Cultural Distance, Firm Boundaries, and Global Sourcing*

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Abstract

Casual observation suggests that cultural differences play an important role in business transactions, yet systematic evidence on this relationship is scarce. This paper provides a novel investigation of the effect of cultural distance on multinational firms' decisions to integrate their cooperation partners into firm boundaries, rather than transact with independent companies at arm's-length. To guide our empirical analysis, we develop a simple theoretical model which suggests that *(i)* cultural distance between contracting parties decreases the relative attractiveness of integration, and *(ii)* this effect is mitigated in more productive firms. We test these predictions using extensive product-, industry-, and firm-level data. We find a robust negative relationship between cultural distance and the relative attractiveness of integration. In line with our theoretical predictions, we also find that the effect of cultural distance on firm boundaries is less pronounced the higher firm's productivity.

JEL Classification: F14, F23, L14, L23

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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 senior executives of multinational enterprises 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 role of cultural differences in international business transactions remains mostly ignored by economists.

To illustrate our point, consider the following two case studies of well-known multinational companies. The Danish toy manufacturer Lego sources its components (bricks) both from a wholly-owned production facility in Czech Republic and an independent supplier in Singapore (Mols, 2010). The state-of-the art answers to the question as to why Lego would integrate its input supply in the former and source it at arm's-length in the latter case include differences in institutions or production cost (see Antràs, 2015). Yet, to the best of our knowledge, there is no well-established explanation that would relate this case study to the fact that Denmark is culturally closer to Czech Republic than to Singapore, as measured, for instance, by Hofstede's well-known individualism/collectivism index. The second case study deals with the U.S. multinational corporation Coca-Cola, which 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, once again, by Hofstede's individualism/collectivism index) might have played a role in Coca-Cola's ownership decisions, beyond institutional or economic differences across countries.

This paper aims to shed 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 across borders and their global sourcing decisions. More specifically, this paper asks the following research question: Does cultural distance affect a multinational firm's incentives to integrate a business partner into firm boundaries, rather than transact with an independent supplier at arm's-length? We provide novel empirical evidence for the negative relationship between cultural distance and the relative attractiveness of integration across a wide range of econometric specifications and tests. Moreover, we find that the impact of cultural distance varies across firms, as the negative effect of cultural distance on the integration intensity is mitigated in more productive firms.

To guide our empirical investigation, we develop a novel theoretical model of firm boundaries with cultural frictions. Our baseline model describes a business relationship between two firm units – a firm's headquarters (HQ) and a manufacturing producer. Each firm unit is governed by a manager who has an independent vision about the best course of action to be implemented in her unit. Building on Hart and Holmström (2010), we assume that the production process requires a coordination of decisions across units, which involves the following trade-off: Better coordination leads to a higher monetary payoff but, to the extent that managerial beliefs differ, causes a reduction in non-monetary managerial job satisfaction. The key novel feature of our model is that the degree to which managerial visions differ is assumed to be a positive function of cultural distance between the managers.[1] Against this backdrop, the HQ manager decides whether to integrate the manufacturing unit into firm boundaries or cooperate with the latter at arm's-length (referred throughout as outsourcing). Importantly, cultural differences play a role under both organizational forms and the effect of cultural distance on the relative attractiveness of the two organizational modes is derived endogenously from the model.

The key trade-off in our framework is the following: Under outsourcing, the decisions in each unit are taken independently by the respective unit's manager to maximize her own welfare, which results in a poor coordination of decisions across firm units and a low quality of output. The associated loss in monetary profits is most pronounced the more discordant are managerial visions, which is a function of cultural distance between the managers. By integrating the supplier into firm boundaries, the HQ obtains the right to make the decisions in the integrated firm's unit and can therefore improve the coordination of decisions across the units. However, the associated increase in goods' quality and monetary profits comes at a loss of non-monetary job satisfaction of the integrating firm's manager due to cultural frictions with the integrated firm's manager. While cultural distance reduces managerial welfare under both organizational forms, the relative attractiveness of integration vs. outsourcing in our model endogenously decreases in cultural differences between firms' managers. Intuitively, the HQ manager's incentive to integrate a supplier into firm boundaries in order to better coordinate the decisions between firm units is lower the higher cultural frictions encountered by the manager during this coordination process.

