by the choice of μ). Throughout the analysis, W_i will be used as the welfare function of a manager $i = H, M$.

Production. The numéraire 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 more productive than in F). This numéraire good is assumed to be costlessly traded, implying the same unit price in all regions. Consequently, the model exhibits a constant wage differential between the home country and the foreign destination: $w^F < w^N$. For simplicity, we normalize the wage rate in N to unity, $w^N = 1$ and define $w \equiv w^F$.

As in Antràs and Helpman (2004), production of the differentiated goods is conducted under monopolistic competition and it requires the cooperation of two units: a headquarter firm and a manufacturing supplier. Each unit is operated by a single owner-manager. The

7 This conceptualization is widely used in organization science, see e.g., Naumann (1993a), Staw (1989).

8 This is a standard working assumption in the organizational literature, cf. Naumann (1993b).

9 We assume sufficiently small preferences for differentiated goods (i.e., $\mu < Y_i$) to ensure positive consumption of the traditional good in equilibrium.

manager of the headquarter and manufacturing unit will be referred to as H and M, respectively. Headquarter units specialize in the provision of headquarter services h, while supply units provide manufacturing components m. Inputs h and m are produced with a unit labor input requirement each. These inputs are combined into final goods according to the following Cobb-Douglas production function:

$$x(v) = \theta \left(\frac{h(v)}{\eta} \right)^{\eta} \left(\frac{m(v)}{1-\eta} \right)^{(1-\eta)}, \tag{5}$$

where $\eta \in (0,1)$ captures the relative importance of headquarter services in the production process (henceforth, headquarter intensity) and $\theta \in (0,1)$ denotes firm-specific productivity, drawn from an ex-ante known distribution function upon paying fixed costs of entry, as in Melitz (2003) and Antràs and Helpman (2004). To simplify on notation, we drop the variety-index v from here onward and identify firms by their productivity, θ.

As mentioned above, we assume that all headquarters are located in the home country, whereas manufacturing suppliers are located abroad. After manufacturing components have been produced, they are shipped to N for final assembly, see equation (5). Transportation of manufacturing inputs from F to N involves standard iceberg-type trade costs $\tau > 1$.

In contrast to Antràs and Helpman (2004), we assume that parties can write enforceable contracts on the *quantity* of inputs h and m.[10] Yet, the *quality* of differentiated goods cannot be verified by the courts. The quality of goods crucially depends on the managerial coordination of strategic decisions across units (e.g., adoption of a common technological standard or platform). To formalize this notion, we build on Conconi et al. (2012) and Legros and Newman (2013). We normalize the set of possible coordination decisions to a unit interval and denote by $\alpha \in [0,1]$ decisions made in the headquarters' unit and by $\beta \in [0,1]$ decisions implemented in the manufacturing firm. Managers H and M are assumed to have differing visions about the appropriate course of action. More specifically, H prefers α to be as high as possible, while M prefers the smallest possible β.[11] It does not matter for production efficiency which particular decisions are chosen in both units, as long as these decisions are perfectly coordinated across firms. The quality function takes the following form:

$$q = 1 - (\alpha - \beta)^2, \tag{6}$$

[10] This assumption eliminates the well-known channel of inefficiencies stemming from the ex-post hold-up and the associated ex-ante underinvestment in both inputs. We return to this issue in the Conclusion.

[11] This assumption is consistent with the anecdotal evidence on real-world commercial transactions. Consider, for instance, the case of a failed merger between Daimler-Benz and Chrysler. It is widely recognized that the reason for the failed collaboration lied in differing managerial visions, cf., e.g., Cohen and St. Jean (2004) and Finkelstein (2004). While managers of Daimler-Benz were committed to the founding credo of "quality at any cost" ($\alpha = 1$), managers of Chrysler aimed to produce low-cost components ($\beta = 0$).

whereby the quality of a final good is highest ($q^{max} = 1$) for any combination of $\alpha = \beta$ (i.e. perfect coordination across units) and it is decreasing as α and β diverge.

Given that managers have strong diverging beliefs about the appropriate actions, coordination of decisions across units leads to a reduction in managerial intrinsic job satisfaction. The marginal decrease in intrinsic job satisfaction is highest, the more a manager departs from his most preferred decision ($\alpha = 1$ for H and $\beta = 0$ for M). We choose a simple way to introduce these assumptions into the managerial utility function by capturing the intrinsic private cost of coordination as follows:

$$j_H^{int} = -(1-\alpha)^2 \quad , \quad j_M^{int} = -\beta^2.$$

Apart from the intrinsic cost from cooperation, managerial job satisfaction also includes an extrinsic component, which stems from the factors bestowed upon an individual by peers. We assume that the ability of a manager to affect the other manager's job satisfaction crucially depends on the ownership structure of a firm. If the two units are not integrated, H choses α for the headquarter unit and M choses β for the manufacturing unit. Given that an arm's-length transaction amounts to a purchase of manufacturing inputs on the market place, managers have a limited ability to affect each others' extrinsic job satisfaction. For simplicity, we normalize both managers' extrinsic job satisfaction under outsourcing to zero. By integrating a manufacturing supplier into firm boundaries, H obtains residual control rights to make decisions in both units and M becomes H's subordinate. More specifically, H instructs the manager of an integrated manufacturing unit to choose a particular β in this unit and M must follow these instructions. However, to the extent the decision implemented in the manufacturing unit deviates from M's most preferred agenda ($\beta = 0$), M is aggrieved and H's extrinsic job satisfaction is reduced.[12] As before, we normalize the upper bound of headquarter manager's extrinsic job satisfaction to zero and capture H's extrinsic private cost under integration as follows:

$$j_H^{ext} = -c\,\beta^2, \tag{7}$$

where the parameter $c \in [0, 1)$ represents the cultural distance between the headquarter manager and the supply unit manager. Intuitively, the larger the cultural distance between the two managers, the higher H's private cost of instructing and convincing M to implement any $\beta > 0$.

We assume that the contracting parties agree in advance on the future division of surplus.[13]

[12] A natural question that arises in this context is why M is kept as a subordinate under integration despite the extrinsic private cost from instructing this manager. This assumption can easily be justified by referring to M's intangible capital or specific know-how of governing the manufacturing unit.

[13] In view of the fact that most, if not all, real-world commercial contracts include (some kind of) specification

Both under integration and outsourcing, H and M stipulate the quantity of deployed inputs $\{h, m\}$ and the associated reward for workers producing these inputs. Furthermore, managers stipulate ex-ante the surplus sharing rule: Under outsourcing, the headquarter manager H obtains a share $s \in (0, 1)$ of the operating profit, whereas the remaining share $(1 - s)$ accrues to the manager M of the manufacturing firm. For simplicity, we assume that these shares are fixed and identical for all pairs of H and M. Under integration, H diverts the entire operating profit and compensates M with a fixed wage $\omega \geq 1$. The timing of events in this simple game is as follows:

- t_1 Each H decides whether to outsource manufacturing production to an independent producer or to integrate a supplier into the firm's boundaries. H contractually commits to compensate M with a fraction $(1 - s) \in (0, 1)$ of a joint operating profit in the former case and a fixed wage ω in the latter.
- t_2 Under outsourcing, H chooses α, while M chooses β. Under integration, H chooses both α and β.
- t_3 Under either organizational form, H choses the quantities of inputs h and m and stipulates them in an enforceable contract. Inputs are produced and combined into final goods according to the production technology from equation (5).
- t_4 The resulting output is sold and the revenue is distributed among the parties according to the sharing rule specified at t_1.

In the following section, we solve this game through backward induction. Before describing the equilibrium of the game, it is worth pausing to briefly discuss one (implicit) assumption of the framework delineated above. Notice that cultural distance enters our benchmark model merely as a cost parameter, cf. equation (7). Clearly, one can imagine various channels through which cultural distance may also positively affect managerial utility or a firm's performance.[14] We nevertheless develop a simple extension of our model that allows for a positive link between cultural distance and final goods quality. We show that this extended model generates qualitatively similar predictions. We relegate its technical discussion to Appendix A.4. In our benchmark model, we interpret c as the costs of cultural frictions in the course of coordination of decisions across firms, net of positive effects of cultural distance.

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for future compensation, this assumption seems realistic.

[14] For instance, Ottaviano and Perri (2005, 2006) explicitly introduce positive utility from goods or services (such as restaurants, entertainment, etc.) supplied by people of different cultures into an individual's preference structure. Although these factors certainly affect job satisfaction, we believe that they play a minor role for the coordination of decision across firm units, which lies in the center of our analysis.

2.2 Equilibrium

The revenue from the sale of the final goods is $R = px$, which, using (3), (5), and (6) can be written as

$$R = \left(1-(\alpha-\beta)^2\right)^{\frac{1}{\sigma}} \left(\theta \left(\frac{h}{\eta}\right)^{\eta} \left(\frac{m}{1-\eta}\right)^{(1-\eta)}\right)^{\frac{\sigma-1}{\sigma}} \mu^{\frac{1}{\sigma}} P^{\frac{\sigma-1}{\sigma}}. \tag{8}$$

The associated joint operating profit is:

$$\Pi = R - h - \tau w m. \tag{9}$$

Consider first the case of outsourcing, which we denote by O. At t_4, this operating profit is divided between two firms according to the sharing rule specified at t_1, i.e., H receives $s\Pi$, whereas M obtains $(1-s)\Pi$. Anticipating this outcome, H chooses at t_3 the quantity of inputs $\{h, m\}$ that maximize his welfare $W_H^O = s\left[R - h - \tau w m\right] + j_H^{int}$, where R is given by (8). This maximization problem yields equilibrium input quantities $h = \eta\frac{\sigma-1}{\sigma}R$ and $m = (1-\eta)\frac{\sigma-1}{\sigma}\frac{R}{\tau w}$. Plugging these quantities back in (9) yields joint operating profit for any tuple $\{\alpha, \beta\}$:

$$\Pi = \left(1-(\alpha-\beta)^2\right)\Theta B \quad , \quad B \equiv (\tau w)^{-(1-\eta)(\sigma-1)}\frac{\mu}{\sigma}\left(\frac{\sigma-1}{\sigma}\right)^{\sigma-1} P^{\sigma-1}, \tag{10}$$

where firm-specific productivity $\Theta \equiv \theta^{\sigma-1}$ has been redefined for notational simplicity and B summarizes all terms that are constant across firms.

