Cultural Distance, Firm Boundaries, and Global Sourcing*

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Abstract
This paper investigates the effect of cultural differences on firm boundaries and intra-firm trade. To guide our empirical analysis, we develop a simple theory of the firm with culturally dissimilar managers. This model suggests that a cooperation partner is less likely to be integrated into firm boundaries the higher the cultural distance between the firm’s managers. Furthermore, it predicts that an industry’s share of intra-firm imports decreases in cultural distance between the source and the destination country. Combining data from the Bureau van Dijk and the U.S. Census Bureau’s Related Party Trade with various measures for cultural distance, we find empirical evidence strongly supportive of the model’s predictions. Our estimates suggests that an increase in cultural distance between firm managers by one standard deviation decreases a firm’s ownership share in its subsidiary by one to two percentage points, on average.

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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 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 U.S. multinational corporation Coca-Cola has more than 250 subsidiaries all over the world. Using firm-level data from the Bureau van Dijk, we identified some of these affiliates and calculated Coca-Cola’s average ownership shares in its subsidiaries by country. Coca-Cola owns more than 90 percent of equity stake in its subsidiaries from Great Britain, New Zealand, and Italy, whereas the ownership share in subsidiaries from Japan, Pakistan, and Albania is smaller than 50 percent, on average. Clearly, countries within the two groups widely differ in terms of their institutional environment and economic development. 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 well-known individualism vs. collectivism index) might have played a role in Coca-Cola’s ownership decisions, beyond institutional or economic differences across countries. The second case study deals with the Danish toy manufacturer Lego. This company 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 outsource it in the latter case include differences in institutions and transportation costs (see, e.g., Antràs 2015, Nunn and Trefler 2014). Yet, to the best of our knowledge, there is no well-established economic theory (nor evidence) that would relate this case study to the fact that Denmark is culturally closer to Czech Republic than to Singapore (as measured, once again, by Hofstede’s individualism scores).

This paper aims at shedding light, both theoretically and empirically, on the effects of cultural distance – defined as the extent to which shared values and norms differ across economic agents – on the organization of firms and their sourcing decisions. More specifically, this paper investigates the following two research questions: First, does cultural distance affect managerial incentives to integrate a business partner more deeply into firm boundaries? Sec-
ond, and related, do cultural differences affect a multinational firm’s choice whether to source intermediate inputs from an integrated supplier rather than import them at arm’s-length?¹

To guide our empirical investigation, we suggest a simple theoretical model of firm boundaries with culturally dissimilar managers. At the heart of our model lies the novel theory of the firm by Hart and Holmström (2010). According to this theory, the integration of a cooperation partner into firm boundaries entails a trade-off between better coordination and a higher monetary payoff but worse managerial non-monetary job satisfaction due to different beliefs about the right course of action. While non monetary job satisfaction is assumed to be exogenous in Hart and Holmström (2010), we endogenize private job satisfaction in the current model as a function of cultural differences. More specifically, as cultural distance increases, it becomes increasingly strenuous for a manager of an integrating firm to impose her agenda to an integrated firm’s manager. 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 engage in arm’s-length contracting instead. Hence, our model delivers the first key prediction: Cultural distance between firms’ managers ceteris paribus decreases a headquarter’s incentive to integrate a cooperation partner into firm boundaries.

In the second step, we embed this simple framework into an international context to study a multinational firm’s make-or-buy decisions. This extended model features vertical fragmentation of the production process (Antràs and Helpman (2004)), firm heterogeneity (Melitz (2003)), and cross-country differences with regard to national cultural values. Production of final goods requires cooperation of two units: domestic headquarters and foreign suppliers of (manufacturing) components. Headquarters decide whether to source intermediate inputs from integrated suppliers or import components at arm’s length. As in Antràs and Helpman (2004), only the most productive headquarters in a given industry are able to bear the fixed costs of vertical integration and insource their inputs, whereas the low-productivity firms outsource their input production to independent suppliers. Yet, our model delivers a novel prediction regarding the effect of cultural differences on firms’ global sourcing decisions: In a given industry, the share of intra-firm imports in total imports decreases in the cultural distance between the two countries. The intuition behind this prediction builds on the logic of our baseline model: A higher cultural distance amplifies the loss in non-monetary job satisfaction due to disputes with the affiliate’s manager and reduces the relative benefit of vertical integration in terms of a better coordination of decisions across firm units.

¹ Note that the answer to the first question does not necessarily elucidate the second research question. Using data on U.S. multiplant firms, Atalay et al. (2014) document that roughly one-half of integrated upstream establishments exhibit no shipments to downstream establishments within the same firm.
To the best of our knowledge, the effects of cultural distance on the organization of firms and their sourcing decisions have not yet been empirically analyzed on a systematic basis. This paper provides a pioneering investigation of these relationships using firm-pair, product/country-, and industry/country-level data. Throughout specifications, we approximate cultural differences across managers and countries using well-known indices developed by Hofstede (2001). Our baseline measure of cultural distance exploits the individualism vs. collectivism cleavage, capturing the extent to which individuals derive value from having an independent self as opposed to being strongly integrated and loyal to a cohesive group.2

To study the link between cultural distance and firm boundaries, we use the Orbis database from the Bureau van Dijk (BvD). This database provides firm-pair specific information on ownership shares of headquarter companies from more than 100 countries in their subsidiaries, located in more than 100 countries. Since we observe in which countries firms are located and which industries they are active in, we can effectively control for cross-country differences in the institutional environment or economic development, as well as industry characteristics (such as R&D intensity, relationship-specificity, contractibility, etc.) using parent and subsidiary country and industry fixed effects, respectively. Moreover, given that headquarters may have multiple subsidiaries in many countries and daughter companies can have multiple parents, we account for unobserved heterogeneity across cooperation partners using parent and subsidiary firm fixed effects. Controlling for a battery of fixed effects and a range of alternative country-pair specific explanations, we find that higher cultural distance between countries is associated with a lower ownership share in a foreign subsidiary. A quantitative interpretation of our preferred estimate suggests that firms choose roughly one percentage point lower ownership shares in subsidiaries’ countries that are culturally distant from the headquarter’s country by one standard deviation.

In the second step, we further scrutinize our first key prediction by exploring variation in cultural distance across firm (rather than country) pairs. To this end, we exploit unique information on the nationality of top managers employed by both companies provided in the Orbis database. Assigning to each managerial nationality the above-mentioned Hofstede scores, we construct a measure of firm-pair specific cultural distance. Since, in any given country, firms may be led by managers from different cultural backgrounds, this approach allows us to pinpoint the specific role of intercultural collaboration between managers, while controlling for cultural differences across countries using country-pair fixed effects. Accounting

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2 This cleavage is generally considered to be the main dimension of cultural variation (see Heine, 2008). Moreover, Gorodnichenko and Roland (2011) find that, among a wide range of alternative cultural scores, the individualism-collectivism dimension matters most for long-run growth. We verify that our empirical results are robust to using alternative measures of cultural distance based on other dimensions identified by Hofstede’s (2001).
for unobserved heterogeneity across business partners via parent and subsidiary firm fixed effects, we find that higher cultural distance between parents’ and subsidiaries’ managers is associated with lower ownership shares. To come even closer towards a casual inference of the effect of cultural distance, we exploit genetic distance as an instrument for cultural differences between managers (see Gorodnichenko and Roland (2011, 2017)). The instrumental variables approach corroborates the negative link between cultural distance and the integration intensity predicted by our theoretical model. In our preferred specification, an increase in firm-pair specific cultural distance by one standard deviation would decrease a firm’s ownership share in its subsidiary by roughly one percentage point.

Having explored the relationship between cultural differences and firm boundaries, we then turn to the empirical investigation of our second key prediction – the negative effect of cultural distance on an industry’s share of intra-firm imports in total imports. We bring this prediction to the data in a two-pronged approach. First, we use highly disaggregated product-level data on the share of U.S. intra-firm imports by origin country from the U.S. Census Bureau’s Related Party Trade dataset. Controlling for product fixed effects, a standard set of gravity variables, and a range of country-specific 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. That is, U.S. firms tend to insource products from culturally proximate suppliers and import them at arm’s-length from culturally distant countries.

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. This approach allows us to introduce country fixed effects, alongside with industry fixed effects. The former fixed effects effectively control for a number of possible omitted variables that may drive the international make-or-buy decision, including the quality of a foreign country’s institutions or its economic development. 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. These findings provide strong support for our second theoretical prediction: The share of intra-firm imports in total imports decreases in cultural distance between countries.

Related literature. Our formalization of Hart and Holmström’s (2010) theory of the firm draws on Conconi et al. (2012) and Legros and Newman (2013). However, both the focus and the approach of the current paper are different. While these authors relate the organization
of firms to exogenous price shocks (e.g., due to liberalization of product or factor markets), our objective is to highlight the effect of cultural distance on firm boundaries and intra-firm imports. From a theoretical perspective, our model of global sourcing is also related to Antràs and Helpman (2004), who explore industry-level determinants of 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 build our model based on the novel theory of the firm by Hart and Holmström (2010). Since the latter theory highlights the importance of non-monetary managerial satisfaction (rather than relationship-specific physical assets), it appears to be a more suitable foundation to understand the link between cultural distance and firm boundaries.

From an empirical perspective, our paper is related to the burgeoning literature that aims at understanding the role of culture in international transactions. Several contribution report a negative relationship between (various measures of) cultural distance and bilateral trade or foreign direct investment stocks, see Felbermayr and Toubal (2010), Guiso et al. (2009), Siegel et al. (2011, 2012). Yet, none of these empirical studies considers the link between cultural distance and firm boundaries. In a recent contribution, Kukharskyy (2016) finds that a headquarter’s ownership share in its foreign subsidiary is positively associated with the long-term orientation of the headquarter’s managers. Furthermore, the author reports that U.S. intra-firm imports are positively related to the level of managerial long-term orientation in U.S. industries and in foreign countries. In the current paper, we account for the level of managerial long-term orientation via firm, industry, and country fixed effects effects and focus on the role of cultural distance between the parties (among other things, with respect to the long-term orientation).

In studying the relationship between cultural distance and intra-firm imports, this paper further relates to the empirical literature aiming to understand the determinants of intra-firm trade (see Antràs (2015) and Nunn and Trefler (2008, 2013, 2014)). This literature has identified a range of important industry-specific explanatory factors, such as R&D-, capital-, and skill-intensity, relationship-specificity, productivity dispersion, downstreamness vs. upstreamness. In our empirical analysis, we account for these explanations via industry (or product) fixed effects and highlight cultural differences as a novel driving force behind intra-firm imports.

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 brings these predictions to the data. Section 4 concludes.
2 Theoretical Framework

This section presents a simple framework of firm boundaries with culturally dissimilar managers. In section 2.1, we set-up a baseline model, which introduces the notion of cultural differences into a theory of the firm along the lines of Hart and Holmström (2010). In section 2.2, we embed this model into an international context to analyze the role of cultural distance on a multinational firm’s make-or-buy decisions.