After we establish this theoretical result in a baseline framework, we ebed it into an international context to study a multinational firm's global sourcing decisions. This extended model features vertical fragmentation of the production process, cross-country differences with regard to national cultural values, and firm heterogeneity along the lines of Melitz (2003). This model predicts that, in industry equilibrium, only a fraction of firms will source their inputs within firm

[1] Although Hart and Holmström (2010) do not model cultural differences themselves, they conclude their paper with the following outlook: "cultural compatibility and fit of an acquisition partner may be of first-order importance [for firm boundaries]" (p. 510).

boundaries and that the relative prevalence of integration decreases in cultural distance between countries. Furthermore, we derive an additional testable prediction stating that, for any given relationship between a HQ and a foreign manufacturer, the negative effect of cultural distance is less pronounced the higher HQ's productivity. Intuitively, the managers of more productive HQ firms receive a relatively higher monetary payoff and may have an incentive to integrate their manufacturers despite the associated cultural frictions, in order to ensure that their monetary profits are not impaired by a poor coordination of decisions across firm units.

To the best of our knowledge, neither the direct effect of cultural distance on firm boundaries, nor its interaction with firm productivity, have been empirically analyzed on a systematic basis. This paper provides a novel investigation of these relationships using extensive product-by-country, industry-by-country, and firm-pair data. We approximate cultural differences across countries and firm managers using a range of indices suggested in the literature. Our baseline measure of cultural distance exploits the individualism vs. collectivism cleavage by Hofstede (2001), 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]

We bring this prediction to the data in a three-pronged approach, where each subsequent step complements the previous one and advances the degree of rigor. In the first step, we exploit highly disaggregated U.S. product-level import data by origin country from the U.S. Census Bureau's Related Party Trade dataset. More specifically, for more than 5,000 product categories, we observe a fraction of imports sourced from related vs. non-related parties in foreign destinations, which allows us to construct a share of intra-firm imports in total imports. 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, in line with our first theoretical hypothesis, U.S. firms tend to source 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, the measure of cultural distance in the second set of regressions 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

[2] This cleavage is generally considered to be the main dimension of cultural variation (see Heine, 2008). Moreover, Gorodnichenko and Roland (2011, 2017) find that, among a wide range of cultural scores, the individualism-collectivism dimension matters most for long-run growth.

a foreign country's institutions or its economic development. We find that the negative effect of cultural distance on intra-firm import shares continues to be economically and statistically significant even after introducing a large set of fixed effects and industry/country-specific controls, which further corroborates our first theoretical hypothesis.

In the third step, we zoom even further into the link between cultural distance and the integration decision using firm-pair data from the Orbis database of Bureau van Dijk (BvD). This database is uniquely suitable for the purpose of our study by combining the following four features. First, it provides information on ownership shares of headquarters in their subsidiaries worldwide, which we use as our outcome variable. Second, it contains unique information on the nationality of top managers employed by both sides of the ownership link, which is used to construct a *firm-pair* specific measure of cultural distance. Third, since we observe in which countries HQs and their subsidiaries 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 technological factors, relationship-specificity, contractibility, etc.), using HQ and subsidiary country and industry fixed effects, respectively. Moreover, given that headquarters may have multiple subsidiaries located in many countries, we account for unobserved heterogeneity across parent firms using HQ firm fixed effects. Lastly, the rich balance sheet information available in these data allows us to construct measures of firm productivity and study the interaction thereof with cultural distance. Controlling for a battery of fixed effects, we find that higher cultural distance between firms' managers decreases a HQ's probability to hold a majority (rather than a minority) ownership share in the subsidiary's company – a pattern consistent with our first theoretical hypothesis. Furthermore, in line with our second testable hypothesis, we find that the negative effect of cultural distance on the HQ's probability to hold a majority ownership share in a given subsidiary is mitigated by the HQ's productivity. Overall, our findings provide strong evidence for the role of cultural distance, as well as its interaction with firm productivity, on firm boundaries.

Related literature. Our paper contributes primarily to the vast literature on global sourcing and multinational firm boundaries.[3] Following the seminal papers by Grossman and Helpman (2002), Antràs (2003), and Antràs and Helpman (2004), the overwhelming majority of contributions to this literature has been built either on Williamson's (1975, 1985) Transaction Cost Theory or on the Property Rights Theory by Grossman and Hart (1986) and Hart and Moore (1990). In contrast, this paper builds on the more recent theory of the firm by Hart and Holmström (2010), which stresses the role of non-monetary factors, such as managerial job satisfaction, on firm boundaries. This theory has been previously explored by Legros and Newman (2013) and applied to an open-economy environment by Conconi et al. (2012) to study the effect of liberalization of product and factor markets on the organization of firms. Our framework draws from these papers the functional forms for a coordination game between firm managers to addresses a differ-

[3] See Antràs (2013, 2015), Antràs and Rossi-Hansberg (2009), and Antràs and Yeaple (2014) for overviews.

ent question: What is the effect of cultural distance on the (international) make-or-buy decision?