At t_2, managers anticipate Π from equation (10) and make coordination decisions that maximize their welfare. More specifically, H chooses α to maximize W_H^O:

$$\max_{\alpha} W_H^O = s(1-(\alpha-\beta)^2)\Theta B - (1-\alpha)^2, \tag{11}$$

while M chooses β to maximize W_M^O :

$$\max_{\beta} W_M^O = (1-s)(1-(\alpha-\beta)^2)\Theta B - \beta^2.$$

Manipulating the first-order conditions, we obtain the following equilibrium coordination decisions under outsourcing:

$$\alpha_O = \frac{1+(1-s)\Theta B}{1+\Theta B} \quad , \quad \beta_O = \frac{(1-s)\Theta B}{1+\Theta B}. \tag{12}$$

It can immediately be seen from (12) that $\alpha_O > \beta_O$, i.e., strategic decisions are not perfectly coordinated across units. The intuition behind this result stems from the fundamental trade-off faced by both managers: A coordination of decisions improves the overall quality of the final good, but is associated with the loss in managerial intrinsic job satisfaction. Note that a higher s is associated with both a lower α_O and a lower β_O, as can be seen from the respective expressions. A larger value of s means that M receives a smaller share of the joint profit. He will thus care more about intrinsic job satisfaction and will choose a lower level of β, closer to his preferences. Since H instead cares relatively more about profit than intrinsic job satisfaction as s is higher, he will want to reduce $(\alpha - \beta)$ and thus reduce α.

Given that $\alpha_O \neq \beta_O$, the quality of final goods under outsourcing

$$q_O = 1 - \frac{1}{(\Theta B + 1)^2} \tag{13}$$

is below its maximum level for all possible parameter values, i.e., $q_O < 1$. Plugging (12) in (11), we obtain H's equilibrium welfare under outsourcing:

$$W_H^O = \frac{s(\Theta B)^2(\Theta B + 2 - s)}{(\Theta B + 1)^2}. \tag{14}$$

Consider next the case of integration, denoted by I. The manager of the integrating firm (H) diverts the entire operating profit and chooses in t_3 inputs quantities h and m that maximize his welfare $W_H = R - h - \tau w m + j_H^{int} + j_H^{ext} - \omega$. As before, equilibrium quantities $h = \eta \frac{\sigma - 1}{\sigma} R$ and $m = (1-\eta)\frac{\sigma-1}{\sigma}\frac{R}{\tau w}$ yield the joint operating profit, $\Pi = (1 - (\alpha - \beta)^2)\,\Theta B$ as a function of equilibrium coordination decisions $\{\alpha, \beta\}$. Yet, in contrast to outsourcing, H now has the right to make strategic decisions in both units. Bearing in mind the extrinsic private cost from instructing M, see (7), H's maximization problem at t_2 is given by:

$$\max_{\alpha,\beta} W_H^I = (1 - (\alpha - \beta)^2)\Theta B - (1 - \alpha)^2 - c\beta^2 - \omega. \tag{15}$$

Manipulating the two first-order conditions, we obtain equilibrium coordination decisions under integration:

$$\alpha_I = \frac{\Theta B + c}{\Theta B(1 + c) + c} \quad , \quad \beta_I = \frac{\Theta B}{\Theta B(1 + c) + c} \ . \tag{16}$$

It can immediately be seen that $\beta_I \leq \alpha_I \leq 1$ and these inequalities hold strictly if $c > 0$. Although H now possesses decision rights in both units, strategic decisions under integration are not perfectly coordinated. Intuitively, H internalizes the loss in job satisfaction from instructing M but does not insist on his most preferred outcome, $\beta_I = \alpha_I = 1$ because of the cost c associated with imposing his position on the foreign manager. One can see that if $c = 0$, there will be perfect coordination and $\alpha_I = \beta_I = 1$. Instead, as c becomes large, both α_I and β_I will be lower and β_I will converge towards 0.

As a result of choices of α_I and β_I, the quality of final goods under integration

$$q_I = 1 - \frac{c^2}{(\Theta B(1+c)+c)^2} \tag{17}$$

is as well below the maximum level, $q_I < 1$ if $c > 0$, and is equal to one only if $c = 0$. We see clearly that the quality of goods declines as c increases. However, a simple comparison of (17) and (13) yields

Lemma 1. The final goods quality is higher under integration than under outsourcing.
Proof. Follows from the fact that $q_I - q_O = \frac{\Theta B(\Theta B(1+2c)+2c)}{(\Theta B(1+c)+c)^2(\Theta B+1)^2} > 0$.

This result is interesting because it holds for all values of c, including large ones. Intuitively, the authority to make decisions in both units under integration allows H to achieve better coordination compared to an arm's-length relationship and, thereby, improve on the final goods quality.[15]

Plugging (16) in (15), we obtain H's welfare under integration:

$$W_H^I(c) = \frac{(\Theta B)^2(1+c)}{\Theta B(1+c)+c} - \omega. \tag{18}$$

At t_1, a headquarter manager anticipates this outcome and compares it with his welfare under outsourcing, W_H^O. In Appendix A.1, we show that both $W_H^I(c)$ and W_H^O increase in firm productivity Θ, yet the former does so at a higher rate, cf. Figure 1. The intuition behind this result lies in the supermodularity of firm profits in productivity and final goods quality, see equation (10). That is, an improvement in final goods quality leads to a larger increase in profits the higher a firm's productivity. Since goods quality is higher under integration (cf. Lemma 1), the effect of productivity on firm profits (and managerial welfare) is significantly higher within an integrated organizational structure. As can be seen from Figure 1, the least productive entrepreneurs (with $\Theta < \hat{\Theta}$) outsource their production to independent suppliers, whereas the most productive ones (with $\Theta \geq \hat{\Theta}$) integrate their foreign suppliers into firm boundaries. This sorting pattern is consistent with the previous theoretical work (cf. Antràs and Helpman (2004), Antràs (2015)) and existing empirical findings (e.g., Corcos et al. (2013), Kohler and Smolka (2009), and Tomiura (2007)).

Yet, our model delivers a novel prediction regarding the link between cultural distance and the make-or-buy decision that has not yet been explored in the literature. A simple

15 There is a broad consensus in the business literature that integration is associated with a higher quality compared to outsourcing, see, e.g., Lu et al. (2012). The Deloitte (2012) Global Outsourcing and Insourcing Survey reports unsatisfactory quality to be the the major factor in the decision to terminate an existing arm's-length relationship. Moreover, almost all of the surveyed firms that switched from outsourcing to integration were satisfied with the result in terms of improved quality.

differentiation of $W_H^I(c)$ from (18) with respect to c implies $\frac{\partial W_H^I(c)}{\partial c} = \frac{(\Theta B)^2}{(\Theta B(1+c)+1)^2} < 0$. That is, an increase in cultural distance leads to a lower managerial welfare under integration. As can be seen from Figure 1, this immediately implies a higher equilibrium productivity cutoff, $\hat{\Theta}'$ (above which firms prefer I over O) and a relatively lower prevalence of vertical integration. We thus have:

Proposition 1. The relative prevalence of vertical integration decreases in the cultural distance between managers of the headquarter and supplier firms.

Proof. Follows immediately from the fact that $\partial W_H^I(c)/\partial c < 0$ and the discussion above.

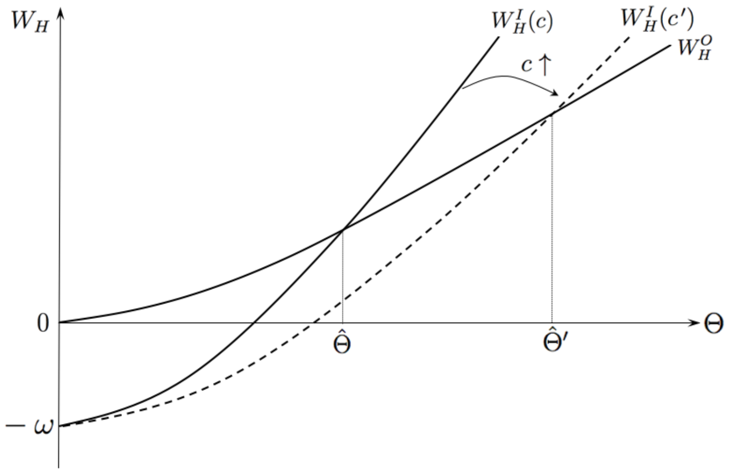

Figure 1: *Equilibrium sorting into vertical integration and outsourcing.*

Our theoretical model entails a further prediction regarding the effect of trade costs, τ on the international make-or-buy decision. This hypothesis is summarized in the following

Corollary 1. The relative prevalence of vertical integration decreases in trade costs between the two countries.

Proof. See Appendix A.2.

Although the predicted effect of trade costs on the integration decision points in the same direction as the one of the cultural distance, the channels behind these results are different. The intuition behind Corollary 1 relates to the fact that profits are submodular in trade cost and final goods quality, see equation (10). In other words, as trade costs decrease, the marginal increase in a firm's profit due to an improvement of final goods quality increases. Given that H's welfare is a function of the firm's profits, the incentive of the headquarter manager to improve upon the quality of final goods by integrating a manufacturing supplier increases. Notably, our model predicts the opposite effect of trade costs on the relative prevalence of integration as compared to Antràs and Helpman (2004) and Antràs (2015). Since empirical findings both in Antràs (2015) and in the current paper are generally supportive of Corollary 1, our model sheds new light on the previously suggested explanatory factors of the international make-or-buy decision.

In the framework presented above, we assumed that cultural distance enters a headquarter's welfare under integration merely as a cost parameter. In Appendix A.4, we develop a variant of our framework which additionally allows for a positive effect of cultural distance. Intuitively, headquarters operating in culturally different environments may learn novel management practices and, thereby, improve the quality of final goods. The sorting of firms in this extended model is analogous to the one presented in Figure 1, i.e. only the most productive firms integrate their suppliers into firm boundaries, whereas the least productive ones cooperate with their suppliers at arm's-length. Yet, the overall effect of cultural distance on the prevalence of integration depends on the relative strength of the two opposing effects: If the performance gain from discovering new organizational techniques is sufficiently low compared to the loss in extrinsic job satisfaction, our Proposition 1 continues to hold. We further verify that the Corollary 1 holds in this extended model for all parameter values.

2.3 Investment in Cultural Management

So far, firms were allowed to respond to cultural frictions only via the make-or-buy decision. In reality, however, companies can also reduce these frictions by investing into cultural training of their managers. We model this investment as a fixed cost, $f_c \geq 1$ (e.g., maintaining a cultural management division within a firm or hiring external consultants). We assume that such an investment reduces cultural frictions between the managers of two firms by a factor $\lambda < 1$, such that a headquarter's extrinsic job satisfaction is now given by $j_H^{ext} = -\lambda c \beta^2$. Following derivations in the previous section, one can find the welfare of a headquarter manager whose firm invests into cultural training:

$$W_H^I(\lambda c) = \frac{(\Theta B)^2(1+\lambda c)}{\Theta B(1+\lambda c)+\lambda c} - \omega - f_c. \tag{19}$$

From the perspective of a single firm, the relative attractiveness of vertical integration continues to decline in cultural distance, yet this effect is relatively weaker for firms that invest in cultural management. We further prove in Appendix A.3 that the break-even productivity cutoff of a firm that invests in cultural training is larger than the productivity cutoff of a firm as implied by (18). Intuitively, only the most productive firms will find it optimal to incur additional expenses in order to reduce cultural frictions. Therefore, the negative effect of cultural distance on the relative likelihood of integration is less pronounced for more productive firms. This result is summarized in the following proposition.