2.1 Baseline Model

2.1.1 Set-up

Consider a simple game between two firms, which may stand either in a horizontal or in a vertical relationship. Given that the subsequent section focuses on the latter type of relationships, we refer to the two firms as a final good producer (headquarter) and a manufacturing supplier. Each firm is operated by a single owner-manager. Let $H$ denote a headquarter manager and $M$ represent a manager of the manufacturing supplier. Following Hart and Holmström (2010), we assume that managers derive their utility not only from the monetary payoff $\pi$, but also from a non-monetary job satisfaction, $j$. Both components enter a manager’s utility $u$ in a linearly additive way:

$$u_a = \pi_a + (j_a^{\text{int}} + j_a^{\text{ext}}), \quad a = H, M.$$  

We subdivide managerial job satisfaction into two components: intrinsic ($\text{int}$), and extrinsic ($\text{ext}$). 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.).

To produce final goods and generate a monetary payoff, managers have to coordinate their decisions (e.g., regarding a common technological standard or platform). It is assumed that decisions cannot be contractually stipulated, however, authority over these decisions can be allocated via ownership (see below). Coordination of decisions across firms involves the following trade-off: On the one hand, better coordination improves the quality of final goods and raises the monetary payoff. On the other hand, to the degree that managers can no longer pursue an independent agenda, their intrinsic job satisfaction decreases. To formalize this trade-off, we draw 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.

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3 In section 2.2, we show that the linear relationship between the monetary payoff and the (indirect) utility can be formally derived from a standard consumer preference structure.

4 This conceptualization is widely used in organization science, see e.g., Naumann (1993), Staw (1989).
made in the headquarters’ unit and by $\beta \in [0, 1]$ decisions implemented in the manufacturing firm. Managers of the two firms are assumed to have differing visions about the appropriate course of action. More specifically, $H$ prefers $\alpha$ to be as high as possible, while $M$ prefers the smallest possible $\beta$. 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 $q$ and functional forms for intrinsic job satisfaction are defined as:

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

whereby the quality of a final good is highest ($q_{\text{max}} = 1$) for any combination of $\alpha = \beta$ (i.e. perfect coordination across units) and is decreasing as $\alpha$ and $\beta$ diverge. Conversely, each manager’s intrinsic job satisfaction is highest (equal to zero) if the manager implements her most preferred decision ($\alpha = 1$ for $H$ and $\beta = 0$ for $M$) and it decreases the more a manager departs from her vision.

The overall monetary payoff is given by:

$$\pi = q\Pi, \quad (3)$$

whereby $\Pi > 0$ represents the (exogenously given) maximum profit that can be obtained on the market from good sales and $q$ denotes the quality of final goods, specified in equation (2). In section 2.2, we endogenize $\Pi$ and formally derive the multiplicative relationship between $q$ and $\Pi$ from a standard consumer preference structure. Intuitively, for any given market value of final goods, a lower quality of these goods decreases a firm’s profits.

Headquarter manager $H$ decides whether to cooperate with the manufacturing supplier at arm’s-length ($A$) or integrate the latter into firm boundaries ($I$). Under arm’s-length transaction, $H$ chooses $\alpha$ for the headquarter unit and $M$ chooses $\beta$ for the manufacturing unit. Under integration, $H$ obtains residual control rights to make decisions $\alpha$ and $\beta$ in both units and $M$ becomes $H$’s subordinate. More specifically, $H$ instructs the manager of an integrated manufacturing unit to choose a particular $\beta$ in this unit and $M$ must follow these instructions. Our modeling of integration differs from Conconi et al. (2012) and Legros and Newman (2013) in three major respects. First, we do not assert that integration automatically

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5 In the original contribution by Hart and Holmström (2010), coordination decisions are modeled as a binary choice between ‘Yes’ (coordinate) and ‘No’ (not coordinate).
6 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 ($\beta = 0$).
7 We endogenize $\Pi$ in section 2.2.2.
implies $\alpha = \beta = 1/2$. Instead, in our model the headquarter manager endogenously chooses $\alpha$ and $\beta$ by maximizing her utility from equation (1). Second, we assume that the manager of an integrated firm $M$ may affect $H$’s utility. More precisely, 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. 8 Third, we assume that $H$’s extrinsic job satisfaction is a function of cultural differences between the two managers. 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 formalize these considerations by normalizing the upper bound of a headquarter manager’s extrinsic job satisfaction to zero and capturing $H$’s extrinsic private cost under integration as follows:

$$j^{ext}_H = -c\beta^2,$$

whereby the parameter $c \in [0,1]$ represents the cultural distance between the headquarter manager and the supply unit manager. 9 It should be noted that letting $c$ affect solely $H$’s extrinsic job satisfaction is without loss of generality and our results are unchanged if we introduce cultural frictions either in $M$’s or in both parties’ utility functions (see below). Throughout the analysis, we normalize both parties’ extrinsic job satisfaction under $A$ to zero. Intuitively, since an arm’s-length transaction amounts to a purchase of manufacturing inputs on the market place, managers have a limited ability to influence each others’ job satisfaction.

The timing of events is as follows:

$t_1$ After a final good producer and a manufacturing supplier match, $H$ decides whether to cooperate with the supplier at arm’s-length or integrate the latter into firm boundaries. Under arm’s-length transaction, $H$ contractually commits to compensate $M$ with a fraction $(1 - s) \in (0,1)$ of the monetary surplus. Under integration, $H$ compensates $M$ with an endogenous managerial wage $\omega$ and incurs a fixed acquisition cost $f$.

$t_2$ Under arm’s-length transaction, $H$ chooses $\alpha$, while $M$ chooses $\beta$ independently. Under integration, $H$ chooses both $\alpha$ and $\beta$.

$t_3$ Final goods are sold and the surplus is distributed among the parties according to the sharing rule specified at $t_1$.

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8 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 be justified by referring to $M$’s intangible capital or specific know-how for governing the manufacturing unit.

9 In words of the previously mentioned case study of Daimler-Chrysler merger, cultural differences aggravate the discrepancies in managerial visions (‘quality at any cost’ vs. ‘low-cost components’, see footnote 6). As former Chrysler president Robert Lutz put it before the merger: “I do think that managing the cultural issues will indeed be the toughest part of making this [merger] work”, see Lutz (1998: 98).
The following section solves this game through backward induction. We set both managers’ ex-ante outside options to zero, such that the organizational form is chosen in period $t_1$ so as to maximize the total social surplus (welfare), $W = u_H + u_M$.

### 2.1.2 Equilibrium

Consider first the arm’s-length transaction ($A$). At $t_3$, the monetary payoff from equation (3) is divided between parties according to the sharing rule specified at $t_1$, i.e., $H$ receives $\pi_H = s\pi$, whereas $M$ obtains $\pi_M = (1 - s)\pi$. At $t_2$, managers anticipate their payoffs and make coordination decisions that maximize their utility from equation (1), bearing in mind the quality function and the intrinsic job satisfaction from equation (2). The Nash equilibrium will be one where $H$ chooses $\alpha$ to maximize $u^A_H$ given $M$’s choice of $\beta$:

$$\max_{\alpha} u^A_H = s(1 - (\alpha - \beta)^2)\Pi - (1 - \alpha)^2,$$

while $M$ chooses $\beta$ to maximize $u^A_M$ given $H$’s choice of $\alpha$:

$$\max_{\beta} u^A_M = (1 - s)(1 - (\alpha - \beta)^2)\Pi - \beta^2.$$

After developing the first-order conditions, we obtain the following equilibrium coordination decisions under arm’s-length transaction:

$$\alpha^A = \frac{1 + (1 - s)\Pi}{1 + \Pi}, \quad \beta^A = \frac{(1 - s)\Pi}{1 + \Pi}.$$

It can immediately be seen that $\alpha^A > \beta^A$ for any $s \in (0, 1)$, 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. Given that $\alpha^A \neq \beta^A$, the quality of final goods under arm’s-length transaction

$$q^A = 1 - \frac{1}{(1 + \Pi)^2}$$

is below its maximum level for any $\Pi > 0$, i.e., $q^A < 1$. Plugging equilibrium $\{\alpha^A, \beta^A\}$ from equation (7) in equations (5) and (6), we obtain $u^A_H = \frac{s\Pi^2(\Pi + 2 - s)}{(1 + \Pi)^2}$ and $u^A_M = \frac{(1 - s)\Pi^2(\Pi + 1 + s)}{(1 + \Pi)^2}$, whereby the total surplus from the relationship under arm’s-length transaction reads:

$$W^A = \frac{\Pi^2(\Pi + 1 + 2s(1 - s))}{(1 + \Pi)^2}.$$
Consider next the case of integration (I). Under integration, $H$ reaps the entire monetary surplus from the relationship (see equation (3)) but incurs the extrinsic private cost from instructing $M$ to implement a certain $\beta$, as specified by equation (4) as well as the acquisition cost $f$. At $t_2$, $H$ maximizes her utility subject to $M$’s participation constraint:

$$\max_{\alpha, \beta} u_H^I = (1 - (\alpha - \beta)^2) \Pi - (1 - \alpha)^2 - c\beta^2 - f - \omega \quad \text{s.t.} \quad u_M^I = \omega - \beta^2 \geq 0.$$  \hspace{1cm} (10)

In equilibrium, $M$’s participation constraint is binding, implying the endogenous managerial wage $\omega = \beta^2$ compensating $M$ for the loss in intrinsic job satisfaction $\beta^2$ (see equation(2)). Utilizing this wage in $H$’s maximization problem from equation (10) and manipulating the two first-order conditions, we obtain equilibrium coordination decisions under integration:

$$\alpha^I = \frac{\Pi + c + 1}{(2 + c)\Pi + c + 1}, \quad \beta^I = \frac{\Pi}{(2 + c)\Pi + c + 1}.$$  \hspace{1cm} (11)

Notice, once again, that $\alpha^I > \beta^I$ for any $c \in [0, 1]$. Although $H$ now possesses decision rights in both units, strategic decisions under integration are not perfectly coordinated. Intuitively, $H$ internalizes both the loss in job satisfaction from instructing $M$ and the need to provide the latter with a higher compensation ($\omega$) in case of a higher $\beta$, and does not insist on his most preferred outcome, $\beta^I = \alpha^I = 1$. As a result of choices of $\alpha^I$ and $\beta^I$, the quality of final goods under integration is:

$$q^I = 1 - \frac{(c + 1)^2}{((2 + c)\Pi + c + 1)^2}.$$  \hspace{1cm} (12)

also below the maximum level, $q^I < 1$. Nevertheless, it can be shown that final goods quality is higher under integration than under arm’s-length transaction. Furthermore, we verify that the quality of final goods decreases in cultural distance. These results are summarized in

**Lemma 1.** For any $c \in [0, 1]$ and $\Pi > 0$, we have (i) $q^I > q^A$, and (ii) $\frac{\partial q^I}{\partial c} \leq 0$.