From an empirical perspective, this paper contributes to a large body of literature investigating the determinants of multinational firm boundaries. Since the seminal contributions by Nunn and Trefler (2008, 2013), this literature has come up with a range of potential explanatory factors that vary across countries (e.g., contracting institutions in Eppinger and Kukharskyy, 2021), product characteristics (e.g., technological importance of inputs in Berlingieri et al., 2021), or firms (e.g., firm productivity in Kohler and Smolka, 2021), see also Antràs (2015) for a review. Accounting for the existing explanations (using either controls or fixed effects), this paper puts forward cultural distance as an important, previously overlooked explanatory factor. The robust link between cultural distance and integration decisions is found not only in the U.S. product- and industry-level import data – a 'go-to data source' in this empirical literature – but also in extensive firm-pair Orbis data.[4] Importantly, employing HQ firm fixed effects (i.e., identifying the effect of cultural distance from the variation across subsidiaries *within* a multinational firm), allows us to account for unobserved heterogeneity across parent firms and come closer towards gauging the true effect of cultural differences on firm boundaries.

Several contributions document a negative relationship between (various measures of) cultural distance and bilateral trade or foreign direct investment, see, e.g., Guiso et al. (2009), Felbermayr and Toubal (2010), Siegel et al. (2011, 2012), Giuliano et al. (2014), Kandogan (2016), and Lucke and Eichler (2016). We complement these studies in two major respects. First, while the existing literature has, in its vast majority, used measures of cultural distance that are *country-pair* specific, we exploit the variation of cultural distance by *country-pair-industry* and by *firm-pair*. This allows us to zoom even closer into the role of cultural differences, while controlling for a myriad of potential confounding factors at the level of country pairs using fixed effects.[5] Second, instead of focusing on bilateral trade and/or FDI flows as outcome variables, our aim is to shed new light on the role of cultural factors in a multinational firm's decision whether to integrate its cooperation partners into firm boundaries or deal with independent companies at arm's-length.

The remainder of the paper is structured as follows. Section 2 lays out our model and derives the theoretical predictions. Section 3 brings these predictions to the data. Section 4 concludes.

[4] These data have been previously used to study the role of downstreamness (Del Prete and Rungi, 2017), contract enforcement (Boehm, 2020; Eppinger and Kukharskyy, 2021), managerial long-term orientation (Kukharskyy, 2016), and knowledge capital (Kukharskyy, 2020) in firms' organizational decisions. Among these papers, the one closest to our work is by Kukharskyy (2016), who finds a positive relationship between the long-term orientation of HQ managers in a given industry or firm and the prevalence of integration. In the current paper, we account for the *absolute value* of any given cultural dimension (including long-term orientation) via fixed effects and focus on the role of cultural *distance* between firms.

[5] It should be noted at the outset that, albeit we consider a range of alternative proxies for cultural differences in the robustness checks, we do not aim to empirically discriminate between various measures that have been suggested in the literature. Our rationale behind using Hofstede's indices as benchmark proxies for cultural differences is twofold: First, unlike the measure of bilateral trust (Guiso et al., 2009) or the measure of cultural proximity based on the Eurovision Song Contest (Felbermayr and Toubal, 2010), the measures of cultural distance used in the current paper are not restricted to European countries, but cover up to 100 countries around the globe. Second, Hofstede's cultural dimensions are widely recognized in the sociology and cultural psychology literature as valid proxies for cultural differences (see, e.g., Gorodnichenko and Roland, 2012).

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 baseline framework into a model of global sourcing with firm heterogeneity to study the effect of cultural distance on the international make-or-buy decision in industry equilibrium.

2.1 Baseline Model

Consider a simple game between two firms, which may stand either in a horizontal or in a vertical relationship. For clarity, we refer to the two firms as headquarters (HQ) and a manufacturing supplier. Each firm is operated by a single manager. Let A denote a HQ manager and B represent a manager of the manufacturing unit. Following Hart and Holmström (2010), we assume that managers derive their utility not only from the monetary payoff, π, but also from a non-monetary job satisfaction, j, with both components entering a manager's welfare W in a linearly additive way:[6]

$$W_i = \pi_i + j_i \quad , \quad i = A, B. \tag{1}$$

To produce final goods and generate a monetary payoff, managers have to coordinate their decisions across the two units. Coordination of decisions involves the following trade-off: On 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 job satisfaction decreases. To formalize this trade-off, we draw on Conconi et al. (2012) and Legros and Newman (2013) by normalizing the set of possible coordination decisions to a unit interval, where $\alpha \in [0, 1]$ denotes decisions made by A and $\beta \in [0, 1]$ represents decisions implemented by B.[7] Following these two studies, we assume that 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 coordination (quality) function q and functional forms for managerial job satisfaction are defined as follows:

$$q = 1 - (\alpha - \beta)^2 \quad , \quad j_A = -\alpha^2 \quad , \quad j_B = -(c - \beta)^2, \tag{2}$$