Proposition 2. High-productivity firms are more likely to integrate their culturally different suppliers into firm boundaries compared to the least productive firms.

Proof. See Appendix A.3.

3 The Empirical Analysis

Our theoretical framework offers a number of testable predictions (e.g., cultural distance should reduce the relative prevalence of foreign vertical integration vs. outsourcing and a parent firm's ownership share in its subsidiary). To investigate whether these predictions are borne out in the data, we use several datasets that measure cultural distance, the intensity of intra-firm cross-border import flows, ownership structure of firms, and a number of other potential determinants of international make-or-buy decisions. We start our analysis at a relatively aggregated (country/product) level and then employ increasingly disaggregated data to end up with a firm-level variation in cultural distance. To rule out alternative explanations, we use an extensive list of controls and a broad spectrum of fixed effects as well as instrumental variables. Across datasets, controls and estimation approaches, we consistently find that cultural distance is associated with increased incidence of outsourcing rather than integration. This key result is robust to a variety of checks, sample splits, etc.

3.1 Cross-country Variation of Cultural Distance

3.1.1 Econometric Specification and Data

To measure the extent to which multinational firms integrate their foreign suppliers rather than cooperate with them at arm's-length, we use the "U.S. Related Party Trade" product-level data collected by the U.S. Bureau of Customs and Border Protection which requires importers to report whether or not the transaction is with a related party.[16] This dataset contains information on U.S. imports of 5705 products (according to the six-digit Harmonized System classification, HS) from 232 countries over 2000-2011 and is a popular source for analyses of the international make-or-buy decisions (Antràs (2013, 2015)). As a measure of vertical integration, we use U.S. intra-firm import share, defined as the ratio of related-party imports to the sum of related and non-related imports. A higher value of this ratio 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. Because this dataset covers only U.S. firms, our analysis in this section is U.S. centered.

Our baseline specification is:

$$IFIS_{p\ell t} = \alpha\, Cultural\ distance_{\ell} + \boldsymbol{\beta D}_{\ell} + \boldsymbol{\gamma X}_{\ell(t)} + \delta_p + \lambda_t + error, \tag{20}$$

[16] A related-party import is defined by the U.S. Census Bureau as an import transaction involving parties "with various types of relationships including any person directly or indirectly, owning, controlling or holding power to vote, 6 percent of the outstanding voting stock or shares of any organization", whereas non-related imports involves parties that "have no affiliation with each other".

where $IFIS$ is the intra-firm import share from the U.S. Bureau of Customs and Border Protection, and p, ℓ, and t index products, foreign countries, and years, respectively. Our key explanatory variable is cultural distance between country ℓ and the U.S., $Cultural\ distance_{\ell}$. We further include a vector of alternative distances, $\boldsymbol{D}_{\ell}$, specified in detail further below. $\boldsymbol{X}_{\ell(t)}$ is a vector of (time-varying) country-level controls. An important feature of our analysis is the inclusion of product fixed effects, δ_p, which account for heterogeneity across goods in terms of headquarter intensity, relationship-specificity, contractibility, transportability, etc. λ_t denotes year fixed effects.

To measure cultural differences across countries, we use cultural indices constructed by Geert Hofstede, initially for about 30 countries in the early 1970s and later extended to cover nearly 100 countries. Hofstede (2001) identified four key dimensions of culture: individualism vs. collectivism, uncertainty avoidance (sensitivity to ambiguity and uncertainty), power distance (strength of social hierarchy), and masculinity-femininity (task orientation versus person-orientation). Since the cross-cultural psychology literature views the individualism-collectivism cleavage as the main difference across cultures (see Heine, 2008), our baseline analysis focuses on this cultural dimension.[17] Figure 2 presents the map of individualism scores. Original scores vary on the scale between 0 (collectivism) and 100 (individualism). For expositional purposes, we rescale them to a unit interval. Conveniently, the U.S. is the country with the highest individualism score. The cultural distance of country ℓ to the U.S. is calculated as $Cultural\ distance_{\ell} = |I_{\ell} - I_{US}|$, where I_{ℓ} is country ℓ's individualism score.

To ensure that the effect of cultural distance on the international make-or-buy decision is not confounded by linguistic, religious, or geographical distance, we include the vector of controls, $\boldsymbol{D}_{\ell}$. We draw from Spolaore and Wacziarg (2015) the following two distance measures. First, $Linguistic\,distance_{\ell}$ measures the expected linguistic distance between two randomly chosen individuals, one from country ℓ and one from the U.S. Second, $Religious\,distance_{\ell}$ measures the probability that two randomly selected individuals (one from each country) adhere to different world religions. Furthermore, we draw from Mayer and Zignago (2011) a measure of geographical distance, $Geo\,distance_{\ell}$, which is calculated as the log of a country's geographic distance to the U.S. weighted by the geographic distribution of population inside each nation.

To further reduce effects of potentially confounding factors, we include additional controls $\boldsymbol{X}_{\ell(t)}$ that vary by country (and time). Specifically, to account for the predicted effect of trade costs on the international make-or-buy decision, we use Antràs's (2015) measure of *Freight*

[17] Gorodnichenko and Roland (2011) find that, among a variety of cultural dimensions, including the other Hofstede measures, the individualism-collectivism dimension is the most important and robustly significant explanatory factor of long-run growth. Our results are generally robust to consideration of a cultural distance measure based on all Hofstede dimensions.

$costs_{\ell t}$, which represents the average ratio of Cost Insurance and Freight (CIF) to Free On Board (FOB) import values by country-year. One might be worried that the structure of trade and cultural attributes may be associated with the level of economic development. For example, more developed trading partners may happen to have a closer proximity to the U.S. in terms of culture and, thereby, exhibit a higher prevalence of integration.[18] To rule out this alternative explanation, we include the log of a country's GDP per capita, $Log(GDPpc)_{\ell t}$ from Penn World Tables, as an additional regressor. Guiso et al. (2006) suggest that the level of trust can influence the volume of trade between countries. It is, however, not clear how differences in the level of trust between countries affect a firm's international make-or-buy decision. To tackle this question, we also control for the country's level of $Trust_{\ell}$, taken from the World Values Survey. Because the data are U.S. centered, we include a dummy variable $English_{\ell}$, which is equal to one if English is an official language of country ℓ. Finally, the correlation between culture and make-or-buy relationship may be driven by a foreign country's institutions. For example, poor and volatile institutions may be associated with a higher level of collectivism (e.g., it may be easier to survive as a group) and a higher prevalence of outsourcing (if the integration process is too bureaucratic and time-consuming). To measure the stability of institutions, we use the International Country Risk Guide (ICRG) *Government* $stability_{\ell}$ score averaged over 1980s through 2000s.[19] In the robustness checks, we consider a wide range of alternative institutional proxies and country-level controls introduced further below. Table A.1 in Appendix presents the descriptive statistics of all variables used in the current paper.

3.1.2 Results

In a first pass at the data, we plot the share of U.S. intra-firm imports aggregated at the country level against that country's cultural distance to the U.S., see Figure 3. At this aggregate level, the correlation between these two measures is negative and highly significant. A country such as Pakistan, which has a high cultural distance to the U.S. has less than 10 percent of intra-firm imports from the U.S. whereas a country like Germany that is culturally much closer has approximately 70 percent of imports that are intra-firm.

While this correlation is informative, obviously we need to control for other variables to see if this relation is not driven by omitted variables, see Table 1. As can be seen from

[18] We should note, however, that while it is widely known that economic development affects the volume of trade between countries, we are not aware of models linking income per capita to intra-firm trade.

[19] This score provides an assessment both of the government's ability to carry out its declared program(s), and its ability to stay in office. The risk rating assigned is the sum of three subcomponents, each with a maximum score of four points and a minimum score of 0 points. A score of 4 points means Very Low Risk and a score of 0 points means a Very High Risk. The maximum score, based on the three subcomponents, is 12.

column (1), the effect of cultural distance is negative and highly significant after controlling for product and year fixed effects. Among all alternative distance measures, only linguistic distance is significantly correlated with the share of intra-firm imports, however, the sign of the coefficient is opposite to the one of cultural distance, see column (2). Consistent with our Corollary 1, trade costs are negatively and significantly associated with the intra-firm import share, see column (3). The effects of a country's economic development, trust level, English as an official language and institutional quality are insignificant, see columns (4) and (5). One may be concerned that the standard set of these variables does not capture all determinants of international trade. To address this concern, we introduce the log of import volume for a given product-country-year, *Log(Import volume)*$_{p\ell t}$, as an additional control. Clearly, the volume of imports is an endogenous variable and one should interpret the results cautiously.[20] As can be seen from column (6), the volume of trade is a strong predictor of intra-firm trade. However, even when we control for the trade volume, the coefficient on cultural distance does not change materially in size and remains highly significant. A standard deviation change in the level of individualism (24.38 points in the individualism index) is associated with a 12.6 percentage point change in the share of intra-firm imports. This is a significant magnitude since the average share of intra-firm imports at the product/country level is 23%.

We further verify the validity of our results in a range of unreported robustness checks (available upon request). First, to account for "zeros" in the intra-firm trade data, we re-run regressions from Table 1 using generalized linear models (fractional logit and probit), see Papke and Wooldridge (1996). Second, we verify that the effect of cultural distance continues to be negative and highly significant in a cross-section, for every single year within 2000-2011. Third, we experiment with a wide range of additional control variables. For instance, we consider alternative proxies for common religious values (e.g., share of catholics or protestants in the population), taken from Barro (2003), experiment with alternative proxies for institutions using World Bank's Doing Business database or International Country Risk Guide data. We further control for a country's human and physical capital abundance using time-varying proxies from Penn World Tables. Throughout specifications, the coefficients on $Cultural\, distance_\ell$ remain negative and statistically and economically significant.

While these results are reassuring, they do not eliminate the possibility that there are confounding factors at the level of countries which affect both cultural distance and the international make-or-buy decision. The standard practice to control for (unobserved) heterogeneity across countries is to include country fixed effects. Unfortunately, we cannot implement this

[20] For instance, cultural distance can affect both make-or-buy decisions and the volume of trade. To the extent imports are measured better than cultural distance, we may find that the estimated coefficient on cultural distance is attenuated to zero. In an extreme case, controlling for the volume of imports can eliminate statistical and economic significance of the cultural distance effect.

approach in the current specification since cultural distance varies only by country. In the following section, we enhance our identification by constructing a novel industry/country measure of cultural distance, which accounts for the heterogeneity of U.S. industries with respect to cultural backgrounds of their managers and also allows for the inclusion of industry and country fixed effects.