**Proof.** Follows from $q^I - q^A = \frac{\Pi(2(1+c)+3+2c)\Pi}{(1+\Pi)^2((2+c)\Pi+c+1)^2} > 0$ and $\frac{\partial q^I}{\partial c} = -\frac{2\Pi(c+1)}{((2+c)\Pi+c+1)^3} \leq 0$.

The intuition behind the first part of this Lemma builds on the fact that integration provides $H$ with an authority to make decisions in both units. Hence, the manager of an integrated firm can achieve better coordination of decisions compared to an arm’s-length relationship and, thereby, improve on the quality of final goods.\textsuperscript{10} Yet, the ability of $H$ to coordinate decisions across firm units is diminished by the cultural distance between firms’ managers and, therefore, final goods quality under integration decreases in $c$.

Plugging in the expressions in (11) in (10), we obtain the total surplus from the relationship\textsuperscript{10} This result is consistent with the evidence provided by the Deloitte (2012) Global Outsourcing and Insourcing Survey. According to this survey, unsatisfactory quality is the major factor in the decision to terminate an existing arm’s-length relationship. Moreover, almost all of the surveyed firms that switched from arm’s-length contracting to integration were satisfied with the result in terms of improved quality.
under integration:

\[ W^I = \frac{(2 + c)\Pi^2}{(2 + c)\Pi + c + 1} - f. \] (13)

Note that \( c \) increases both the numerator and the denominator of \( W^I \) and, hence, the overall impact of cultural distance on the welfare under integration depends on the interplay of several opposing effects. As can be seen from equation (10), a higher \( c \) ceteris paribus decreases \( H \)'s job satisfaction and, thereby, reduces \( W^I \). Furthermore, cultural distance decreases the quality of final goods, \( q^I \) (see Lemma 1) and, thereby, the overall monetary payoff \( \pi \) (see equation (3)). At the same time, \( H \) internalizes an increase in \( c \) by choosing a lower \( \beta^I \) in the manufacturing unit, see equation (11). In so doing, \( H \) not only mitigates the negative effect of cultural distance on her job satisfaction but also reduces the wage \( \omega \) paid to \( M \) in order to satisfy the latter’s participation constraint. However, it can be shown that the overall effect of \( c \) on \( W^I \) is negative, as summarized in the following

**Lemma 2.** \( \frac{\partial W^I}{\partial c} < 0 \) for any \( c \in [0, 1] \) and \( \Pi > 0 \).

*Proof.* Follows from the fact that \( \frac{\partial W^I}{\partial c} = -\frac{\Pi^2}{((2+c)\Pi + c + 1)^2} < 0. \)

At \( t_1 \), \( H \) chooses the organizational form which maximizes the total surplus from the cooperation. A simple inspection of equations (9) and (13) reveals that the relationship \( W^A \geq W^I \) cannot be assigned without ambiguity for all parameter values. However, since \( W^I \) decreases in \( c \) according to Lemma 2, we have the following

**Proposition 1.** The relative attractiveness of integration decreases in the cultural distance between the managers of the integrating and the integrated company.

*Proof.* Follows immediately from Lemma 2.

To understand the intuition behind this proposition, recall the key trade-off between integration and arm’s-length transaction in the current model. By integrating a supplier into firm boundaries, the headquarter achieves better coordination of decisions across units, a higher quality of final goods, and a higher monetary profit. Yet, to the extent that managers have to deviate from their most preferred agenda, better coordination of decisions leads to a decrease in non-monetary job satisfaction. Since the adverse affect of the coordination of decisions on managerial non-monetary job satisfaction is most pronounced in culturally dissimilar environments, the relative attractiveness of integration decreases in cultural distance.

Before embedding this framework into an international economics context, it is worth pausing to discuss the generality of Proposition 1. To ensure that our results do not hinge on the particular way cultural distance is introduced into the model, we consider a range of alternative modeling approaches and extensions. First, one could argue that it is \( M \) (rather than \( H \)) who bears the extrinsic costs of cross-cultural coordination of decisions under integration.
Intuitively, $M$ not only intrinsically dislikes to depart from $\beta = 0$, but also experiences a dissatisfaction if she is instructed to do so, whereby the latter effect is amplified by the cultural distance to the instructor. Formally, this amounts to setting $j_{\text{ext}}^{\text{M}} = -c\beta^2$ and $j_{\text{ext}}^{\text{M}} = 0$. Note, however, from equation (10) that $H$ fully internalizes $M$’s non-monetary job satisfaction and this alternative set-up would lead to identical results as those presented above. Second, one could envision a scenario in which both $H$ and $M$ experience a culture-related loss of extrinsic job satisfaction, i.e., $j_{\text{ext}}^{\text{H}} = -c\beta^2$ and $j_{\text{ext}}^{\text{M}} = -c\beta^2$. Following the approach delineated above, it is easy to show that Lemmas 1 and 2 and Proposition 1 continue to hold in this case. Third, notice that cultural distance enters our benchmark model merely as a cost parameter. Clearly, one can imagine various channels through which cultural differences may also positively affect managerial utility or a firm’s performance. To keep our model simple, we abstained from modeling these positive effects of cultural distance and interpret $c$ as the net costs of cultural frictions in the course of coordination of decisions across firms. Lastly, while our baseline model captures the internalization decision as a binary choice between integration and arm’s-length contracting, it can be easily generalized to encompass continuous organizational choices. More specifically, one can define the overall welfare as a convex combination of welfare under integration and arm’s-length contracting, $W = oW^I + (1 - o)W^A$, whereby $o \in [0, 1]$ denotes a headquarter’s ownership share in the subsidiary. Hence, when $W^I$ decreases due to an increase in $c$, a headquarter has an incentive to reduce $o$ in order to reap a higher $W$. In line with Proposition 1, this simple extension predicts that the optimal ownership share in a given subsidiary decreases in the cultural distance between the headquarter’s and the subsidiary’s managers.

### 2.2 Global Sourcing

#### 2.2.1 Set-up

Consider now a model with two countries: North ($N$), and South ($S$). Each country is populated by a unit measure of consumers. Each consumer is endowed with a unit of inelastically supplied labor. A subset of individuals also possess managerial abilities which allow them to become managers. As in the previous section, there are two types of firms: headquarters (final goods producers) and manufacturing suppliers, operated by managers $H$ and $M$, respectively. Headquarters are located in $N$, while manufacturing suppliers are located in $S$.

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11 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.

12 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
Preferences of a representative consumer are given by the following two-tier utility function:

\[ U = z + \mu \ln X, \quad X = \left[ \int_{v \in V} q(v)^{\frac{1}{\sigma}} x(v)^{\frac{\sigma-1}{\sigma}} dv \right]^{\frac{\sigma}{\sigma-1}}, \quad (14) \]

where \( z \) denotes consumption of a homogenous numeraire-good, \( X \) is an index of aggregate consumption of differentiated varieties \( v \in V \), and \( \mu \) is a parameter governing the intensity of preferences for differentiated goods. The index \( X \) is a constant elasticity of substitution (CES) aggregate of the quantity \( x(v) \) and quality \( q(v) \) of differentiated varieties, whereby \( \sigma > 1 \) represents the elasticity of substitution between any two varieties.

A representative consumer’s budget constraint reads \( PX + z = Y \), where \( Y \) denotes income, \( P = \left( \int_{v \in V} p(v)^{1-\sigma} q(v) dv \right)^{\frac{1}{1-\sigma}} \) 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:\(^{13}\)

\[ z = Y - \mu, \quad X = \mu P^{-1}, \quad p(v) = q(v)^{\frac{1}{\sigma}} x(v)^{-\frac{1}{\sigma}} \mu^{\frac{1}{\sigma}} P^{\frac{\sigma-1}{\sigma}}. \quad (15) \]

Plugging these results back in equation (14), we obtain an individual’s indirect utility:

\[ V = Y - \mu(1 + \ln P - \ln \mu). \quad (16) \]

Note that, under the preference structure assumed in equation (14), an individual’s indirect utility is linear in income. This result provides a theoretical underpinning for the utility function from equation (1), assumed to be linear in the monetary payoff. As in section 2.1, we assume that managers derive their utility not only from the monetary payoff but also from non-monetary job satisfaction, defined as in equations (2) and (4). Since the expression \( \mu(1 + \ln P - \ln \mu) \) in equation (16) is constant for all managers and does not affect the organizational decision, we disregard it in our subsequent analysis.

The production side of the model draws on Antràs and Helpman (2004). The numéraire good \( z \) 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 North and \( a^S > a^N \) labor units in the South (i.e., workers in \( N \) are assumed to be more productive than in \( S \)). 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

---

\(^{13}\) We assume sufficiently small preferences for differentiated goods (i.e., \( \mu < Y \)) to ensure positive consumption of the homogenous good in equilibrium.
the foreign destination: $w^S < w^N$. For simplicity, we normalize the wage rate in $N$ to unity, $w^N = 1$ and define $w \equiv w^S$.

Production of the differentiated goods is conducted under monopolistic competition. Headquarters firms 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:

$$x(v) = \theta \left( \frac{h(v)}{\eta} \right)^{\eta} \left( \frac{m(v)}{1-\eta} \right)^{(1-\eta)} (1-\eta), \quad (17)$$

where $\eta \in (0,1)$ captures the relative importance of headquarter services in the production process (henceforth, headquarter intensity) and $\theta \in [\theta, \infty)$ denotes firm-specific productivity, drawn from an ex-ante known distribution function $g(\theta)$ upon paying the fixed costs of entry.

To simplify on notation, we drop the variety-index $v$ from here onward and identify firms by their productivity, $\theta$. 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 (17). Transportation of manufacturing inputs from $S$ to $N$ involves standard iceberg-type trade costs $\tau > 1$. The timing of the game is as in section 2.1, whereby the provision of inputs and the import of $m$ occur between periods $t_2$ and $t_3$.

Before presenting the equilibrium of the game, it is worth pausing to discuss the key difference between our model and Antràs and Helpman (2004). Unlike these authors, we assume that parties can write enforceable contracts on the quantity of inputs $h$ and $m$. This assumption eliminates the well-known channel of inefficiencies stemming from the ex-post hold-up and the associated ex-ante underinvestment (see Grossman and Hart (1986) and Hart and Moore (1990)). Instead, we assume that the quality of differentiated goods cannot be verified by the courts. Building on the novel theory of the firm by Hart and Holmström (2010), we assume that this quality crucially depends on the coordination of strategic decisions across firm units (see equation (2)).