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

Our modeling of managerial job satisfaction in equation (2) differs from Conconi et al. (2012)

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[6] In Appendix A.3, we provide a microfoundation for the linear relationship between the monetary payoff and the welfare.

[7] In the original contribution by Hart and Holmström (2010), coordination decisions are modeled as a binary choice between 'Yes' (coordinate) and 'No' (not coordinate).

and Legros and Newman (2013) in that we do *not* assume diametrically opposed visions between managers A and B and allow these visions to differ continuously, depending on the cultural differences between the two managers, $c \in [0,1]$. Note that each manager's job satisfaction is highest (equal to zero) if the manager implements her most preferred decision ($\alpha = 0$ for A and $\beta = c$ for B) and it decreases the more a manager departs from her most favored vision. If there are no cultural differences between the two managers (i.e., $c = 0$), the preferred decisions from the perspective of both managers are perfectly aligned (i.e., $\alpha = \beta = 0$). Conversely, if $c = 1$, managerial visions are diametrically opposed (i.e., A prefers the lowest possible $\alpha = 0$ while B prefers highest possible $\beta = 1$), and the functional forms in equation (2) reduce to the case of fully discordant preferences considered by Conconi et al. (2012) and Legros and Newman (2013).

The overall monetary payoff is given by:

$$\pi = q\Pi, \tag{3}$$

where Π represents the maximum operating profit that can be obtained on the market from final good sales and q denotes the quality of these goods, specified in equation (2). In section 2.2, we endogenize Π and formally derive the multiplicative relationship between q and Π 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.

HQ manager A decides whether to cooperate with the manufacturing supplier at arm's-length (referred henceforth as outsourcing, O) or integrate the producer into firm boundaries (I). As in Hart and Holmström (2010), we set both managers' ex-ante outside options to zero. Hence, both parties' participation constraints are fulfilled as long as managerial welfare is non-negative, i.e., $W_A \geq 0$ and $W_B \geq 0$. In our baseline analysis, we assume that the HQ manager A chooses the organizational form $k \in \{I, O\}$ which maximizes her own welfare, W_A, subject to $W_B \geq 0$. It should be noted at the outset that our key predictions remain in tact if the organizational form is chosen so as to maximize the total welfare, $W = W_A + W_B$. Note, however, that the latter scenario presupposes the existence of ex-ante lump-sum transfers and, as asserted by Antràs and Staiger (2012: 3148): "the feasibility of these transfers is particularly hard to defend in the international context [...], where such transfers and the obligations associated with them might be difficult to enforce." Since our baseline model will be embedded in the international context in section 2.2, we choose to characterize the case of no ex-ante lump-sum transfers in the main text and relegate the discussion of our model with lump-sum transfers to Appendix A.2.

Consider first the case of outsourcing, O. A retains the fraction $s \in (0,1)$ of the monetary payoff and compensates B with the remaining fraction $(1-s)$ of π, where π is the total monetary payoff from equation (3). Since A chooses α and B chooses β, the respective party's optimization problem under O reads:

$$\max_{\alpha} W_A^O = s(1-(\alpha-\beta)^2)\Pi - \alpha^2 \quad , \quad \max_{\beta} W_B^O = (1-s)(1-(\alpha-\beta)^2)\Pi - (c-\beta)^2. \tag{4}$$

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

$$\alpha^O = \frac{cs\Pi}{\Pi+1} \quad , \quad \beta^O = \frac{cs\Pi + c}{\Pi+1}. \tag{5}$$