3.2 Industry/Country Variation of Cultural Distance

3.2.1 Econometric Specification and Data

As before, the dependent variable is the share of intra-firm imports in total imports from the U.S. Census Bureau's Related Party Trade database. Yet, instead of using the 6-digit HS product-level data, we now exploit industry-level information, categorized according to the 6-digit North American Industry Classification System (NAICS). This slightly less disaggregated data contains information on intra-firm imports by 390 manufacturing industries from 232 countries over 2000-2011. Our baseline specification in this section reads:

$$IFIS_{j\ell t} = \alpha\, Cultural\ distance_{j\ell} + \delta_j + \lambda_{\ell t} + \boldsymbol{\beta} \boldsymbol{X}_j + \boldsymbol{\gamma} \boldsymbol{X}_{j\ell(t)} + error, \qquad (21)$$

where $IFIS$ is the U.S. intra-firm import share and j, ℓ and t index industries, countries, and years, respectively. The key feature of this section is that our explanatory variable, $Cultural\ distance_{j\ell}$ now varies across countries *and* industries. δ_j and $\lambda_{\ell t}$ are, respectively, industry and country-year fixed effects. In some specifications, we include a vector of industry-level, $\boldsymbol{X}_j$, or industry/country-level controls, $\boldsymbol{X}_{j\ell(t)}$, some of which vary over time.

To construct a measure of cultural distance at the industrial level between a given country and the U.S., we proceed as follows. We use information on the ancestry of U.S. citizens from the 2000 U.S. Census to estimate ethnic composition of managers in U.S. industries. In this census, 80.1 percent of the population reported their ethnic origin, 72 percent of which specified a single ancestry and the remaining 28 percent mentioned two ancestries. For the construction of our measure, we use the first ancestry indicated by an individual. The vast majority of ancestries can be mapped to a distinct country of origin (e.g., Japanese to Japan, or Italian to Italy). A small fraction of individuals who indicated their ancestry in terms of geographical areas (e.g., Western European or African), broad ethnic groups (e.g., Arab or Slav), or no longer existent countries (e.g., Assyrian/Chaldean) were dropped. This leaves us with 94 distinct countries of origin. Since our theoretical model emphasizes the effect of cultural distance on the *managerial* make-or-buy decisions, we restrict our sample to individuals who indicated their occupation as 'Manager'. For the construction of our baseline measures of cultural composition, we restrict the sample ("narrow definition") even further by considering only those managers who are likely to be in charge of the make-or-buy decision (i.e., 'Chief Executives', occupation code 001 in the 2000 U.S. Census classification) or directly involved in the coordination of decisions across firm units ('Operations Managers', 'Industrial Production Managers', 'Engineering Managers', codes 002, 014, and 030, respectively). As a robustness check, we also report results for the case where we include all managerial occupations (including sales managers, public relations managers, etc.), which corresponds to using codes 001 through 041 in the 2000 U.S. Census classification. We refer to this case as the "broad definition" of managers.

Having calculated the ethnic shares of managers in a given industry, we weigh them with the individualism levels of their ancestor's country of origin to obtain industry-specific individualism scores:

$$I_{j,US} = \sum_{\ell} s_{\ell j} I_{\ell}, \tag{22}$$

where $s_{\ell j}$ is the share of ethnic group ℓ in industry j. The cultural distance between a country ℓ and the U.S. for industry j is thus given by $\textit{Cultural distance}_{j\ell} = |I_{\ell} - I_{j,US}|$.

We consider three versions of this measure to assess the robustness of our results to alternative treatments of missing values as well as to rule out competing theories of the structure of trade. First, we consider only those managers who report their ancestry, and define the associated cultural distance as $\textit{Cultural distance}^{(1)}_{j\ell} = |I_{\ell} - I^{(1)}_{j,US}|$. For the second measure, we assign the average U.S. individualism score to all respondents of the U.S. Census who do not report their ancestry, $I^{(2)}_{j,US} = \sum_{\ell} \tilde{s}_{\ell j} I_{\ell}$. We denote the corresponding distance $\textit{Cultural distance}^{(2)}_{j\ell} = |I_{\ell} - I^{(2)}_{j,US}|$. The third measure is a modification of the first one, tailored to minimize the effects of language ties or network effects within ethnic groups, see Rauch (1999). In particular, we construct a measure of individualism for a given trading partner of the U.S. and a given industry such that this measure considers only ethnic groups other than the one from the trading partner. For example, when we calculate cultural distance between a U.S. industry j and Germany, we exclude German managers in this industry.[21] Formally, we use $I^{(3)}_{j,US,Germany} = \sum_{\ell:\ell \neq Germany} \breve{s}_{\ell j} I_{\ell}$ to compute cultural distance $\textit{Cultural distance}^{(3)}_{j,Germany} = |I_{Germany} - I^{(3)}_{j,US,Germany}|$.

The vector of industry-level controls, $\boldsymbol{X}_j$ includes variables that have been suggested in the empirical literature as important explanatory factors of the intra-firm import share, cf. Antràs (2015). To examine the effect of trade costs on the international make-or-buy decision, we

[21] We also experiment with different variants of this index using CEPII data on language ties from Mayer and Zignago (2011). In the above-mentioned example, for the construction of cultural distance between a U.S. industry importing from Germany, we 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).

consider two alternative proxies: *Freight costs*$_j$, measured as the average ratio of CIF to FOB imports by industry for the period 2000-2005, and *Tariffs*$_j$, calculated as average tariffs faced by importing firms in a given U.S. industry. The inclusion of the next three control variables is motivated by the Property rights theory of the firm, cf. Grossman and Hart (1986) and Antràs and Helpman (2004). According to this theory, the ownership rights should be assigned to the party that conducts the most important relationship-specific investment. Hence, in industries with a high headquarter intensity, final good producers are more likely to integrate their manufacturing suppliers and to source intermediate inputs within firm boundaries (implying a high intra-firm import share). The empirical literature on the property rights theory of the firm has suggested the following three proxies for the headquarter intensity (see, e.g., Nunn and Trefler (2008, 2013) and Antràs (2015)): $Log(R\&D/Sales)_j$ is a measure of Research and Development (R&D) intensity of an industry and is calculated as the log of R&D expenditures divided by total sales; $Log(Capital/Labor)_j$ is a proxy for capital intensity of an industry, measured as the log of the real capital stock per worker; $Log(Skilled/Unskilled)_j$ is an industry's skill intensity, calculated as the log of the number of non-production workers divided by total employment. The final two industry-level covariates are productivity $Dispersion_j$ and demand $Elasticity_j$ in a given industry. The inclusion of these two control variables is motivated by the theoretical work of Antràs and Helpman (2004). In their model, a higher productivity dispersion positively affects the share of intra-firm imports, since firms that integrate their foreign suppliers are more productive than firms that source foreign inputs at arm's-length. Following Nunn and Trefler (2008, 2013) and Antràs (2015), we measure productivity dispersion as the standard deviation of the log of exports for a particular good across U.S. port locations and destination countries in 2000, using data from the U.S. department of Commerce. Similarly, elasticity of demand can affect the revenue of firms and, thereby, the share of intra-firm imports. The measure of demand elasticity has been constructed following Broda and Weinstein (2006).

3.2.2 Results

First, we regress the intra-firm import share on our alternative measures of cultural distance, controlling for all previously mentioned industry covariates of the make-or-buy decision. As can be seen from columns (1)-(3) of Table 2, all three proxies for cultural distance are negatively and highly significantly correlated with the $IFIS_{j\ell t}$. A one standard deviation increase in cultural distance (0.25) decreases the intra-firm import share by approximately 0.4 standard deviations (0.31), on average. Estimates for the control variables in columns (1)-(3) are broadly in line with previous empirical studies of global sourcing, (see, e.g., Chapter 8 in

Antràs (2015)). Consistent with our Corollary 1, both proxies for trade costs negatively affect the share of intra-firm trade, whereby only the effect of tariffs is significant. R&D and capital intensity both have the predicted sign and are significant, while skill intensity is insignificant. Coefficients on productivity dispersion and demand elasticity are mostly insignificant. Importantly, comparing the fit of the statistical models with and without cultural distance (columns (1)-(3) and column (4), respectively), suggests that cultural distance more than doubles the R^2 and thus has a considerable predictive power. This is an important result since it shows that culture can be as quantitatively important as the well-established explanatory factors of the internalization decisions of multinational firms taken together. Results for the "broad" definition of managers are similar, see columns (5)-(8).

Columns (1)-(3) of Table 3 report the results of our baseline specification with country-year and industry fixed effects (which absorb all industry-level covariates). In all three cases, we continue to find a highly significant negative association between cultural distance and intra-firm import share. The magnitude of the estimate is somewhat smaller but this reduction in magnitude may simply reflect a decrease in the signal-to-noise ratio in a regression with many fixed effects (see Griliches and Hausman 1986).

To ensure that the effect of cultural distance reported in Table 3 is not confounded by other factors that vary by industry-country, we include the following control variables. The capital abundance of the foreign country may have a differential impact on the make-or-buy decision depending on the capital intensity of an industry. To control for this alternative channel, we include $\textit{Capital interaction}_{j\ell t} = \textit{Log}(Capital/Labor)_j \times \textit{Log}(Capital/Labor)_{\ell t}$, whereby $\textit{Log}(Capital/Labor)_j$ represents the above-mentioned proxy for capital intensity of an industry and $\textit{Log}(Capital/Labor)_{\ell t}$ is the relative capital abundance of a foreign country, as measured by the log of the ratio of capital stock over population from Penn World Tables. Similarly, we control for $\textit{Skill interaction}_{j\ell t} = \textit{Log}(Skilled/Unskilled)_j \times HC_{\ell t}$, whereby $\textit{Log}(Skilled/Unskilled)_j$ is the above-mentioned industry-level proxy for skill intensity and $HC_{\ell t}$ is the country-level index of human capital per person from Penn World Tables, which is constructed based on the average years of schooling and the return to education. We further control for $\textit{R\&D interaction}_{j\ell} = \textit{Log}(R\&D/Sales)_j \times Rule_\ell$, whereby $\textit{Log}(R\&D/Sales)_j$ is the above-mentioned proxy for R&D intensity of an industry and $Rule_\ell$ is a country's Rule of Law index from the World Bank. The idea behind the latter interaction term is that firms in R&D-intensive industries are potentially more vulnerable towards dissipation of knowledge or ex-post hold-up and are likely to decide on the ownership structure based on the quality of a foreign country's (formal) institutions. As can be seen from columns (4)-(6) in Table 3, the negative association between cultural distance and intra-firm imports is robust to the inclusion of all above-mentioned industry/country controls. Notably, few of these controls seem to be significantly correlated with the $IFIS$. In contrast, the effect of cultural difference is statistically and economically significant throughout specifications.