### 2.2.2 Equilibrium

The revenue from the sale of the final goods is $R = px$, which, using equations (15) and (17), can be written as

$$R = \left( \theta \left( \frac{h}{\eta} \right)^{\eta} \left( \frac{m}{1-\eta} \right)^{(1-\eta)} (1-\eta) \right) \frac{\eta^\frac{\eta-1}{\sigma}}{\sigma} (\mu q)^{\frac{1}{\sigma}} P^{\frac{\eta-1}{\sigma}} \mu q \frac{\eta^\frac{\eta-1}{\sigma}}{\sigma} P^{\frac{\eta-1}{\sigma}}, \quad (18)$$
whereby $q$ is given by equation (2). The associated joint operating profit reads:

$$\pi = R - h - \tauwm. \quad (19)$$

Since input quantities are verifiable by the courts, parties choose the amounts of $h$ and $m$ that maximize the joint operating profit. Using equation (18), this maximization problem yields equilibrium input quantities $h = \eta \sigma^{-1} R$ and $m = (1 - \eta) \sigma^{-1} \frac{R}{\tauw}$. Plugging these quantities back in equation (18) and utilizing the resulting expression in equation (19) yields joint operating profit for any tuple $\{\alpha, \beta\}$:

$$\pi = q B \theta^{\sigma - 1}, \quad (20)$$

where $B \equiv (\tauw)^{-(1-\eta)(\sigma-1)} \frac{\sigma-1}{\sigma} \sigma^{-1} P^{\sigma - 1}$ summarizes all terms that are constant across firms. Note that we have $\Pi \equiv B \theta^{\sigma - 1}$, (see equation (3)). Since the coordination of decisions in period $t_2$ is assumed to be the same as in the baseline model, we can use the results derived in section 2.1.2 and replace $\Pi$ with $B \theta^{\sigma - 1}$. More specifically, using equations (9) and (13), the total surplus under arm’s-length transaction and integration in a foreign country reads, respectively:

$$W^A = \frac{(B \theta^{\sigma - 1})^2 (B \theta^{\sigma - 1} + 1 + 2s(1 - s))}{(1 + B \theta^{\sigma - 1})^2}, \quad W^I = \frac{(2 + c)(B \theta^{\sigma - 1})^2}{(2 + c)B \theta^{\sigma - 1} + c + 1 - f}. \quad (21)$$

It can be shown analytically that both $W^A$ and $W^I$ increase in firm productivity $\theta$. Yet, the positive effect of $\theta$ on $W^I$ is weaker the higher cultural distance between domestic and foreign managers. These effects are summarized in the following lemma:

**Lemma 3.** For all permissible parameter values, we have (i) $\frac{\partial W^A}{\partial \theta} > 0$, $\frac{\partial W^I}{\partial \theta} > 0$; (ii) $\frac{\partial^2 W^I}{\partial \theta \partial c} < 0$.

**Proof.** See Appendix A.1.

Part (i) of Lemma 3 follows immediately from the fact that productivity increases monetary profits and, thereby, raises the total surplus under any organizational form. To understand the intuition behind the second part of this Lemma, notice from equation (20) that firm profits are supermodular in productivity and final goods quality. That is, an improvement in a firm’s productivity leads to a larger increase in profits the higher final goods quality. Since the quality of final goods decreases in $c$ (see Lemma 1), the effect of productivity on firm profits (and, thereby, on total surplus) is lower the higher cultural distance between the two countries. Note that the relationship $\frac{\partial W^I}{\partial \theta} \geq \frac{\partial W^A}{\partial \theta}$ cannot be assigned without ambiguity for all parameter values. However, it can be shown that $\frac{\partial W^I}{\partial \theta} > \frac{\partial W^A}{\partial \theta}$ if $c$ is sufficiently small (see Appendix A.1 for a formal condition). In order to ensure the coexistence of integration and arm’s-length transactions in equilibrium, we assume henceforth that this condition is fulfilled.
Figure 1, illustrates the sorting of firms into arm’s-length transactions and integration based on their productivities. The least productive firms (with $\theta < \hat{\theta}$) outsource their production to independent suppliers, whereas the most productive ones (with $\theta \geq \hat{\theta}$) integrate 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. Recall from Lemma 3 that an increase in $\theta$ leads to a disproportionately smaller increase in $W^I$ the higher $c$. As illustrated in Figure 1, an increase in $c$ implies a ceteris paribus lower managerial welfare under integration and a higher equilibrium productivity cutoff $\hat{\theta}'$, above which firms prefer integration over arm’s-length transactions. Since the relative prevalence of firms that source their inputs within firm boundaries rather than from independent suppliers decreases in $c$, we have

**Proposition 2.** An industry’s share of intra-firm imports in total imports is smaller the higher cultural distance between a home and a foreign country.

*Proof.* Follows immediately from Lemma 3.

![Figure 1. Productivity-based sorting into arm’s-length transactions and integration.](image)

### 3 The Empirical Analysis

Our theoretical framework delivers two key testable predictions: Cultural distance ceteris paribus 1) reduces the relative attractiveness of integration and 2) decreases an industry’s share of goods imported from integrated (rather than independent) suppliers. We bring these predictions to the data by first investigating the effect of cultural distance on firm boundaries (section 3.1), and subsequently studying the relationship between cultural distance and global sourcing (section 3.2). In each section, we first consider a ‘coarse’ measure of cultural differ-
ence based on the cross-country variation in culture distance. In the second step, we exploit variation in culture across firm pairs and industries to construct more refined measures of cultural distance. To rule out alternative explanations, we use a battery of fixed effects, an extensive list of controls, as well as instrumental variables. Across datasets, controls and estimation approaches, we consistently find that a larger cultural distance is associated with lower firm ownership shares in their subsidiaries and lower industry shares of intra-firm imports.

3.1 Cultural Distance and Firm Boundaries

3.1.1 Cross-country Variation of Cultural Distance

Data and Econometric Specification. All firm-level data used in the current section are drawn from the Orbis database by Bureau van Dijk (BvD). This dataset has four unique features which are particularly useful for our analysis of cultural determinants of firm boundaries.\textsuperscript{14} First, it contains information on the ownership structure of firms – our key outcome variable of interest. More specifically, it provides firm-pair specific information on direct ownership shares (in percent) of parent companies in their subsidiaries in 2014. Second, the fact that some parents in the dataset own shares of multiple subsidiaries located in different industries and countries, allows us to effectively control for unobservable heterogeneity across countries, industries and firms using a battery of fixed effects. Third, the dataset is characterized by a large international coverage, which allows us to explore cross-country variation of cultural distance. In our baseline sample, parent companies from more than 100 countries own shares in subsidiaries from more than 100 countries. Lastly, Orbis data provide information on the nationality of firm managers which allows us to calculate firm-pair specific measures of cultural distance between parent firms and their subsidiaries (see section 3.1.2).

To investigate the relationship between the variation in country-level cultural distance and firm boundaries, we estimate the following econometric model:

\[
O_{ps} = \alpha \text{Cultural distance}_{lt} + \phi_l + \phi_\ell + \phi_v + \phi_v + \phi_p + \phi_s + \beta X_{lt} + \epsilon_{ps},
\]

whereby \(O_{ps}\) denotes the ownership share of parent company \((p)\) in its subsidiary \((s)\); \(\text{Cultural distance}_{lt}\) is a measure of cultural difference between a parent’s country \(l\) and a subsidiary’s country \(\ell\); \(\{\phi_l, \phi_\ell, \phi_v, \phi_v, \phi_p, \phi_s\}\) is a set of fixed effects introduced further below, the vector \(X_{lt}\) (with the associated coefficient vector \(\beta\)) contains sets of country-pair specific controls; \(\epsilon_{ps}\) is the error term on which we impose a standard set of assumptions. Given that the measure of cultural distance in this specification varies only across countries, we exclude all

\textsuperscript{14} See also https://orbis.bvdinfo.com and Kalemli-Ozcan et al. (2015) for more details on this database.
domestic ownership links (for which Cultural distance\(_{l\ell}\) is zero by definition). We thereby restrict our sample to multinational firms owning shares in their foreign subsidiaries (i.e., \(l \neq \ell\)). Based on our theoretical model, we expect a negative effect of cultural distance on ownership shares, reflected in \(\alpha < 0\). In words of our motivational example from the introduction, our model predicts that U.S. multinational corporations should ceteris paribus own relatively higher ownership shares in culturally similar countries (such as Great Britain, New Zealand, or Italy) and relatively lower shares in culturally distant countries (such as Japan, Pakistan, or Albania).

To measure cultural differences across countries, we use 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: (i) individualism vs. collectivism (the extent to which it is believed that individuals are supposed to take care of themselves as opposed to being strongly integrated and loyal to a cohesive group); (ii) uncertainty avoidance (sensitivity to ambiguity and uncertainty); (iii) power distance (strength of social hierarchy); (iv) and masculinity-femininity (task orientation versus person-orientation). The list of cultural dimensions has been subsequently extended with a fifth measure of long-term orientation, capturing the extent to which individuals are willing to delay immediate gratification in favor of long-term benefits (see Hofstede et al. (2010)). 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.

Appendix Figure A.1 presents the map of individualism scores. Original scores vary on the scale between 0 and 100, where a higher (lower) score means a higher level of individualism (collectivism). For expositional purposes, we rescale them to a unit interval. The cultural distance between countries \(l\) and \(\ell\) is calculated as Cultural distance\(_{l\ell}\) = \(|i_l - i_\ell|\), where \(i\) is a country’s individualism score.

We account for heterogeneity across countries with respect to time-invariant characteristics (such as geography or history) or factors that are relatively stable over time (such as economic development or institutions) via parent- and subsidiary-country fixed effects (FE), \(\phi_l\) and \(\phi_\ell\). We further observe a firm’s main industry affiliation (four-digit NAICS code), which allows us to include parent- and subsidiary-industry fixed effects, \(\phi_\upsilon\) and \(\phi_\nu\). In so doing, we effectively control for industry-specific factors that have been previously identified as important drivers of firm boundaries (such as R&D-, capital-, and skill-intensity, relationship-specificity, contractibility, etc.) (see Antràs (2015) and Nunn and Trefler (2014)). Most importantly, since parent companies can have multiple subsidiaries, while daughter companies can have multiple parents, we can include parent- and subsidiary-firm fixed effects, \(\phi_p\) and \(\phi_s\), to account for

\[\text{(15)}\] We provide the robustness checks using other Hofstede’s dimensions in section 3.1.2.
time-invariant firm characteristics (such as age and ownership history) as well as firm-level factors that are relatively stable over time (such as size, capital-intensity, or productivity).

To ensure that the effect of cultural distance on firm boundaries is not confounded by other country-pair specific factors, we include a vector of controls, $X_{l\ell}$. More specifically, we draw from the CEPII database by Mayer and Zignago (2011) the following standard set of bilateral (gravity) control variables: Geographic distance$_{l\ell}$ is calculated as (the log of) the sum of the distances between the biggest cities of both countries, weighted by the share of population living in each city; the dummy variable Common border$_{l\ell}$ is set to 1 for pairs of countries that share a border; Common language$_{l\ell}$, Common legal origin$_{l\ell}$, and Colonial links$_{l\ell}$ are binary variables equal to 1 if both countries have the same official language, share the same legal origin, or have had a colonial relationship, respectively. One may be worried that the dummy variable Common language$_{l\ell}$ does not sufficiently account for linguistic distance between countries, see, e.g., Melitz and Toubal (2014). Moreover, one might argue that cultural distance merely reflects religious differences between countries. To account for these potential confounding factors, we draw from Spolaore and Wacziarg (2015) two additional distance measures: Linguistic distance$_{l\ell}$, which measures the expected linguistic distance between two randomly chosen individuals, one from country $l$ and one from country $\ell$, and Religious distance$_{l\ell}$, capturing the probability that two randomly selected individuals (one from each country) adhere to different world religions.