It can immediately be seen that, for any $c > 0$, $s \in (0,1)$, and $\Pi > 0$, we have $\beta^O > \alpha^O$. That is, in the presence of cultural differences between managers, the strategic decisions are not perfectly coordinated across units (i.e., $\alpha^O \neq \beta^O$) and each manager implements the decision closer to her preferred choice (which is $\alpha = 0$ for A and $\beta = c$ for B). 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 (and, consequently, managerial profit), but is associated with the loss in non-monetary job satisfaction. As a result, the quality of final goods

$$q^O = \frac{(\Pi+1)^2 - c^2}{(\Pi+1)^2} \tag{6}$$

is below its maximum level (i.e., $q^O < 1$) for any $c > 0$. Plugging equilibrium decisions $\{\alpha^O, \beta^O\}$ from equation (5) in (4), we obtain managerial welfare under outsourcing:

$$W_A^O = \frac{s\Pi(\Pi^2 + \Pi(2 - sc^2) + 1 - c^2)}{(\Pi+1)^2}, \quad W_B^O = \frac{(1-s)\Pi(\Pi^2 + \Pi(2-(1-s)c^2) + 1 - c^2)}{(\Pi+1)^2}. \tag{7}$$

Note first that $W_A^O > 0$ and $W_B^O > 0$ for any $s \in (0,1)$, $c \in [0,1]$, and $\Pi > 0$, i.e., both parties' participation constraints are fulfilled under outsourcing. Further, notice that, under outsourcing, the quality in equation (6) and each party's welfare in (7) decrease in cultural distance c.

Consider next the case of integration, I. Specifically, we assume that the integrated firm's manager B becomes A's subordinate, while the integrating firm's manager A reaps the total monetary profit from the relationship and obtains the rights to make the decisions in both units. In our context with culturally dissimilar managers, we additionally assume that the ability of A to coordinate decisions across the units comes at a (fixed) cost which is directly proportional to cultural distance c. One can think of this extra cost as A's managerial overload in dealing with a culturally distant B, but it could also be seen as A's cost of familiarizing herself with B's culture, obtaining cultural trainings, etc. In a nutshell, this cost is related to cultural frictions in collaboration inside an integrated firm. Hence, A maximizes $W_A^I = (1-(\alpha-\beta)^2)\Pi - \alpha^2 - \omega - c$, where ω denotes the wage paid by A to B. The latter's welfare under integration reads $W_B^I = \omega - (c-\beta)^2$, where the second terms on the right-hand side continues to denote B's non-monetary cost of implementing decisions β further away from c.[8] Since we have normalized both parties' ex-ante outside options to zero, B is willing to be integrated by A only if $W_B^I \geq 0$.[9] Assuming that this participation constraint holds with equality, the wage paid to B reads $\omega = (c-\beta)^2$. Utilizing this wage in W_A^I above, yields A's optimization problem under integration:

$$\max_{\alpha,\beta} W_A^I = (1-(\alpha-\beta)^2)\Pi - \alpha^2 - (c-\beta)^2 - c. \tag{8}$$

This maximization problem yields the following coordination decisions under integration:

$$\alpha^I = \frac{c\Pi}{2\Pi+1} \quad , \quad \beta^I = \frac{c\Pi + c}{2\Pi+1}, \tag{9}$$

which imply the following quality:

$$q^I = \frac{(2\Pi+1)^2 - c^2}{(2\Pi+1)^2}. \tag{10}$$

As with the case of outsourcing, a simple inspection of equation (10) implies that quality under integration is below its maximum level (i.e., $q^I < 1$) for any $c > 0$. It can be easily shown, however, that quality under integration is higher than under outsourcing, i.e., $q^I > q^O$.[10] This result is intuitive give that, under integration, A has the right to coordinate decisions across units. However, since A internalizes B's job (dis)satisfaction in her optimization problem, the decisions are not perfectly coordinated even under integration (i.e., $\alpha^I < \beta^I$), as long as $c > 0$, see equation (9). Plugging these decisions back into equation (8) yields A's welfare under integration:

$$W_A^I = \frac{\Pi(2\Pi+1) - c(1+\Pi(c+2))}{(2\Pi+1)}. \tag{11}$$

It can be immediately seen from the above expression that A's welfare under integration decreases in c.[11] Since cultural distance negatively affects the welfare both under integration and outsourcing, it is not a priori clear whether or not a larger c leads to a higher propensity of integration. To formally address this question, we define $\Theta_A(c) \equiv \frac{W_A^I}{W_A^O}$ as the relative attractiveness of integration and study the effect of c on this ratio. As previously mentioned, we focus in the main text on the scenario in which the HQ manager A maximizes her own welfare, but show in Appendix A.2 that our results remain in tact if we allow for lump-sum transfers under outsourcing and define the relative attractiveness of integration as $\Theta(c) \equiv \frac{W_A^I}{W^O}$, where $W^O = W_A^O + W_B^O$.