One might be worried that the link between cultural distance and intra-firm imports is confounded by other values or beliefs passed on from parents to their descendants. To account for this possibility, we include further industry/country-specific controls. Specifically, Algan and Cahuc (2010) show that trust of the second and third generation of U.S. immigrants (as measured by the General Social Survey) is highly correlated with the trust level in their ancestor's country of origin from the World Values Survey. To ensure that our results do not merely reflect differences in generalized trust, we control for *Trust distance*$_{j\ell} = |Trust_\ell - \sum_\ell s_{\ell j} Trust_\ell|$, whereby $s_{\ell j}$ is the share of ethnic group ℓ in industry j (constructed by analogy to (22)) and $Trust_\ell$ is the level of trust in country ℓ from the World Values Survey.[22] In the same vein, one could argue that a manager's ethnic background also affects his or her understanding of (or reliance on) formal institutions. We thus include a measure of *Institutional distance*$_{j\ell} = |Rule_\ell - \sum_\ell s_{\ell j} Rule_\ell|$, whereby $Rule_\ell$ is the Rule of Law index from the World Bank.[23] To account for religious differences, we control for *Protestant distance*$_{j\ell} = |Protestants_\ell - \sum_\ell s_{\ell j} Protestants_\ell|$ and *Catholic distance*$_{j\ell} = |Catholics_\ell - \sum_\ell s_{\ell j} Catholics_\ell|$, whereby $Protestants_\ell$ and $Catholics_\ell$ represent, respectively, the share of Protestants and Catholics in a given country in 2000 from Barro (2003). In the robustness checks, we also consider historical prevalence of Protestants and Catholics (as of 1900) and/or other religious groups. In columns (7)-(9) of Table 3, we add these variables to the list of control variables in $\boldsymbol{X}$. None of these controls seems to be significantly correlated with the $IFIS$. In contrast, the effect of cultural difference is statistically and economically significant throughout specifications. We find similar results for the "broad" definition of managers (Table 4).

We further validate this strong result in a wide range of unreported robustness checks. First, we construct the above-mentioned interaction terms using alternative proxies. For instance, we capture a country's human (physical) capital abundance by the log of human capital to labor (respectively, log of capital to output) ratio relative to the U.S. from Hall and Jones (1999) or a country's average years of schooling from Barro and Lee (2013). Similarly, during the construction of *R&D interaction*$_{j\ell}$ and *Institutional distance*$_{j\ell}$, we experiment with alternative measures of institutions from the World Bank and ICRG. Second, we exploit the World Values Survey to construct further industry/country-indices that might capture

[22] All reported control variables were constructed using only managers who reported their nationality, similarly to *Cultural distance*$^{(1)}_{j\ell}$. However, our results are fairly unchanged when we assign the respective U.S. scores to all managers with unreported nationality, as in *Cultural distance*$^{(2)}_{j\ell}$, or, similarly to *Cultural distance*$^{(3)}_{j\ell}$, consider only managers from countries other than the respective trading partner.

[23] We experimented with a wide range of alternative institutional measures and found similar results.

managerial traits. For instance, to control for differences in (managerial) work ethics, we construct an index $Work\ ethics_{j\ell} = |Work_\ell - \sum_\ell s_{\ell j} Work_\ell|$, whereby $s_{\ell j}$ is the share of ethnic group ℓ in industry j (constructed by analogy to (22)) and $Work_\ell$ is the percentage of population in country ℓ that pick "Hard Work" as the answer to the WVS question "What should children be taught at home?" Controlling for these additional factors, the coefficients on cultural distance remain negative and statistically significant.

3.3 Variation of Cultural Distance Across Firms

In previous sections, we focused on how cultural distance can affect the share of intra-firm imports at the *industry/product* level. We can further refine our analysis of make-or-buy decisions by examining the ownership structure of subsidiaries at the *firm* level. Specifically, our theory predicts that the ownership stake in a foreign subsidiary is likely to be higher when cultural distance is small. We also show theoretically that more productive parent firms can overcome cultural distance, i.e., the interaction of a parent firm's productivity and cultural distance should ceteris paribus result in a greater share of the parent firm's ownership share in a subsidiary.

We study these predictions using Bureau van Dijk's Orbis database (https://orbis.bvdinfo.com) which provides information crucial for these empirical tests. Specifically, Orbis covers around 100 countries so that we have considerable cross-country/culture variation. Furthermore, in contrast to trade flow data that are U.S.-centered, Orbis includes multinationals from many countries which allows us to exploit additional tools (e.g., instrumental variables) to strengthen an argument that the link from cultural distance to make-or-buy decisions could be causal. Apart from income statements and balance sheets, the database has information on ownership structure of firms, a key variable of interest for us. Finally, Orbis provides data on the nationality of managers which allows us to calculate cultural distance between parent firms and their subsidiaries.[24]

Building on our previous econometric exercises, we consider the following specification:

$$\begin{aligned} OS_{p,d,j_p,i_d,\ell_p,l_d} &= \alpha\, Cultural\ distance_{p,d,j_p,i_d,\ell_p,l_d} + \boldsymbol{\beta X}_{p,d,j_p,i_d,\ell_p,l_d} \\ &\quad +\delta_{j_p} + \lambda_{i_d} + \phi_{\ell_p} + \psi_{l_d} + \gamma_p + error, \end{aligned} \tag{23}$$

where OS is the ownership share of a parent (p) firm in its daughter company (d), j_p and ℓ_p denote the industry and country of a parent firm, respectively, and i_d and l_d represent,

[24] While Orbis has a panel component, we use only the cross-section for 2013, the most recent year with the largest coverage, because the time dimension is too short and the coverage is sparse in early years to discern variation in ownership structure or composition of manager nationality over time. See Kalemli-Ozcan et al. (2015) for more details.

respectively, the industry and country of a subsidiary. $\delta, \lambda, \phi, \psi$ are fixed effects for countries and industries. Importantly, since parent companies can have multiple subsidiaries in multiple countries, we can further include a parent firm's fixed effects γ_p. Thus, we can not only control for the institutional environment of countries and industries but also for the specific business model of a parent firm. To calculate cultural distance between firms, we compute the average individualism score for each firm using Hofstede's scores and the nationality composition of managers (C-level: CEO, CFO, etc.) during the 2004-2013 period. The list of controls $\boldsymbol{X}$ includes age, capital stock, employment, sales, and total factor productivity (calculated as in Aw et al. (2001)) for parent and subsidiary firms.

Given the broad country/firm/nationality coverage of the Orbis database, we use genetic distance as an instrumental variable for cultural distance. Given the nationality of managers, we compute the genetic distance between parent and subsidiary firms, using average frequency of blood types, as in Gorodnichenko and Roland (2011). This instrumental variable can help us to address the endogeneity of cultural diffusion (i.e., if two countries trade intensively, their cultures could be more likely to converge). At the same time, this instrumental variable does not eliminate endogeneity of managerial appointments (e.g., an American parent firm could be more likely to appoint an American than a Japanese to run a subsidiary in Japan). However, this type of endogeneity is likely to bias our estimates of α toward zero. Indeed, this potential response of parent firms to tackle cultural distance should introduce a positive comovement of ownership share and measured cultural distance, while our theory predicts a negative comovement between the variables. Thus, if we find a strong association in our estimates, the true degree of association may be even stronger.

In the basic specification without controls (only fixed effects $\delta, \lambda, \phi, \psi$ are included), we find a negative relationship between cultural distance and ownership share (column (1) of Table 5) which is consistent with the pattern observed in the trade flows and the theoretical predictions of the model. Controlling for observed characteristics of parent firms and subsidiaries (columns (2) and (3)) makes estimates more precise. In columns (4), we introduce fixed effects for parent firms so that the coefficient on cultural distance is identified from variation across subsidiaries within a multinational firm. These fixed effects account for a large share of variation in the data (R^2 increases from 0.343 in column (3) to 0.718 in column (4)). However, even in this case, we find an even stronger negative relationship between cultural distance and ownership share. Using genetic distance as an instrumental variable for cultural distance (column (5)) further raises the size of the coefficient on cultural distance, consistent with our expectation that IV estimates should be larger in absolute value than OLS estimates.

To test our model's prediction that high productivity of parent firms can help to "overcome" negative effects of cultural distance, we introduce an interaction of cultural distance and parent firm productivity as an additional control in specification (23). Consistent with the prediction, we find that the interaction term has a positive, statistically significant coefficient. Approximately, one to two log point increase in parent firm productivity is enough to offset the effect of a unit increase in cultural distance. Similar to results in columns (4)-(5), IV estimates point to a greater sensitivity of ownership to cultural distance and parent firm productivity than the corresponding OLS estimates.

We further explored the robustness of these results in a battery of checks (available upon request) and found that, by and large, the estimates are insensitive to including more controls, focusing on integration/outsourcing within and across industries, constraining the sample only to industrial firms or firms active in different industries than their subsidiaries. We conclude that results for predictors of firm-level ownership are consistent with the evidence based on trade flows and implications of our theoretical framework.

4 Conclusion

We presented a basic model of global sourcing with culturally dissimilar countries. In this model, headquarter managers decide whether to source intermediate inputs from independent suppliers or integrate the latter into firm boundaries against the backdrop of private costs associated with cross-cultural collaboration. The key prediction of our model is that greater cultural distance will reduce the headquarters' incentive to source inputs from an integrated supplier. Combining product-, industry-, and firm-level data on the international make-or-buy decisions with the well-known cultural dimensions by Hofstede, we find a strong empirical support for our key prediction, controlling for a great range of additional variables and accounting for the issue of endogeneity. Although we cannot rule out that cultural motives for the international make-or-buy decision may also work via other channels than the ones suggested in our model, our empirical results show that cultural motives can shed new light on patterns of international trade and organization of production. Indeed, cultural distance appears to have strong predictive power for the make-or-buy decision even after controlling for a large set of variables emphasized in the earlier work on the matter.

Our theoretical framework leaves several questions open for future research. First, cultural dimensions in the current version of model affect solely managerial job satisfaction. While we believe that our results will continue to hold if we allow for workers' job satisfaction, a study of organizational structure and international team-work in a multi-cultural environment might be an appealing research agenda in itself. Second, we abstracted from the canonical Property rights approach by Grossman and Hart (1986) and Hart and Moore (1990) to pinpoint the novel predictions of our theoretical framework. Our empirical work, however, suggests that both theories may simultaneously play a role in a firm's international make-or-buy decision. Moreover, our empirical analysis was constructed to identify the effect of cultural distance independently of that of institutions. An investigation of the interaction between these two alternative explanations of a multinational firm's boundaries in a unified theoretical framework may constitute an interesting research agenda.