**Results.** Table 1 develops our preferred specification of equation (22) step by step. Column (1) reports the unconditional (raw) correlation between country-pair cultural distance and ownership shares. The negative and highly significant coefficient suggests that multinational firms tend to integrate their subsidiaries less tightly in culturally distant countries. Clearly, this simple correlation can be confounded by a host of country-, industry-, and firm-specific factors. We control for these factors in columns (2) through (5) of Table 1. As we include fixed effects for countries and industries of parents and subsidiaries in column (2), the estimate of Cultural distance$_{l\ell}$ decreases by half but remains significant at the 5% level.\(^{16}\) The link between cultural distance and ownership shares remains robust to the inclusion of standard gravity controls and the additional linguistic distance measure (available only for a smaller set of countries), see columns (3) and (4). In column (5), we further include parent and subsidiary firm fixed effects, which account for a large share of variation in the data.\(^{17}\) Despite a notable

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\(^{16}\) The decline in number of observations is mainly due to missing information on industry affiliation of parents and/or subsidiaries. Observations are also dropped if they are fully explained by the fixed effects.

\(^{17}\) Since all firms in our database have unique country and industry affiliation, parent and subsidiary country and industry fixed effects are nested within firm fixed effects.
reduction in the number of observations,\textsuperscript{18} the estimate remains remarkably robust in size and significance. A quantitative interpretation of the estimate of Cultural distance\(_{\ell}\ell \) in our preferred specification from column (5) suggests that firms choose roughly one percentage point lower ownership shares in subsidiaries’ countries that are culturally distant from the headquarter’s country by one standard deviation.

\begin{table}[h]
\centering
\begin{tabular}{lccccc}
\hline
 & \text{Dependent variable: } \text{\(O_{ps}\)} & (1) & (2) & (3) & (4) & (5) \\
\hline
\(\text{Cultural distance}_\ell\ell\) & -0.128*** & -0.057** & -0.067*** & -0.063** & -0.066** & \\
 & (0.044) & (0.023) & (0.020) & (0.026) & (0.033) & \\
 Geographical distance\(_{\ell}\ell\) & 0.010 & 0.643 & -2.135** & \\
 & (0.993) & (0.934) & (0.982) & \\
 Common border\(_{\ell}\ell\) & 0.530 & 1.520* & -1.913 & \\
 & (0.944) & (0.896) & (1.566) & \\
 Common language\(_{\ell}\ell\) & -2.897* & -3.089* & 2.424 & \\
 & (1.461) & (1.634) & (2.276) & \\
 Common legal origin\(_{\ell}\ell\) & 0.548 & 1.601 & 1.512 & \\
 & (1.144) & (1.325) & (3.056) & \\
 Colonial links\(_{\ell}\ell\) & -2.936 & -1.138 & 7.320 & \\
 & (1.839) & (1.810) & (4.693) & \\
 Linguistic distance\(_{\ell}\ell\) & 0.188 & 6.342 & \\
 & (5.132) & (9.623) & \\
 Religious distance\(_{\ell}\ell\) & 3.863 & 10.602* & \\
 & (2.521) & (5.535) & \\
\hline
Parent country FE & no & yes & yes & yes & nested & \\
Subsidiary country FE & no & yes & yes & yes & nested & \\
Parent industry FE & no & yes & yes & yes & nested & \\
Subsidiary industry FE & no & yes & yes & yes & nested & \\
Parent firm FE & no & no & no & no & yes & \\
Subsidiary firm FE & no & no & no & no & yes & \\
Observations & 398,300 & 97,454 & 97,454 & 73,272 & 8,927 & \\
\(R^2\) & 0.066 & 0.189 & 0.190 & 0.209 & 0.869 & \\
\hline
\end{tabular}
\caption{Ownership Shares and Cross-country Variation in Cultural Distance.}
\end{table}

Notes: The table reports OLS estimates of (variations of) equation (22). The dependent variable is the ownership share of a parent firm \(p\) from country \(l\) in a foreign subsidiary \(s\) from country \(\ell, l \neq \ell\). Cultural distance\(_{\ell}\ell\) is a country-pair specific measure of cultural distance. Robust standard errors are clustered at the level of parent firm’s countries and presented in parentheses. ***, **, * denote 1, 5, 10 \% significance, respectively.

\textbf{3.1.2 Firm-pair Variation of Cultural Distance}

\textbf{Data and Econometric Specification.} Having explored the relationship between country-level cultural distance and firm ownership shares, we now turn to an even more stringent version of our first theoretical prediction and consider variation in cultural distance across firm pairs. The idea behind this test is that, within any given country, firms may be led by managers from different cultural backgrounds. We thus investigate whether, conditional on

\textsuperscript{18} We exclude observations that are singletons, that is, fully accounted for with a fixed effect.
cultural differences between a parent’s and a subsidiary’s country, managers of parent firms choose different ownership shares depending on their cultural distance to the subsidiary’s managers. The Orbis database provide a unique laboratory to study this question since it contains information on the nationality of firms’ top managers (CEO, CFE, board of directors, etc.). Using Hofstede’s individualism scores, we compute the average individualism index of the parent \((i_p)\) and the subsidiary firm \((i_s)\), and then use these indices to calculate the (average) cultural distance between these firms’ managers, \(Cultural \ distance_{ps} = |i_p - i_s|\).

To investigate the effect of firm-pair specific cultural distance on firm boundaries, we estimate the following econometric model:

\[
O_{ps} = \alpha Cultural \ distance_{ps} + \phi I + \phi \ell + \phi v + \phi \nu + \phi p + \phi s + \phi \nu + \phi p + \phi s + \phi \nu + \epsilon_{ps},
\]

(23)

whereby \(O_{ps}\) is the ownership share of parent company \(p\) in its subsidiary \(s\). Given that the measure of cultural distance now varies across firm pairs, and there is substantial variation in \(Cultural \ distance_{ps}\) even within individual countries, we do not restrict \(O_{ps}\) to international ownership links but also consider domestic ownership shares. Our theoretical model predicts a negative effect of \(Cultural \ distance_{ps}\) on \(O_{ps}\), i.e. \(\alpha < 0\). Apart from fixed effects for parent and subsidiary countries \((\phi I, \phi \ell)\), industries \((\phi v, \phi \nu)\), and firms \((\phi p, \phi s)\), we include country-pair fixed effects, \(\phi \nu \ell\). The latter FEs fully account for cross-country variation in \(Cultural \ distance_{\ell \ell}\), as well as any observable and unobservable country-pair characteristics, and allow us to identify the effect of cultural distance within firm pairs.

Given that cultural distance in this section varies across firm (rather than country) pairs, specification from equation (23) might be prone to an endogeneity issue. In particular, one could argue that a higher ownership share leads to cultural diffusion between a parent’s and a subsidiary’s managers. To address this possibility, we apply an instrumental variables (IV) approach using Genetic distance between firms’ managers as an instrument for \(Cultural \ distance_{ps}\). More specifically, we exploit data on frequency of blood types (A and B) in a given ethnic group to calculate Euclidean blood distance between managers of the parent and the subsidiary company. The idea behind this approach is that both genes and cultural traits are passed on from parents to offspring and, hence, genetically distant managers are likely to exhibit a higher cultural distance. At the same time, since frequency of blood types is a neutral genetic marker (in the sense that it does not cause a higher level of intelligence or effort), and since managers of parent firms are unlikely to make their integration

\[\text{Genetic distance_{ps}} = 
\frac{(f_{A,p} - f_{A,s})^2 + (f_{B,p} - f_{B,s})^2}{2}\]

(21)

In the robustness checks, we consider distance measures based on other cultural dimensions.

Genetic distance has been frequently used in the economic literature as an instrument for cultural distance, see Bisin and Verdier (2010), Gorodnichenko and Roland (2011, 2017), and Spolaore and Wacziarg (2015). Formally, Genetic distance_{ps} = [(f_{A,p} - f_{A,s})^2 + (f_{B,p} - f_{B,s})^2], where f_{t,p} and f_{t,s} denote the frequencies of blood type \(t \in \{A,B\}\) of parent’s and subsidiary’s managers, respectively.
decisions based on their genetic distance to a subsidiary’s managers, this instrument is likely
to satisfy the exclusion restriction. Given that genetic distance is stable over time, the IV
approach allows us to address the endogeneity of cultural diffusion. However, this approach
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).\footnote{Arguably, this type of endogeneity is likely to bias our estimates of $\alpha$ toward zero. 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.}

To address the latter type of endogeneity, we run robustness checks by restricting the sample
to minority ownership shares (with $O_{ps} < 50\%$), for which the parent firm are less likely to
dictate manager appointments in the subsidiary company.

**Results.** Table 2 develops our preferred specification of equation (23) step by step. In the
basic specification of column (1), we regress $O_{ps}$ against $Cultural distance_{ps}$, controlling for
parent and subsidiary country and industry fixed effects. Consistent with our theoretical
predictions, we find a negative and highly significant relationship between cultural distance
and ownership shares. In column (2), we apply a more demanding test, by including parent
and subsidiary country/industry FE. In doing so, we effectively control for a differential impact
of country-specific factors depending on an industry’s characteristics. For instance, the impact
of a country’s contracting institutions might be particularly pronounced in industries with a
high degree of relationship-specificity (see Nunn, 2007, and Eppinger and Kukharskyy, 2017),
while the impact of a country’s financial development might be stronger in sectors that require
a large amount of external finance (Rajan and Zingales, 1998). As can be seen from column
(2), the coefficient of $Cultural distance_{ps}$ is virtually unaffected by this test. In column
(3), we further add country-pair fixed effects, which fully control for cross-country variation in
$Cultural distance_{it}$ as well as other country-pair specific covariates from Table 1. The estimate
coefficient on $Cultural distance_{ps}$ increases in size and remains highly significant.\footnote{A possible explanation behind the increase of the coefficient is that the effect of cultural distance in previous specifications was masked by systematic differences in ownership shares between domestic and international firm relationships. As soon as these differences are accounted for (via country-pair fixed effects), the effect of cultural distance between firm managers appears to be larger in size. In column (4), we further add parent and subsidiary firm fixed effects to account for (unobserved) heterogeneity across business partners.}

As in Table 1, these fixed effects account for a large share of variation in ownership shares. However, even
after applying this stringent test, we find a highly significant negative relationship between
cultural distance and ownership shares.