[8] A natural question that arises in this context is why B is kept as a subordinate under integration despite her differing vision compared to the HQ manager A. This assumption can be justified by invoking B's intangible capital or specific know-how of governing the manufacturing unit, which is indispensable for this relationship.

[9] It should be noted at the outset that the normalization of the ex-ante outside option to zero does not qualitatively affect any of our main results.

[10] Formally, we have $q^I - q^O = \frac{\Pi c^2(3\Pi+2)}{(2\Pi+1)^2(\Pi+1)^2} \geq 0 \; \forall \; c, \Pi \geq 0$.

[11] In order to ensure $W_A^I \geq 0$, we need to impose $c \leq \frac{-2\Pi-1+\sqrt{4\Pi(2\Pi(\Pi+1)+1)+1}}{2\Pi}$, which we assume throughout.

Using (7) and (11), our baseline measure for the relative attractiveness of integration reads:

$$\Theta_A = \frac{(\Pi(2\Pi+1) - c(1+\Pi(c+2)))\,(\Pi+1)^2}{s\Pi(\Pi^2+\Pi(2-sc^2)+1-c^2)(2\Pi+1)}. \tag{12}$$

It should be noted that Θ_A can be smaller or larger than 1, depending on the parameter values of s, c, and Π. In other words, none of the organizational forms in our framework strictly dominates the other one for all parameters. A differentiation of Θ_A with respect to c and Π yields the following results:

Lemma 1. *The relative attractiveness of integration increases in firm's operating profit* Π $\left(i.e., \frac{\partial\Theta_A}{\partial\Pi} > 0\right)$*, decreases in cultural distance* c $\left(i.e., \frac{\partial\Theta_A}{\partial c} < 0\right)$*, and the negative effect of cultural distance on the attractiveness of integration is less pronounced the higher* Π $\left(i.e., \frac{\partial^2\Theta_A}{\partial c\partial\Pi} > 0\right)$*.*
Proof. *See Appendix A.1.* □

The intuition behind this lemma is as follows. First, since the benefit of integration lies in a better coordination of decisions across the units, a higher potential profit Π induces the HQs to integrate their suppliers into firm boundaries, to increase the goods' quality and reap this profit. Second, an improved quality provision under integration comes at a cost of higher cultural frictions and lower managerial non-monetary job satisfaction compared to outsourcing. The higher the cultural distance c, the larger the importance of these non-monetary cost, making at some point outsourcing preferable, despite a loss in coordination. Third, since HQ managers in our model always trade-off monetary profits vs. non-monetary job satisfaction, the negative effect of cultural distance on the relative attractiveness of integration becomes less pronounced the higher monetary profit Π.

The subsequent section embeds the baseline framework developed above into a simple model of global sourcing to derive testable predictions for our ensuing empirical analysis of multinational firm boundaries.

2.2 Global Sourcing

Consider 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 baseline model, there are two types of firms: HQ and manufacturing suppliers, operated by managers A and B, respectively. For expositional purposes, we assume that headquarters are located in N, while manufacturing suppliers are located in S.[12] In this

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

set-up, the cultural distance c introduced in the previous section refers to differences in national cultural values between managers from N and S.

Preferences of an individual i are given by the following two-tier utility function:

$$U_i = z_i + \mu \ln X_i + \mathbf{1}_{i=A,\,B}\, j_i \quad , \quad X_i = \left[\int_{v \in V} q(v)^{\frac{1}{\sigma}} x(v)^{\frac{\sigma-1}{\sigma}} \mathrm{d}v \right]^{\frac{\sigma}{\sigma-1}} , \tag{13}$$

where z_i denotes consumption of a homogenous numeraire-good, X_i is an index of aggregate consumption of differentiated varieties $v \in V$, and μ is a parameter governing the intensity of preferences for differentiated goods. The index X_i is a constant elasticity of substitution (CES) aggregate of the quantity $x(v)$ and quality $q(v)$ of differentiated varieties, where $\sigma > 1$ represents the elasticity of substitution between any two varieties. The indicator function $\mathbf{1}_{i=A,\,B}$ takes the value one if an individual i is a manager and zero otherwise, where j_i represents managerial job satisfaction introduced in section 2.1.[13] As shown in Appendix A.3, this utility function delivers the indirect utility (welfare) which is linear in individual's income. This result provides a theoretical underpinning for the welfare function from equation (1) in the baseline model.