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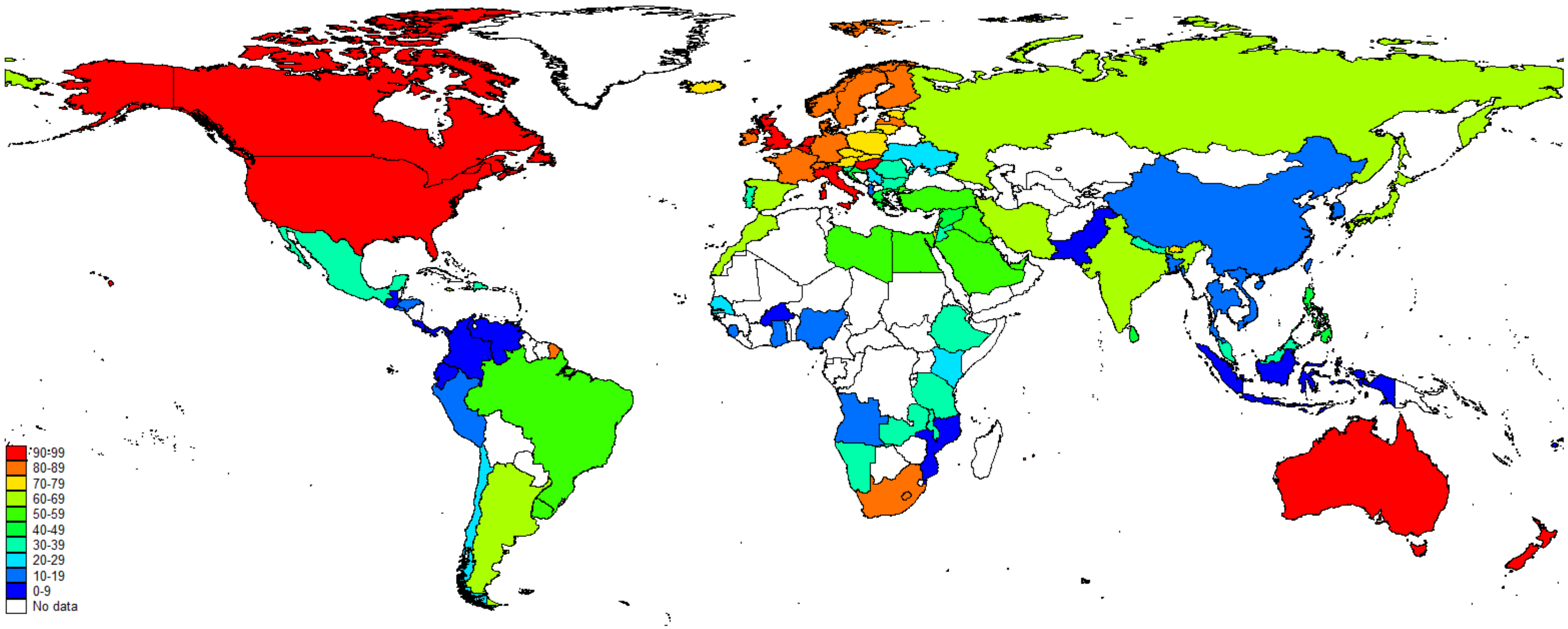

Figure 2

The Distribution of Hofstede's Individualism Scores.

Notes: The scores are publicly available at: http://www.geerthofstede.eu.

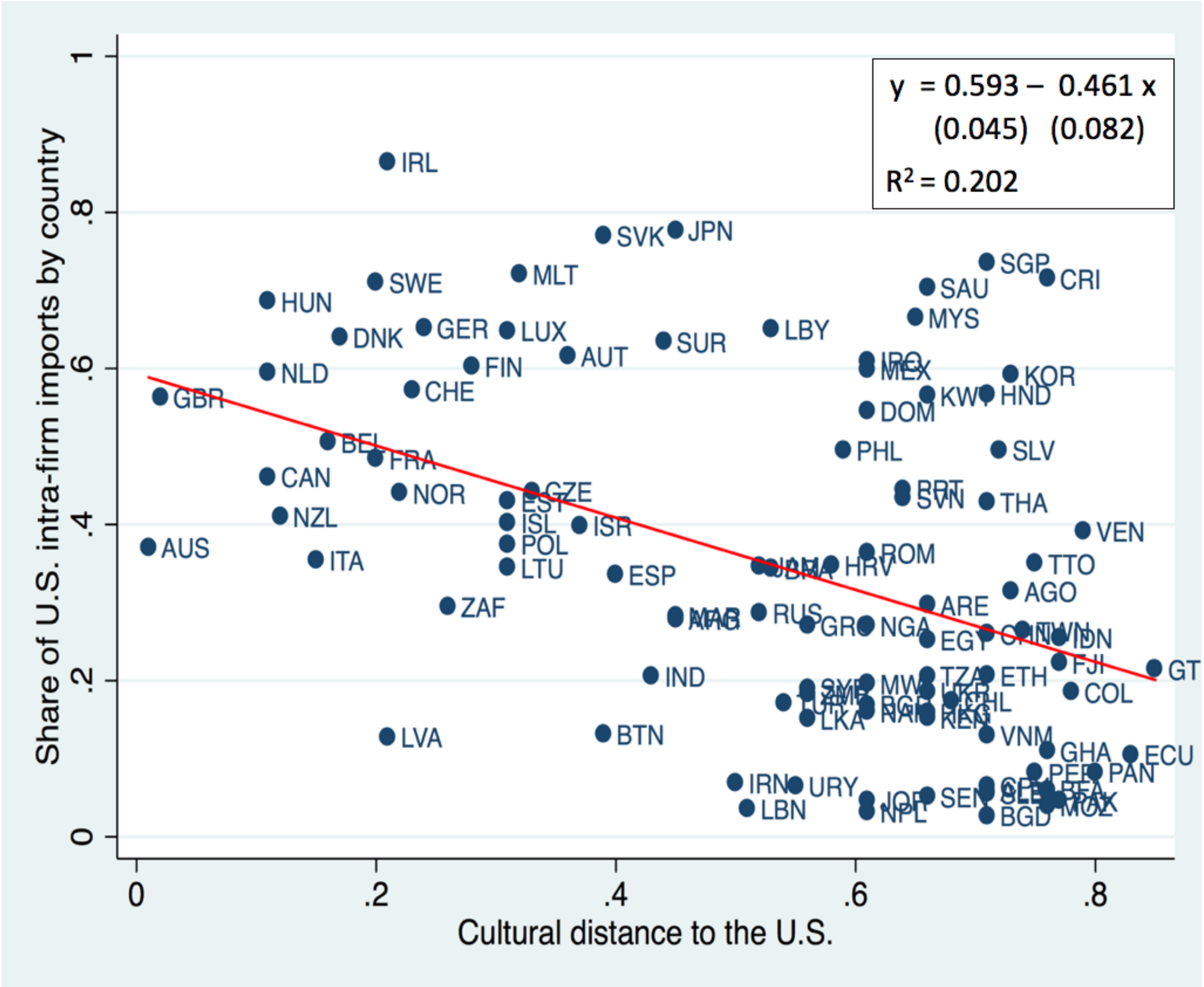

Figure 3

Cultural distance and the share of intra-firm imports by country.

Notes: The horizontal axis is the distance from the U.S. in terms of individualism scores. The vertical axis is the share of intra-firm imports in total imports of U.S. firms (average over 2000-2011). Each point corresponds to a country. The red line is the fitted linear relationship between the variables. The top right corner reports results for the fitted line.

Table 1
Determinants of U.S. Intra-firm Import Shares:
Cross-country Variation in Cultural Distance

	Dependent variable: Intra-firm import share, $IFIS_{p\ell t}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$Cultural\ distance_{\ell}$	-0.212***	-0.232***	-0.136**	-0.136**	-0.157***	-0.160**
	(0.041)	(0.056)	(0.054)	(0.055)	(0.056)	(0.061)
$Linguistic\ distance_{\ell}$		0.220***	0.215***	0.215***	0.162***	0.177***
		(0.065)	(0.058)	(0.058)	(0.049)	(0.049)
$Religious\ distance_{\ell}$		-0.059	-0.115	-0.117	-0.099	-0.158
		(0.164)	(0.136)	(0.142)	(0.154)	(0.153)
$Geo\ distance_{\ell}$		-0.052	0.006	0.007	0.018	0.004
		(0.040)	(0.030)	(0.031)	(0.030)	(0.035)
$Freight\ costs_{\ell t}$			-1.576***	-1.605***	-1.923***	-0.913
			(0.536)	(0.615)	(0.676)	(0.684)
$Log(GDPpc)_{\ell t}$				-0.001	-0.013	0.002
				(0.016)	(0.017)	(0.019)
$Trust_{\ell}$					-0.000	-0.000
					(0.000)	(0.000)
$English_{\ell}$					-0.036	-0.027
					(0.027)	(0.027)
$Government\ stability_{\ell}$					0.011	0.011
					(0.012)	(0.013)
$Log(Import\ volume)_{p\ell t}$						0.017***
						(0.002)
Observations	1,460,347	1,371,606	1,371,606	1,362,812	1,327,668	1,327,668
Fixed effects	Prod&Year	Prod&Year	Prod&Year	Prod&Year	Prod&Year	Prod&Year
R^2	0.151	0.156	0.163	0.162	0.164	0.179

Notes: The table reports estimates of OLS regressions with product and year fixed effects. The specification is given by equation (20). Variables are defined in the text. Robust standard errors are clustered at the country level and presented in parentheses. ***, **, * denote 1, 5, 10 % significance, respectively.

TABLE 2

DETERMINANTS OF U.S. INTRA-FIRM IMPORT SHARES:
INDUSTRY/COUNTRY-SPECIFIC MEASURES OF CULTURAL DISTANCE

	Dependent variable: Intra-firm import share, $IFIS_{j\ell t}$							
	Narrow definition				Broad definition			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Cultural\ distance_{j\ell}^{(1)}$	-0.438***				-0.425***			
	(0.031)				(0.025)			
$Cultural\ distance_{j\ell}^{(2)}$		-0.486***				-0.475***		
		(0.035)				(0.028)		
$Cultural\ distance_{j\ell}^{(3)}$			-0.474***				-0.466***	
			(0.035)				(0.028)	
$Freight\ costs_j$	-0.415	-0.431	-0.425	-0.388**	-0.413	-0.428	-0.423	-0.398**
	(0.363)	(0.361)	(0.361)	(0.181)	(0.400)	(0.397)	(0.397)	(0.156)
$Tariffs_j$	-0.003***	-0.003***	-0.003***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
$Log(R\&D/Sales)_j$	0.042***	0.044***	0.044***	0.043***	0.041***	0.042***	0.042***	0.039***
	(0.012)	(0.012)	(0.012)	(0.007)	(0.012)	(0.012)	(0.012)	(0.006)
$Log(Capital/Labor)_j$	0.034**	0.033**	0.033**	0.036***	0.035***	0.035***	0.035***	0.040***
	(0.014)	(0.014)	(0.014)	(0.008)	(0.013)	(0.013)	(0.013)	(0.007)
$Log(Skilled/Unskilled)_j$	-0.013	-0.013	-0.015	-0.027	-0.015	-0.013	-0.013	-0.024
	(0.044)	(0.043)	(0.043)	(0.020)	(0.038)	(0.038)	(0.038)	(0.017)
$Dispersion_j$	0.006	0.004	0.004	0.010	0.001	-0.001	-0.001	-0.007
	(0.038)	(0.038)	(0.038)	(0.017)	(0.035)	(0.035)	(0.035)	(0.015)
$Elasticity_j$	-0.003*	-0.003*	-0.003*	-0.003***	-0.003**	-0.003**	-0.003**	-0.003***
	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
Observations	23,055	23,055	23,055	23,055	31,289	31,289	31,289	31,289
R^2	0.145	0.138	0.136	0.062	0.139	0.133	0.131	0.053

Notes: The table reports estimates of OLS regressions. The specification is given by equation (21). Robust standard errors are clustered at the industry/country level and presented in parentheses. Columns (1)-(4) use the "narrow" definition of managers (occupation codes 001, 002, 014, and 030 in the 2000 U.S. Census classification). Columns (5)-(8) use the "broad" definition of managers (occupation codes 001-041 in the 2000 U.S. Census classification). See text for further details on the definition of variables. ***, **, * denote 1, 5, 10 % significance, respectively.