To account for a potential issue of endogenous cultural diffusion, we now turn to the
IV approach. In column (5), we rerun our preferred specification from column (4) using
$Genetic distance_{ps}$ as an instrument for $Cultural distance_{ps}$. As can be seen from the lower
Table 2. Ownership Shares and Firm-pair Variation in Cultural Distance.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
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<tr>
<td>Dependent variable: $O_{ps}$</td>
<td>OLS</td>
<td>IV</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>$Cultural\ distance_{ps}$</td>
<td>-0.142***</td>
<td>-0.135***</td>
<td>-0.245***</td>
<td>-0.109***</td>
<td>-0.142***</td>
<td>-0.069***</td>
</tr>
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<td></td>
<td>(0.016)</td>
<td>(0.016)</td>
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</tr>
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<td>yes</td>
<td>yes</td>
<td>yes</td>
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<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Subsidiary firm FE</td>
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<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td>Observations</td>
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<td>346,783</td>
<td>343,492</td>
<td>105,627</td>
<td>105,594</td>
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<td>$R^2$</td>
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<td>0.256</td>
<td>0.347</td>
<td>0.846</td>
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<td>0.869</td>
</tr>
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</table>

First-stage:

<p>| | | |</p>
<table>
<thead>
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<th></th>
<th></th>
<th></th>
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<td>$Genetic\ distance_{ps}$</td>
<td>258.8***</td>
<td>266.01***</td>
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<td></td>
<td>(11.24)</td>
<td>(13.40)</td>
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<td>Partial $R^2$ (excl. IV)</td>
<td>0.976</td>
<td>0.977</td>
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<td>$F$-stat (excl. IV)</td>
<td>529.71</td>
<td>393.92</td>
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<td>$p$-value of $F$-test</td>
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<td>0.000</td>
</tr>
</tbody>
</table>

Notes: Columns (1)-(4) report OLS estimates of (variations of) equation (23). The dependent variable is the ownership share of a parent firm $p$ from country $l$ in a subsidiary $s$ from country $\ell$, whereby $l$ and $\ell$ may be either the same or different countries. $Cultural\ distance_{ps}$ is a firm-pair specific measure of cultural distance. Column (5) and (6) present IV estimates, using $Genetic\ distance_{lt}$ as an instrument for $Cultural\ distance_{ls}$. Columns (1)-(5) consider the full sample, while column (6) restricts the sample to $O_{ps} < 50\%$. Robust standard errors are clustered at the level of parent firms and presented in parentheses. ***, **, * denote 1, 5, 10 % significance, respectively.

Panel of Table 2, this instrument is highly correlated with our explanatory variable. Moreover, a high first-stage $F$-statistic on the excluded instrument and a high first-stage partial $R^2$ reassure that the instrument is relevant and not weak. Instrumenting $Cultural\ distance_{ps}$ with $Genetic\ distance_{ps}$ slightly raises the estimate of the former, consistent with our expectation that IV estimates should be larger in absolute value than OLS estimates. Yet, the relationship remains highly significant. A quantitative interpretation of the estimates of $Cultural\ distance_{ps}$ in columns (4) and (5) suggests that an increase in firm-pair specific cultural distance by one standard deviation would decrease a firm’s ownership share in its subsidiary by roughly one percent. To ensure that our results are not driven by endogenous appointments of managers with certain cultural backgrounds, we restrict our sample in column (6) to those relationships in which the parent firm owns less than 50% in the subsidiary’s company. While the estimate reduces in size (partly due to a significant reduction in the number of observations), the coefficient of $Cultural\ distance_{ps}$ continues to be highly significant. In a range of unreported robustness checks (available upon request), we further experimented with gradually restricting the sample to even smaller ownership shares (i.e., $O_{ps} < 40\%$, $O_{ps} < 30\%$, 23
Throughout sample restrictions, we find a negative coefficient of $Cultural\ distance_{ps}$, which is significant at least at the five percent level.

Table 3 shows that our results are fully robust to using alternative definitions of $Cultural\ distance_{ps}$ based on the other four Hofstede’s cultural dimensions: uncertainty avoidance, masculinity vs. femininity, power distance, and long-term orientation. For each cultural dimension, we report only the preferred OLS and IV specifications analogous to columns (4) and (5) from Table 2. Controlling for country-pair, as well as parent and subsidiary firm fixed effects, we find a negative and highly significant coefficients of $Cultural\ distance_{ps}$ across cultural dimensions and estimation techniques. This leads us to conclude that parent firms choose ceteris paribus lower ownership shares the higher cultural distance to their subsidiaries.

### 3.2 Cultural Distance and Global Sourcing

#### 3.2.1 Cross-country Variation of Cultural Distance

**Data and Econometric Specification.** To measure the extent to which multinational firms source intermediate inputs within firm boundaries rather than import them from independent suppliers, we use the U.S. Census “Related Party Trade” product-level data collected by the U.S. Bureau of Customs and Border Protection. These data are drawn from Antràs (2015) and contain information on U.S. imports of 5705 products (according to the six-digit Harmonized System classification, HS) from 232 countries over 2000-2011. For each product category, this dataset not only reports the total value of imports but also indicates the value of imports from related parties.\footnote{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”.

\footnote{Since a higher ratio of intra-firm imports reflects a greater willingness of firms to obtain an ownership or control stake in foreign suppliers, this dataset has been widely used in the literature to study the determinants of a multinational firm’s integration vs. outsourcing decisions, see Antràs (2013, 2015).}

We use the share of related-party imports in total imports as our dependent variable (henceforth intra-firm import share, $IFIS$).\footnote{We use the share of related-party imports in total imports as our dependent variable (henceforth intra-firm import share, $IFIS$).}

Our baseline specification in this section reads:

$$IFIS_{\rho\ell t} = \alpha Cultural\ distance_{US,\ell} + \phi_p + \phi_\ell + \gamma X_{US,\ell} + \zeta Y_{\ell(t)} + \epsilon_{\rho\ell t},$$

where $IFIS$ is the U.S. intra-firm import share, and $\rho$, $\ell$, and $t$ index products, foreign countries, and years, respectively. Cultural differences between the U.S. and country $\ell$ are measured by $Cultural\ distance_{US,\ell} = |i_{US} - i_{\ell}|$, where $i_{US}$ and $i_{\ell}$ denote the individualism scores of the U.S. and country $\ell$, respectively. Vector $X_{US,\ell}$ (with the associated coefficient vector $\gamma$) contains the gravity controls introduced in section 3.1.1: Geographic distance$_{US,\ell}$.
<table>
<thead>
<tr>
<th>Dependent variable: $O_{ps}$</th>
<th>Uncertainty avoidance</th>
<th>Masculinity vs. femininity</th>
<th>Power distance</th>
<th>Long-term orientation</th>
</tr>
</thead>
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<tr>
<td>Cultural distance&lt;sub&gt;ps&lt;/sub&gt;</td>
<td>OLS</td>
<td>IV</td>
<td>OLS</td>
<td>IV</td>
</tr>
<tr>
<td>$Cultural distance_{ps}$</td>
<td>-0.119***</td>
<td>-0.190***</td>
<td>-0.141***</td>
<td>-0.165***</td>
</tr>
<tr>
<td>(0.025)</td>
<td>(0.048)</td>
<td>(0.027)</td>
<td>(0.041)</td>
<td>(0.032)</td>
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<td>Country-pair FE</td>
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<td>Parent firm FE</td>
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<td>Subsidiary firm FE</td>
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</tr>
<tr>
<td>Observations</td>
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<td>105,594</td>
<td>105,627</td>
<td>105,594</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.846</td>
<td>0.846</td>
<td>0.846</td>
<td>0.846</td>
</tr>
<tr>
<td>First-stage:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Genetic distance&lt;sub&gt;pd&lt;/sub&gt;</td>
<td>192.9***</td>
<td>222.45***</td>
<td>196.40***</td>
<td>223.22***</td>
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<tr>
<td>(17.53)</td>
<td>(18.58)</td>
<td>(14.41)</td>
<td>22.16</td>
<td></td>
</tr>
<tr>
<td>Partial $R^2$ (excl. IV)</td>
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<td>0.965</td>
<td>0.968</td>
<td>0.952</td>
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<tr>
<td>$F$-stat (excl. IV)</td>
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<td>143.30</td>
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<td>$p$-value of $F$-test</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Notes: The table reports estimates of equation (23) with country-pair, as well as parent and subsidiary firm fixed effects. The OLS and IV specifications are analogous to columns (4) and (5) of Table 2. The dependent variable is the ownership share of a parent firm $p$ from country $l$ in a subsidiary $s$ from country $\ell$. The respective measure of $Cultural distance_{ps}$ is calculated based on the cultural dimension reported in the header. Robust standard errors are clustered at the level of parent firms and presented in parentheses. ***, **, * denote 1, 5, 10 % significance, respectively.
Common border_{US,ℓ}, Common language_{US,ℓ}, Common legal origin_{US,ℓ}, Colonial links_{US,ℓ}, and Linguistic distance_{US,ℓ}. In addition, this vector includes a proxy for Freight costs_{US,ℓ}, calculated as the average ratio of Cost Insurance and Freight (CIF) to Free On Board (FOB) import values from a given country. This measure is drawn from Antràs (2015) and it controls for the effect of trade costs on the international make-or-buy decision.

To further reduce the effects of potentially confounding factors, we include additional controls \( Y_{\ell(t)} \) (with the associated coefficient vector \( \zeta \)) that vary by country (and time). One may be worried that the structure of trade and cultural attributes is 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.\(^{26}\) To rule out this alternative explanation, we include the log of a country’s GDP per capita, \( \log(GDP_{pc})_{\ell t} \) from the Penn World Tables (version 8.1), as an additional regressor. To account for the effect of a foreign country’s market size on U.S. intra-firm imports, we further control for the log of a country’s GDP, \( \log(GDP)_{\ell t} \) from the Penn World Tables. Contracting institutions have been shown to be an important explanatory factor of the international make-or-buy decision, see, e.g., Nunn and Trefler (2014). We draw from the World Bank’s Worldwide Governance Indicators the Rule of law_{\ell} index – a standard measure of the quality of contracting institutions. In the robustness checks, we consider a wide range of alternative institutional proxies from the World Bank and the International Country Risk Guide (ICRG). Guiso et al. (2006) suggest that the level of trust can influence the volume of trade between countries. To tackle this question, we also control for the country’s level of Trust_{\ell}, taken from the World Values Survey.