The production side of the model draws on Antràs and Helpman (2004). The numéraire good z_i is produced in both countries under constant returns to scale and perfect competition. This good is assumed to be costlessly traded, implying the same unit price in all regions. Production of the differentiated goods is conducted under monopolistic competition. HQ specialize in the provision of headquarter services h, while manufacturing suppliers provide manufacturing components m. Each unit of h and m is produced from one unit of labor. Both inputs are combined into goods $x(v)$ according to the following Cobb-Douglas production function:[14]

$$x(v) = \varphi \left(\frac{h}{\eta} \right)^{\eta} \left(\frac{m}{1-\eta} \right)^{(1-\eta)} , \tag{14}$$

where $\eta \in (0,1)$ is an industry-specific parameter capturing the relative importance of headquarter services in the production process and φ denotes firm-specific productivity. Building on Melitz (2003), we assume that this productivity is drawn by HQ managers A upon paying the fixed costs of entry, f_E (measured in units of A's welfare, W_A) from the known distribution function $G(\varphi)$. To simplify on notation, we drop the variety-index v from here onward and identify firms by their productivity, φ.

Before presenting the equilibrium of the game, it is worth pausing to discuss the key difference between our model and the standard model of global sourcing by Antràs and Helpman (2004).

[13] The utility function in equation (13) generalizes the standard quasi-linear function assumed in Antràs and Helpman (2004) in two key aspects. First, building on Hart and Holmström (2010), we introduce managerial job satisfaction into the utility function. Second, we allow differentiated varieties to differ in their quality, $q(v)$.

[14] In principle, the goods produced by the manufacturer may constitute either final goods or—similarly to Antràs (2003)—intermediate composites which are shipped to the HQ and converted by the latter to final goods using a costless one-to-one production technology.

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 into input provision, extensively studied in the Property Rights Theory of the firm by Grossman and Hart (1986) and Hart and Moore (1990). Instead, we assume that the *quality* of differentiated goods, q 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. As in the baseline model, the functional forms for the quality and managerial job satisfaction are drawn from Conconi et al. (2012) and Legros and Newman (2013) and are given by equation (2).

As shown in Appendix A.3, the utility function imposed in equation (13) implies the following revenue from the sales of the final goods:

$$R = (q(\alpha, \beta)D)^{\frac{1}{\sigma}} \left(\varphi \left(\frac{h}{\eta} \right)^{\eta} \left(\frac{m}{1-\eta} \right)^{(1-\eta)} \right)^{\frac{\sigma-1}{\sigma}}, \tag{15}$$

where $q(\alpha, \beta)$ is given by equation (2) and D is the exogenous factor (demand shifter) which is constant across all firms. The associated joint operating profit reads:

$$\pi = R - h - m. \tag{16}$$

Since input quantities are verifiable by the courts, parties choose the amounts of h and m that maximize the joint operating profit. Using equation (15), this maximization problem yields equilibrium input quantities $h = \eta \frac{\sigma-1}{\sigma} R$ and $m = (1-\eta)\frac{\sigma-1}{\sigma} R$. Plugging these quantities back in equation (15) and utilizing the resulting expression in equation (16) yields joint operating profit for any tuple $\{\alpha, \beta\}$:

$$\pi = q(\alpha, \beta)\Pi(\varphi), \tag{17}$$

where

$$\Pi(\varphi) = \varphi^{\sigma-1} \frac{D}{\sigma} \left(\frac{\sigma-1}{\sigma} \right)^{\sigma-1} \tag{18}$$

denotes the maximum operating profit that can be obtained on the market from the sales of differentiated goods. Importantly, notice that equation (17) provides an underpinning for the multiplicative relationship between quality q and maximum operating profit Π assumed in the baseline model, see equation (3).

Based on their firms' productivities, managers A self-select into integration vs. outsourcing by comparing their welfare under the respective organizational mode. To ensure the coexistence of integration and outsourcing in industry equilibrium, we assume that each organizational form $k \in \{I, O\}$ entails additional fixed cost, f^k, which are orthogonal to the cost of cultural distance.

Following Antràs and Helpman (2004), we assume that $f^I > f^O$. Intuitively, the integration of a subsidiary into firm boundaries may entail additional merger and acquisition expenses and increase managerial overload, compared to dealing with independent supplier. Under this assumption, we obtain the sorting of firms into integration vs. outsourcing as illustrated in Figure 1a.