TABLE 3

DETERMINANTS OF U.S. INTRA-FIRM IMPORT SHARES:
CULTURAL DISTANCE AND FURTHER INDUSTRY/COUNTRY COVARIATES (NARROW DEFINITION OF MANAGERS)

	Dependent variable: Intra-firm import share, $IFIS_{j\ell t}$								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$Cultural\ distance^{(1)}_{j\ell}$	-0.417**			-0.436***			-0.361*		
	(0.163)			(0.165)			(0.186)		
$Cultural\ distance^{(2)}_{j\ell}$		-0.325***			-0.337***			-0.312**	
		(0.125)			(0.126)			(0.158)	
$Cultural\ distance^{(3)}_{j\ell}$			-0.317***			-0.329***			-0.295*
			(0.122)			(0.123)			(0.151)
$Capital\ interaction_{j\ell t}$				0.001	0.001	0.001	0.001	0.001	0.001
				(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)
$Skill\ interaction_{j\ell t}$				-0.053*	-0.053*	-0.053*	-0.046	-0.047	-0.047
				(0.032)	(0.032)	(0.032)	(0.032)	(0.032)	(0.032)
$R\&D\ interaction_{j\ell}$				0.007	0.006	0.006	0.006	0.005	0.005
				(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
$Trust\ distance_{j\ell}$							0.002	0.002	0.002
							(0.002)	(0.002)	(0.002)
$Institutional\ distance_{j\ell}$							-0.281	1.589	1.371
							(4.176)	(4.509)	(4.468)
$Protestant\ distance_{j\ell}$							-0.078	-0.056	-0.061
							(0.186)	(0.187)	(0.187)
$Catholic\ distance_{j\ell}$							-0.000	0.001	-0.004
							(0.120)	(0.119)	(0.119)
Observations	22,998	22,998	22,998	22,674	22,674	22,674	22,379	22,379	22,379
Fixed effects	C/Y&Ind	C/Y&Ind	C/Y&Ind	C/Y&Ind	C/Y&Ind	C/Y&Ind	C/Y&Ind	C/Y&Ind	C/Y&Ind
R^2	0.375	0.375	0.375	0.373	0.373	0.373	0.374	0.374	0.374

Notes: The table reports estimates of OLS regressions with country-year and industry fixed effects. The specification is given by equation (21). Measures of cultural distance are constructed using the "narrow" definition of managers (occupation codes 001, 002, 014, and 030 in the 2000 U.S. Census). See text for further details on the definition of variables. Robust standard errors are clustered at the industry/country level and presented in parentheses. ***, **, * denote 1, 5, 10 % significance, respectively.

TABLE 4

DETERMINANTS OF U.S. INTRA-FIRM IMPORT SHARES:
CULTURAL DISTANCE AND FURTHER INDUSTRY/COUNTRY COVARIATES (BROAD DEFINITION OF MANAGERS)

	Dependent variable: Intra-firm import share, $IFIS_{j\ell t}$								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$Cultural\ distance^{(1)}_{j\ell}$	-0.254			-0.269*			-0.137		
	(0.160)			(0.161)			(0.176)		
$Cultural\ distance^{(2)}_{j\ell}$		-0.371***			-0.357***			-0.331**	
		(0.118)			(0.119)			(0.152)	
$Cultural\ distance^{(3)}_{j\ell}$			-0.369***			-0.355***			-0.322**
			(0.117)			(0.118)			(0.148)
$Capital\ interaction_{j\ell t}$				0.005	0.003	0.003	0.005	0.005	0.005
				(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
$Skill\ interaction_{j\ell t}$				-0.026	-0.027	-0.027	-0.022	-0.023	-0.023
				(0.026)	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
$R\&D\ interaction_{j\ell}$				0.010***	0.010***	0.010***	0.009**	0.009**	0.009**
				(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
$Trust\ distance_{j\ell}$							0.003	0.003	0.003
							(0.002)	(0.002)	(0.002)
$Institutional\ distance_{j\ell}$							-0.951	2.684	2.574
							(3.933)	(4.239)	(4.210)
$Protestant\ distance_{j\ell}$							-0.269	-0.211	-0.217
							(0.187)	(0.190)	(0.190)
$Catholic\ distance_{j\ell}$							0.119	0.099	0.094
							(0.134)	(0.134)	(0.134)
Observations	31,246	31,246	31,246	30,698	30,698	30,698	30,206	30,206	30,206
Fixed effects	C/Y&Ind	C/Y&Ind	C/Y&Ind	C/Y&Ind	C/Y&Ind	C/Y&Ind	C/Y&Ind	C/Y&Ind	C/Y&Ind
R^2	0.354	0.355	0.355	0.353	0.354	0.354	0.356	0.357	0.357

Notes: The table reports estimates of OLS regressions with country-year and industry fixed effects. The specification is given by equation (21). Measures of cultural distance are constructed using the "broad" definition of managers (occupation codes 001-043 in the 2000 U.S. Census). See text for further details on the definition of variables. Robust standard errors are clustered at the industry/country level and presented in parentheses. ***, **, * denote 1, 5, 10 % significance, respectively.

TABLE 5

DETERMINANTS OF A PARENT FIRM'S OWNERSHIP SHARE IN ITS SUBSIDIARIES

	Dependent variable: Ownership share						
	OLS	OLS	OLS	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Cultural distance	-0.142**	-0.125***	-0.099***	-0.286***	-0.363***	-0.285***	-0.349***
	(0.058)	(0.031)	(0.029)	(0.044)	(0.093)	(0.045)	(0.107)
$Cultural\ distance * TFP_p$						0.122*	0.250***
						(0.065)	(0.054)
Age_p		-0.082***	-0.066***				
		(0.010)	(0.013)				
Age_d		-0.098***	-0.128***	-0.030	-0.031	-0.091**	-0.091**
		(0.023)	(0.029)	(0.024)	(0.024)	(0.033)	(0.033)
$Capital_p$		2.180***	3.254***				
		(0.253)	(0.377)				
$Capital_d$		-3.211***	-4.015***	-1.630***	-1.631***	-1.790***	-1.787***
		(0.642)	(0.664)	(0.528)	(0.528)	(0.614)	(0.615)
$Employment_p$		-0.230	-0.276				
		(0.256)	(0.509)				
$Employment_d$		3.524***	3.906***	1.802***	1.795***	1.970***	1.961***
		(0.438)	(0.344)	(0.606)	(0.609)	(0.561)	(0.567)
$Sales_p$		1.273***	1.165				
		(0.360)	(0.980)				
$Sales_d$		-2.605***	-3.468***	-0.834*	-0.829*	-1.203***	-1.201***
		(0.251)	(0.181)	(0.441)	(0.443)	(0.227)	(0.229)
TFP_p			3.015***				
			(0.454)				
TFP_d			-1.874**	-0.869*	-0.863*		
			(0.699)	(0.449)	(0.447)		
Observations	347,265	78,830	43,988	40,276	40,276	28,336	28,336
Parent fixed effect	No	No	No	Yes	Yes	Yes	Yes
R^2	0.246	0.321	0.343	0.718	0.718	0.685	0.685
First-stage F stat					10.2		38.39

Notes: The table reports estimates of OLS and instrumental variable (IV) regressions with parent firms' country and industry and subsidiaries' country and industry fixed effects. Columns (4)-(7) also include parent firm fixed effects. The specification is given by equation (23). Cultural distances are based on the nationality of C-level managers (CEO, CFO, etc.). For control variables, subscripts p and d refer to parent and daughter firms, respectively. In columns (5) and (7), cultural distance is instrumented with blood distance as in Gorodnichenko and Roland (2011). In column (7), the interaction of cultural distance and parent firm's productivity is instrumented with the interaction of blood distance and parent's firm productivity. Robust standard errors are clustered at the level of parent firms' countries and presented in parentheses. ***, **, * denote 1, 5, 10 % significance, respectively.

A Theoretical Appendix

A.1 Discussion of Figure 1

A simple differentiation of (14) and (18) with respect to Θ implies $\frac{\partial W_H^I(c)}{\partial \Theta} > \frac{\partial W_H^O}{\partial \Theta}$ only if

$$\Omega \equiv \frac{(\Theta B(1+c)+2c)(1+c)}{(\Theta B(1+c)+c)^2} - \frac{s((\Theta B)^2+3\Theta B+2(2-s))}{(\Theta B+1)^3} > 0. \tag{24}$$

Notice that

$$\frac{\partial \Omega}{\partial c} = -\frac{2c}{(\Theta B(1+c)+c)^3} < 0.$$

Hence, if $\Omega > 0$ holds for the highest possible c (i.e., $c = 1$), it holds a fortiori for all $c < 1$. Utilizing $c = 1$ in (24), we have

$$\Omega|_{c=1} = \frac{4(\Theta B+1)}{(2\Theta B+1)^2} - \frac{s((\Theta B)^2+3\Theta B+2(2-s))}{(\Theta B+1)^3}. \tag{25}$$

Furthermore, notice that

$$\frac{\partial \Omega|_{c=1}}{\partial s} = -\frac{(\Theta B)^2+3\Theta B+4(1-s)}{(\Theta B+1)^3} < 0.$$

Hence, if $\Omega|_{c=1} > 0$ holds for the highest possible s (i.e., $s = 1$), it holds a fortiori for all $s < 1$. Substituting $s = 1$ in (25) yields after rearranging

$$\Omega|_{c=s=1} = \frac{3(\Theta B)^2+5\Theta B+2}{(2\Theta B+1)^2(\Theta B+1)^3} > 0.$$

We thus have shown that $\Omega > 0$ and, therefore, $\frac{\partial W_H^I(c)}{\partial \Theta} > \frac{\partial W_H^O}{\partial \Theta}$ for all parameter values.