Results. As a first pass at the data, we plot the share of U.S. intra-firm imports aggregated at the country level and averaged over 2000-2011 against the Cultural distance_{US,ℓ} between the U.S. and a given country \( \ell \). The line depicts the fitted linear relationship between the variables, whereby the top right corner reports results for the fitted line. At this aggregate level, the correlation between these two measures is negative and highly significant. A country such as Pakistan, which exhibits 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. Table 4 reports estimates of equation (24). As can be seen from column (1), the effect of cultural distance is negative and highly significant after controlling for product and year fixed effects. The coefficient remains highly

\(^{26}\) 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.
significant after the inclusion of a range of bilateral controls in columns (2) and (3). Among the 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. The coefficient of Cultural distance_{US,\ell} remains significant after controlling for trade cost in column (4), a foreign country’s economic development and market size in column (5), as well as institutional quality and trust level in column (6). A standard deviation change in the level of individualism (24.83 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%.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure2.png}
\caption{Cultural distance and the share of intra-firm imports by country}
\end{figure}

In the analysis so far, we have taken the foreign destination as given and have studied whether cultural distance affects U.S. importers’ decisions whether to source a given product from that country within firm boundaries or at arm’s-length. However, the choice of the foreign production destination may itself be a function of cultural distance. In particular, one could argue that headquarters solve in practice a two-stage decision problem, deciding in the first step whether to source products from a given country or not, and choosing in the second step whether to import these products within firm boundaries or transact with an independent supplier. To account for the potential selection bias, we apply the selection correction proposed by Heckman (1979). The first-stage selection equation explains a dummy \( \Psi_{p\ell} \), which indicates whether or not we observe any imports of product \( p \) from a foreign country \( \ell \) in a given year by the following Probit regression:\(^{27}\)

\[ \Pr(\Psi_{p\ell} = 1 | K_{p\ell}) = \Phi(\kappa K_{p\ell}), \]

\(^{27}\) As suggested by Wooldridge (2010), we estimate the Probit model for each \( t \).
whereby the vector $\mathbf{K}_{\rho\ell}$ (with associated coefficient vector $\mathbf{k}$) contains product fixed effects $\phi_p$, as well as all the country and country-pair specific variables contained, respectively, in vectors $\mathbf{Y}_{\ell(t)}$ and $\mathbf{X}_{US,\ell}$ from equation (24), see column (5) of Table 4. In addition, we follow the approach by Helpman et al. (2008) by including in $\mathbf{K}_{\rho\ell}$ a proxy for Religious distance$_{US,\ell}$, introduced in section 3.1.1. This approach reflects the idea that religious beliefs may affect a headquarter’s willingness to engage with a cooperation partner from a given country and yet Religious distance$_{US,\ell}$ is not significantly correlated with IFIS$_{\rho\ell t}$. Since Religious distance$_{US,\ell}$ is excluded in the second-stage, it contributes to identification. From the probabilities predicted by equation (25), we compute the inverse Mills ratios ($IMR_{\rho\ell t}$), which we include (together with their interaction with year dummies) in the second-stage model from equation (24), to correct for potential selection bias, see Wooldridge (2010).

Table 4. Determinants of U.S. Intra-firm Import Shares: Cross-country Variation in Cultural Distance.

| Dependent variable: Intra-firm import share, IFIS$_{\rho\ell t}$ |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                                  | (1)             | (2)             | (3)             | (4)             | (5)             | (6)             |
| Cultural distance$_{US,\ell}$   | -0.212***       | -0.233***       | -0.170***       | -0.178***       | -0.138**        | -0.128*         |
|                                  | (0.041)         | (0.035)         | (0.058)         | (0.061)         | (0.066)         | (0.068)         |
| Geographical distance$_{US,\ell}$ | -0.021          | -0.014          | 0.006           | 0.002           | -0.004          | -0.004          |
|                                  | (0.024)         | (0.029)         | (0.029)         | (0.034)         |                  |                 |
| Common border$_{US,\ell}$       | 0.044           | -0.029          | -0.030          | -0.020          | -0.027          |                 |
|                                  | (0.077)         | (0.063)         | (0.060)         | (0.064)         | (0.064)         |                 |
| Common language$_{US,\ell}$     | -0.049*         | -0.031          | -0.036          | -0.048          | -0.045          |                 |
|                                  | (0.027)         | (0.027)         | (0.029)         | (0.031)         | (0.032)         |                 |
| Common legal origin$_{US,\ell}$ | -0.034          | -0.011          | -0.017          | -0.019          | -0.020          |                 |
|                                  | (0.028)         | (0.026)         | (0.026)         | (0.028)         | (0.029)         |                 |
| Linguistic distance$_{US,\ell}$ | 0.149***        | 0.136***        | 0.128**         | 0.129**         |                 |                 |
|                                  | (0.049)         | (0.050)         | (0.053)         | (0.053)         |                 |                 |
| Freight costs$_{US,\ell}$       | -1.610***       | -2.204***       | -2.133***       | -2.488***       |                 |                 |
|                                  | (0.573)         | (0.679)         | (0.849)         | (0.893)         |                 |                 |
| log(GDPpc)$_{\ell t}$           | -0.015          | -0.042**        | -0.049**        |                  |                 |                 |
|                                  | (0.016)         | (0.019)         | (0.020)         |                 |                 |                 |
| log(GDP)$_{\ell t}$             | -0.006          | -0.002          | 0.010           |                  |                 |                 |
|                                  | (0.008)         | (0.009)         | (0.012)         |                 |                 |                 |
| Rule of law$_t$                 | 0.043**         | 0.053**         |                 |                  |                 |                 |
|                                  | (0.021)         | (0.022)         |                 |                 |                 |                 |
| Trust$_t$                       | -0.035*         | -0.034          |                 |                  |                 |                 |
|                                  | (0.020)         | (0.021)         |                 |                 |                 |                 |
| IMR$_{\rho\ell t}$             | 0.056**         |                 |                 |                  |                 |                 |
|                                  | (0.022)         |                 |                 |                  |                 |                 |

Notes: The table reports OLS estimates of equation (24) with product and year fixed effects. 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.

Column (6) from Table 4 reports the estimates of equation (25) after sample selection
correction. The coefficient of $\text{Cultural distance}_{US,\ell}$ remains negative, albeit slightly diminishes in size and significance (as the p-value is 0.06). We thus conclude that the negative relationship between cultural distance and intra-firm imports is robust to sample selection correction. We further verify the validity of our results in a range of unreported robustness checks (available upon request). First, we find that the link between $\text{Cultural distance}_{US,\ell}$ and $\text{IFIS}_{\rho t}$ is negative and significant for single years within 2000-2011. Second, although the use of the OLS model to study the determinants of intra-firm import shares is fairly standard in the literature (see, e.g., Nunn and Trefler 2008, 2013, and Antrás 2015), one might be concerned that this estimation technique does not accommodate well the fact that the dependent variable is a fraction (bounded between zero and one). To account for this concern, we rerun our regressions using generalized linear models – fractional probit and fractional logit (see Papke and Wooldridge (1996)). Lastly, we consider a wide range of additional control variables. For instance, we include proxies for common religious values (e.g., share of catholics or protestants in the population), taken from Barro (2003), and 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 negative coefficients on $\text{Cultural distance}_{US,\ell}$ remains 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 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.

### 3.2.2 Industry/Country Variation of Cultural Distance

**Data and Econometric Specification.** As in the previous section, 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.
baseline specification in this section reads:

$$\text{IFIS}_{vtt} = \alpha \text{Cultural distance}_{v\ell t} + \phi_{t}t + \phi_{v} + \chi X_{v\ell(t)} + \varepsilon_{vtt},$$

(26)

where \(\text{IFIS}\) is the U.S. intra-firm import share and \(v, \ell\) and \(t\) index industries, countries, and years, respectively. The key feature in this section is that our explanatory variable, \(\text{Cultural distance}_{v\ell t}\), now varies across countries and industries.\(^{28}\) This approach allows us to address the above-mentioned concern related to unobserved heterogeneity across foreign destinations using country-year fixed effects, \(\phi_{t}\).\(^{29}\) We further account for heterogeneity across U.S. sectors via industry fixed effects, \(\phi_{v}\). Lastly, to account for factors that vary by industry/country, we include a vector of (time-varying) industry/country-level controls, \(X_{v\ell(t)}\).

To construct a measure of cultural distance between the U.S. and a given country that varies by industry/country, we proceed as follows. We use information on the ancestry of U.S. citizens from the 2000 U.S. Census to estimate the 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 further narrow down the sample 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).\(^{30}\) 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:

$$i_{v,US} = \sum_{\ell} \lambda_{v\ell t},$$

(27)

\(^{28}\) We omit the subscript “\(US\)” to simplify on notation.

\(^{29}\) Since the U.S. is the only source country in our analysis, the destination country fixed effects also fully account for time-invariant bilateral factors that might have confounded the relationship in Table 4.

\(^{30}\) Our results are robust to considering 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.
where $\lambda_{\ell v}$ is the share of ethnic group $\ell$ in industry $v$. The cultural distance between a country $\ell$ and the U.S. for industry $v$ is thus given by $\text{Cultural distance}_{v \ell} = |i_{v,US} - i_{\ell}|$.

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 $\text{Cultural distance}^{(1)}_{v \ell} = |i^{(1)}_{v,US} - i_{\ell}|$. 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, $i^{(2)}_{v,US} = \sum_{\ell} \tilde{\lambda}_{\ell v} i_{\ell}$. We denote the corresponding distance $\text{Cultural distance}^{(2)}_{v \ell} = |i^{(2)}_{v,US} - i_{\ell}|$. 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 $v$ and Germany, we exclude German managers in this industry.\footnote{We also experiment with alternative variants of this index using data on language ties from Mayer and Zignago (2011). For instance, for the construction of cultural distance between a U.S. industry importing from Germany, we exclude managers from countries in which German is the official language (Austria, Switzerland, Luxembourg, Lichtenstein) or spoken by a substantial share of population (e.g., Belgium).} Formally, we use $i^{(3)}_{v,US,\text{Germany}} = \sum_{\ell: \ell \neq \text{Germany}} \tilde{\lambda}_{\ell v} i_{\ell}$ to compute cultural distance $\text{Cultural distance}^{(3)}_{v,\text{Germany}} = |i^{(3)}_{v,US,\text{Germany}} - i_{\text{Germany}}|$.