A.2 Proof of Corollary 1

Consider an equilibrium along the lines of Figure 1 and assume that an exogenous shock increases the trade costs τ. Using (14) and (18), it can be easily verified that both $W_H^I(c)$ and W_H^O decrease in τ. As a result, the productivity cutoff $\hat{\Theta}$ shifts to the right only if $\frac{\partial W_H^I(c)}{\partial \tau} < \frac{\partial W_H^O}{\partial \tau}$. Taking the first-order derivatives of (14) and (18) and rearranging yields:

$$\frac{\partial W_H^I(c)}{\partial \tau} - \frac{\partial W_H^O}{\partial \tau} = \Omega \Theta^2 B(\tau) \frac{\partial B(\tau)}{\partial \tau} < 0,$$

where $\Omega > 0$ is given by (24) and $\frac{\partial B(\tau)}{\partial \tau} < 0$ follows immediately from (10). Since the productivity cutoff $\hat{\Theta}$ increases in τ, the relative prevalence of integration decreases in τ.

A.3 Proof of Proposition 2

Solving $W_H^I(c) = 0$ from (18) for Θ, we obtain the productivity cutoff, above which managers who do not invest in cultural training obtain positive welfare under integration:

$$\Theta^I = \frac{1}{2}\frac{\sqrt{\omega(1+c)(\omega(1+c)+4c)} + \omega(1+c)}{(1+c)B}.$$

Solving $W_H^I(\lambda c) = 0$ from (19) for Θ, we obtain productivity cutoff, above which managers who invest in cultural training obtain positive welfare under integration:

$$\Theta_c^I = \frac{1}{2}\frac{\sqrt{(\omega+f_c)(1+\lambda c)((4+\omega+f_c)\lambda c+\omega+f_c)} + (\omega+f_c)(1+\lambda c)}{(1+\lambda c)B}.$$

We have $\Theta_c^I > \Theta^I$ if and only if

$$\Phi \equiv \frac{\Theta_c^I}{\Theta^I} = \frac{(\sqrt{(\omega+f_c)(1+\lambda c)((4+\omega+f_c)\lambda c+\omega+f_c)} + (\omega+f_c)(1+\lambda c))(1+c)}{(\sqrt{\omega(1+c)(\omega(1+c)+4c)} + \omega(1+c))(1+\lambda c)} \tag{26}$$

is larger than one. Differentiating this expression with respect to λ yields

$$\frac{\partial \Phi}{\partial \lambda} = \frac{2c(1+c)(\omega+f_c)}{(1+\lambda c)\sqrt{(\omega+f_c)(1+\lambda c)((4+\omega+f_c)\lambda c+\omega+f_c)}(\sqrt{\omega(1+c)(\omega(1+c)+4c)} + \omega(1+c))} > 0.$$

Hence, if $\Phi > 1$ holds for the lowest possible λ (i.e., $\lambda = 0$), it holds a fortiori for all $\lambda > 0$. Substituting $\lambda = 0$ in (26) yields

$$\Phi|_{\lambda=0} = \frac{2(\omega+f_c)(1+c)}{\sqrt{\omega(1+c)(\omega(1+c)+4c)} + \omega(1+c)}. \tag{27}$$

Differentiating the latter expression with respect to c yields after simplification

$$\frac{\partial \Phi|_{\lambda=0}}{\partial c} = -\frac{4\omega(\omega+f_c)(1+c)}{\sqrt{\omega(1+c)(\omega(1+c)+4c)}\left(\sqrt{\omega(1+c)(\omega(1+c)+4c)} + \omega(1+c)\right)^2} < 0.$$

Hence, if $\Phi|_{\lambda=0} > 1$ holds for the highest possible c (i.e. $c = 1$), it holds a fortiori for all $c < 1$. Substituting $c = 1$ in (27), we obtain:

$$\Phi|_{\lambda=0,c=1} = \frac{2(\omega+f_c)}{\sqrt{\omega(\omega+2)} + \omega}.$$

This expression is clearly increasing in f_c. Substituting $f_c = 1$ therein yields $\Phi|_{\lambda=0,c=f_c=1}$ as a function of ω only. It can be easily verified that $\Phi|_{\lambda=0,c=f_c=1}$ decreases in ω and is equal to $\frac{4}{1+\sqrt{3}} > 1$ if $\omega = 1$. We thus have $\Phi > 1$ and, therefore, $\Theta_c^I > \Theta^I$ for all parameter values.

A.4 Adding Advantages of Cultural Distance to the Model

We introduce the benefit of cultural distance into our model by adding a function $\gamma(c) \in (0,1)$ to the quality function under integration:

$$q_I = 1 - \gamma(c)(\alpha - \beta)^2 \quad , \quad \gamma'(c) < 0. \tag{28}$$

Note that the quality of final goods ceteris paribus increases as cultural distance becomes larger. Intuitively, in the course of coordination of decisions across firm units, headquarters can learn novel practices or organizational techniques from foreign supply managers and, thereby, improve firm performance for any combination of α and β. As with the costs of extrinsic job satisfaction, we assume that this quality-improving effect does not apply for arm's-length transactions, in which headquarters acquire manufacturing components at the marketplace from independent suppliers. Substituting the quality function from (15) by the one from (28) and solving the resulting maximization problem yields H's welfare under integration:

$$W_H^I(c) = \frac{(\Theta B(1+c)\gamma(c) + c(1-\gamma(c)))\Theta B}{\Theta B(1+c)\gamma(c) + c} - f_I.$$

As before, this expression is increasing in firm productivity Θ. Furthermore, following the approach from Appendix A.1 one can show that $\frac{\partial W_H^I(c)}{\partial \Theta} > \frac{\partial W_H^O}{\partial \Theta}$ holds for all parameter values and, therefore, the sorting pattern from Figure 1 is maintained in this extended model.

Yet, the effect of an increase in cultural distance c on the equilibrium productivity cutoff $\hat{\Theta}$ depends on the interplay of two opposing effects. On the one hand, cultural distance increases product quality and, ceteris paribus, leads to higher monetary profits. On the other one, it decreases managerial extrinsic job satisfaction, which gets reflected in lower managerial welfare. The latter effect overcompensates the former one if and only if:

$$-\frac{\gamma'(c)}{(\gamma(c))^2} < \frac{\Theta B}{c^2}.$$

Under this condition, Proposition 1 continues to hold. Yet, following the approach from Appendix A.2, one can show that Corollary 1 does not necessitate this condition and continues to hold for all parameter values.

B Appendix Tables

Table A.1
Descriptive Statistics

Variable	Obs (1)	Mean (2)	Std. Dev. (3)	Min (4)	Max (5)
Country-specific cultural distance:					
$Cultural\ distance_{\ell}$	1,327,668	0.430	0.248	0.010	0.850
$Intra\text{-}firm\ import\ share,\ IFIS_{p\ell t}$	1,327,668	0.234	0.346	0.000	1.000
$Linguistic\ distance_{\ell}$	1,327,668	0.906	0.149	0.352	1.000
$Religious\ distance_{\ell}$	1,327,668	0.766	0.139	0.593	0.996
$Geo\ distance_{\ell}$	1,327,668	8.994	0.482	7.639	9.650
$Freight\ costs_{\ell t}$	1,327,668	1.080	0.027	1.019	1.181
$Log(GDPpc)_{\ell t}$	1,327,668	9.681	0.887	6.062	11.28
$Trust_{\ell}$	1,327,668	63.38	31.90	7.900	148.0
$English_{\ell}$	1,327,668	0.237	0.425	0.000	1.000
$Government\ stability_{\ell}$	1,327,668	7.865	0.744	5.920	9.909
$Log(Import\ volume)_{p\ell t}$	1,327,668	11.95	2.993	5.525	24.90
Industry/country-specific cultural distance:					
Narrow definition of managers					
$Cultural\ distance^{(1)}_{j\ell}$	23,031	0.229	0.189	0.000	0.690
$Cultural\ distance^{(2)}_{j\ell}$	23,031	0.200	0.164	0.000	0.636
$Cultural\ distance^{(3)}_{j\ell}$	23,031	0.205	0.165	0.003	0.639
Broad definition of managers					
$Cultural\ distance^{(1)}_{j\ell}$	31,339	0.263	0.200	0.000	0.702
$Cultural\ distance^{(2)}_{j\ell}$	31,339	0.228	0.173	0.000	0.635
$Cultural\ distance^{(3)}_{j\ell}$	31,339	0.232	0.174	0.000	0.638
$Intra\text{-}firm\ import\ share,\ IFIS_{j\ell t}$	31,339	0.312	0.290	0.000	1.000
$Freight\ costs_{j}$	31,339	1.095	0.043	1.028	1.231
$Tariffs_{j}$	31,339	2.754	8.158	0.000	90.25
$Log(R\&D/Sales)_{j}$	31,339	-4.983	1.167	-6.907	-2.100
$Log(Capital/Labor)_{j}$	31,339	4.774	0.732	3.205	7.234
$Log(Skilled/Unskilled)_{j}$	31,339	-1.252	0.386	-2.320	-0.412
$Capital\ interaction_{j\ell t}$	22,667	52.10	9.189	23.18	87.55
$Skill\ interaction_{j\ell t}$	22,667	-3.618	1.234	-7.864	-0.693
$R\&D\ interaction_{j\ell}$	22,667	-4.155	4.904	-13.42	7.314
$Trust\ distance_{j\ell}$	22,360	26.26	19.67	0.010	82.85
$Institutional\ distance_{j\ell}$	22,360	0.008	0.006	0.000	0.030
$Protestant\ distance_{j\ell}$	22,360	0.234	0.140	0.000	0.748
$Catholic\ distance_{j\ell}$	22,360	0.333	0.142	0.000	0.589
Firm-specific cultural distance:					
$Cultural\ distance_{pd}$	347,265	2.087	6.334	0.000	79.58
OS_{pd}	347,265	59.49	40.09	0.000	100
Age_{p}	78,830	26.66	19.22	0.000	437
Age_{d}	78,830	19.17	14.85	0.000	202
$Capital_{p}$	78,830	6.815	2.731	0.000	18.07
$Capital_{d}$	78,830	5.788	2.336	0.000	16.64
$Employment_{p}$	78,830	3.460	1.957	0.000	11.95
$Employment_{d}$	78,830	2.902	1.544	0.000	11.65
$Sales_{p}$	78,830	9.153	2.353	0.000	19.83
$Sales_{d}$	78,830	8.718	1.734	2.302	17.95
TFP_{p}	43,988	-0.063	0.885	-5.352	7.407
TFP_{d}	43,988	-0.014	1.005	-4.997	6.242