Notice from the econometric specification from equation (26) that all factors specific to a given foreign destination and to a given U.S. sector are effectively controlled via country-year and industry fixed effects, respectively. To further account for a differential impact of a foreign country’s characteristics depending on U.S. industry-specific factors, we include a vector of industry/country(-year) controls, $X_{v \ell t}$. To this end, we draw from Antràs (2015) the following three proxies for capital-, skill-, and R&D-intensity of a U.S. sector:\footnote{These factors have been identified as important drivers of U.S. intra-firm imports by Nunn and Treffler (2008, 2013).} $\log(Capital/Labor)_{v}$, calculated as the (log of the) average real capital stock per worker in a given sector; $\log(Skilled/Unskilled)_{v}$, measured as the (log of the) average number of non-production workers divided by total employment; and $\log(R&D/Sales)_{v}$, calculated as the (log of) average R&D expenditures divided by total sales. Using these proxies, we construct the following three industry/country(-year) controls. To account for a differential impact of a foreign country’s capital abundance depending on the capital intensity of an industry, we include $\text{Capital interaction}_{v \ell t} = \log(Capital/Labor)_{v} \times \log(Capital/Labor)_{\ell t}$, whereby $\log(Capital/Labor)_{\ell t}$ is the relative capital abundance of a foreign country in year $t$, as measured by the log of the ratio of capital stock over population from the Penn World Tables. Similarly, we control for $\text{Skill interaction}_{v \ell t} = \log(Skilled/Unskilled)_{v} \times HC_{\ell t}$, whereby $HC_{\ell t}$ is
the time-variant country-level index of human capital per person from the Penn World Tables, constructed based on the average years of schooling and the return to education. We further control for \( \text{R&D interaction}_{v,t} = \log(\text{R&D/Sales})_v \times \text{Rule}_t \), whereby \( \text{Rule}_t \) is a foreign 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 and a hold-up problem and are likely to decide on the ownership structure based on the quality of a foreign country’s contracting institutions.

One might be concerned that the link between cultural distance and intra-firm imports is confounded by other values or beliefs passed on from parents to their descendants. 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 further extend our baseline vector \( \mathbf{X}_{v,t}(t) \) of industry/country-specific controls with a Trust distance \( \text{Trust}_{v,t} = |\text{Trust}_t - \sum \lambda_{\ell_v} \text{Trust}_\ell| \), whereby \( \lambda_{\ell_v} \) is the share of ethnic group \( \ell \) in industry \( v \) (constructed by analogy to (27)) and \( \text{Trust}_t \) is the level of trust in country \( t \) from the World Values Survey.\(^{33}\) 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 an industry/country-specific measure of Institutional distance \( \text{Rule}_{v,t} = |\text{Rule}_t - \sum \lambda_{\ell_v} \text{Rule}_\ell| \), whereby \( \text{Rule}_t \) is the Rule of Law index from the World Bank. In the robustness checks, we consider further industry-country covariates introduced below.

**Results.** Table 5 reports estimates of equation (26) with country-year and industry fixed effects. As can be seen from columns (1)-(3), all three measures of cultural distance are negatively and highly significantly associated with intra-firm import shares. That is, firms tend to source inputs at arm’s-length (rather than within firm boundaries) from countries that are culturally dissimilar to the firms’ managers. In columns (4)-(6), we include the above-mentioned list of industry/country(-year) control variables. Notably, none of these controls seem to be significantly correlated with the U.S. intra-firm import shares. In contrast, the negative effect of cultural distance is statistically and economically significant throughout specifications.

Despite an extensive list of industry/country controls included in Table 5, one might be worried that the effect of cultural distance is confounded by other factors that vary by indus-

\(^{33}\) All control variables are constructed using only managers who reported their nationality, similarly to \( \text{Cultural distance}_{v,t}^{(1)} \). However, our results are fairly unchanged when we assign the respective U.S. scores to all managers with unreported nationality, as in \( \text{Cultural distance}_{v,t}^{(2)} \), or, similarly to \( \text{Cultural distance}_{v,t}^{(3)} \), consider only managers from countries other than the respective trading partner.
Table 5. U.S. Intra-firm Import Shares: Industry/country Variation in Cultural Distance.

<table>
<thead>
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<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
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<td>-0.394**</td>
<td>-0.325***</td>
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<td>(0.186)</td>
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<td>0.001</td>
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<td>Institutional distance(_{\ell})</td>
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<td>1.269</td>
<td>1.185</td>
<td>3.706</td>
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</table>

Country/Year FE | yes | yes | yes | yes | yes | yes | yes | yes | yes |
Industry FE     | yes | yes | yes | yes | yes | yes | yes | yes | yes |
Industry dummies×log(GDPpc)\(_{\ell}\) | no | no | no | no | no | no | yes | yes | yes |
Industry dummies×Rule\(_{\ell}\) | no | no | no | no | no | no | yes | yes | yes |
Observations    | 22,998 | 22,998 | 22,998 | 22,379 | 22,379 | 22,379 | 22,379 | 22,379 | 22,379 |
R\(^2\)         | 0.375 | 0.375 | 0.375 | 0.374 | 0.374 | 0.374 | 0.412 | 0.412 | 0.412 |

Notes: The table reports OLS estimates of equation (26) with country/year and industry fixed effects. See text for 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.
try/country. To address this concern, we add to our main specification a full set of interaction terms of industry dummies and a foreign country’s GDP per capita, log(GDPpc)_lt. In so doing, we control for arbitrary effects of a foreign country’s economic development across U.S. industries. In the same vein, we add a full set of interaction terms of industry dummies with Rule_l to account for the possibility that a foreign country’s institutions may have a differential impact on the internalization decision depending on the industry’s characteristics (see, e.g., Eppinger and Kukharskyy (2017)). As can be seen from columns (7)-(9), the negative effect of cultural distance remains robust in magnitude and significance to these stringent tests.

We further validate this strong result in a wide range of unreported robustness checks. First, we construct the industry/country covariates from Table 5 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_υℓ and Institutional distance_υℓ, 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 managerial traits. For instance, to control for differences in (managerial) work ethics, we construct an index Work ethics_υℓ = |Work_ℓ - ∑_ℓ λ_ℓυWork_ℓ|, whereby λ_ℓυ is the share of ethnic group ℓ in industry υ (constructed by analogy to (27)) and Work_ℓ 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.

4 Conclusion

We presented a simple model of firm boundaries with culturally dissimilar managers. In this model, headquarter managers decide whether to cooperate with their business partners at arm’s-length or integrate the latter into firm boundaries against the backdrop of private costs associated with cross-cultural collaboration. This model suggests that a cooperation partner is less likely to be integrated into firm boundaries the higher cultural distance between the firms’ managers. Moreover, it predicts that an industry’s share of intra-firm imports decreases in cultural distance between the source and the destination country. Combining firm-, product-, and country/industry-level data with various proxies for cultural differences, we find strong empirical support for the model’s predictions. In particular, our estimates suggests that an

34 This approach has been developed by Levchenko (2007) and subsequently employed by Antràs (2015) in a context similar to ours.
increase in cultural distance between firm managers by one standard deviation decreases a firm’s ownership share in its subsidiary by one to two percentage points, on average. These results are robust to controlling for a host of unobserved country-, industry-, and firm-specific factors via fixed effects and suggest that cultural differences play an important role in firms’ make-or-buy decisions. Furthermore, by establishing a robust relationship between cultural distance and intra-firm trade, our empirical work suggest that cultural motives can shed new light on patterns of international trade and cross-border organization of production.

Our analysis leaves several questions open for future research. First, cultural differences in the current 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, to pinpoint the novel predictions of our theoretical framework based on the model by Hart and Holmström (2010), we abstracted from the canonical Property rights approach by Grossman and Hart (1986) and Hart and Moore (1990). Considering both cultural frictions and hold-up inefficiencies in a unified framework may provide a more comprehensive view of the determinants of firms’ international make-or-buy decisions. Lastly, 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 both theoretically and empirically may constitute an interesting research agenda.
References


Deloitte. 2012 “Global Outsourcing and Insourcing Survey,” Deloitte Consulting LLP.


A Theoretical Appendix

A.1 Proof of Lemma 3

Differentiating $W^A$ and $W^I$ from equation (21) with respect to $\theta$, we obtain after simplification:

$$\frac{\partial W^A}{\partial \theta} = \frac{(\sigma - 1)(B\theta^{\sigma-1})^2((B\theta^{\sigma-1})^2 + 3B\theta^{\sigma-1} + 2 + 4s(1 - s))}{\theta(B\theta^{\sigma-1} + 1)^3} > 0,$$

$$\frac{\partial W^I}{\partial \theta} = \frac{(\sigma - 1)((2 + c)B\theta^{\sigma-1} + 2(c + 1))(2 + c)(B\theta^{\sigma-1})^2}{\theta((2 + c)B\theta^{\sigma-1} + c + 1)^2} > 0.$$

The cross-partial derivative of $W^I$ with respect to $\theta$ and $c$ reads:

$$\frac{\partial^2 W^I}{\partial \theta \partial c} = -\frac{2(\sigma - 1)(B\theta^{\sigma-1})^2(c + 1)}{\theta((2 + c)B\theta^{\sigma-1} + c + 1)^3} < 0.$$

The formal condition for $\frac{\partial W^I}{\partial \theta} < \frac{\partial W^A}{\partial \theta}$ reads:

$$c < \frac{B\theta^{\sigma-1} + 1 - (2B\theta^{\sigma-1} + 1)4s(1 - s) + \sqrt{(B\theta^{\sigma-1} + 1)(1 + B\theta^{\sigma-1}(1 - 4s(1 - s)))}}{4s(1 - s)(B\theta^{\sigma-1} + 1)}.$$
## B Appendix Tables and Figures

### Table A.1. Descriptive Statistics

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<th>Variables</th>
<th>Obs</th>
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<th>Std. Dev.</th>
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<th>Max</th>
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<td>1.48</td>
</tr>
<tr>
<td><strong>Industry/country variation of cultural distance:</strong></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Intra-firm import share, $IFIS_{pslt}$</td>
<td>22,379</td>
<td>0.338</td>
<td>0.285</td>
<td>0.000</td>
<td>1.000</td>
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<tr>
<td>Cultural distance$_{1}^{(1)}$</td>
<td>22,379</td>
<td>0.229</td>
<td>0.189</td>
<td>0.000</td>
<td>0.690</td>
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<tr>
<td>Cultural distance$_{2}^{(2)}$</td>
<td>22,379</td>
<td>0.200</td>
<td>0.164</td>
<td>0.000</td>
<td>0.636</td>
</tr>
<tr>
<td>Cultural distance$_{3}^{(3)}$</td>
<td>22,379</td>
<td>0.202</td>
<td>0.166</td>
<td>0.003</td>
<td>0.639</td>
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<tr>
<td>Capital interaction$_{pslt}$</td>
<td>22,379</td>
<td>52.25</td>
<td>9.114</td>
<td>23.18</td>
<td>87.55</td>
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<tr>
<td>Skill interaction$_{pslt}$</td>
<td>22,379</td>
<td>-3.633</td>
<td>1.233</td>
<td>-7.864</td>
<td>-0.693</td>
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<tr>
<td>R&amp;D interaction$_{pslt}$</td>
<td>22,379</td>
<td>-4.245</td>
<td>4.874</td>
<td>-13.42</td>
<td>7.314</td>
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<tr>
<td>Trust distance$_{pslt}$</td>
<td>22,379</td>
<td>26.26</td>
<td>19.67</td>
<td>0.010</td>
<td>82.89</td>
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<tr>
<td>Institutional distance$_{pslt}$</td>
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<td>0.008</td>
<td>0.006</td>
<td>0.000</td>
<td>0.030</td>
</tr>
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Figure A.1.

The Distribution of Hofstede's Individualism Scores.

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