Figure 1. *Organizational choice in industry equilibrium*

(a) *Sorting pattern.* (b) *Increase in cultural distance, $c' > c$.*

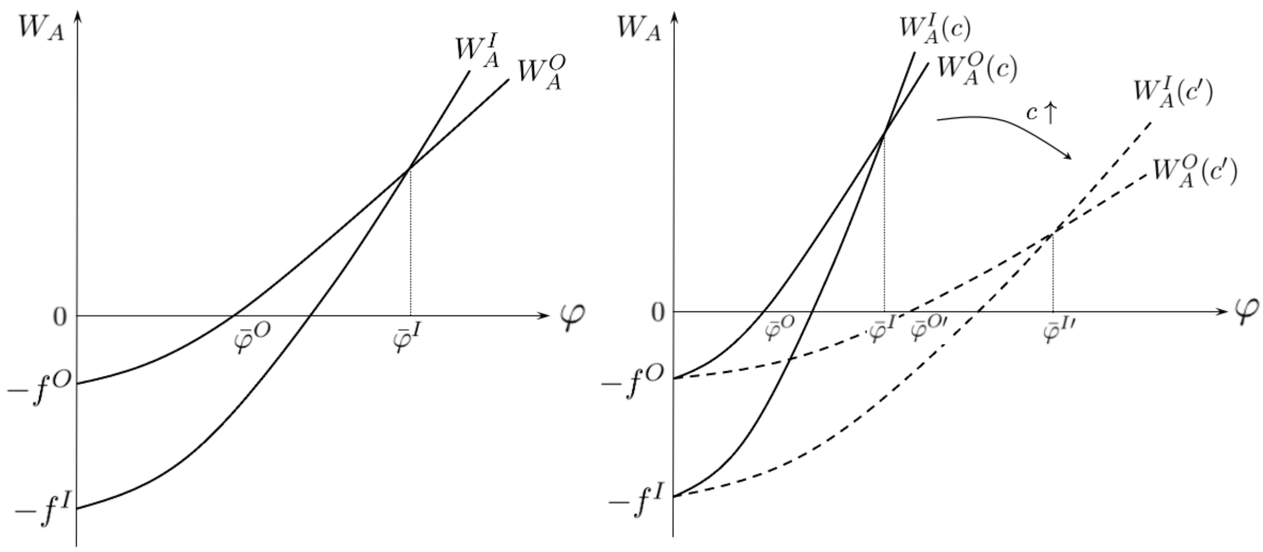

Figure 1a is constructed based on the following results, formally derived in Appendix A.4. First, we show that, while A's welfare increases in firm productivity φ under both organizational forms (i.e., $\frac{\partial W_A^I}{\partial \varphi} > 0$ and $\frac{\partial W_A^O}{\partial \varphi} > 0$), this increase is more pronounced under integration, (i.e., $\frac{\partial W_A^I}{\partial \varphi} > \frac{\partial W_A^O}{\partial \varphi}$). The intuition behind this result lies in the supermodularity of firm profits in productivity φ and final goods quality q, see equation (17). Since goods quality is higher under integration, $q^I > q^O$ (see previous section), the effect of productivity on firm profits (and managerial welfare) is disproportionately higher within an integrated organizational structure. This result is in line with Lemma 1, showing that the relative attractiveness of integration increases in firm's profit Π, which is a positive function of φ in the current set-up. Together with the fact that $\lim_{\varphi \to \infty} W_A^I > \lim_{\varphi \to \infty} W_A^O$, we have a unique crossing point of W_A^I and W_A^O. The intersection of these two curves yields the cutoff $\bar{\varphi}^I$, implicitly defined by $W_A^I(\bar{\varphi}^I) - f^I = W_A^O(\bar{\varphi}^I) - f^O$, such that manager A prefers integration over outsourcing for any $\varphi \geq \bar{\varphi}^I$. In principle, the W_A^I curve can cross the W_A^O curve to the right or to the left of cutoff $\bar{\varphi}^O$, defined by $W_A^O(\bar{\varphi}^O) - f^O = 0$, above which outsourcing yields a positive welfare, i.e., $W_A^O > 0$. In order to ensure the coexistence of the two organizational forms in industry equilibrium, we assume that W_A^I crosses W_A^O in the positive range, which yields the pattern illustrated in figure 1a:[15] Managers of the least productive firms, $\varphi < \bar{\varphi}^O$, exit the industry after drawing their productivity; managers of firms with

[15] If W_A^I crosses W_A^O in the negative range, which occurs if f^I is sufficiently small compared to f^O, we have $\bar{\varphi}^I < \bar{\varphi}^O$ and outsourcing would be strictly dominated by integration. To generate a non-trivial trade-off between integration and outsourcing in industry equilibrium, we thus implicitly assume f^I to be sufficiently large.

intermediate productivities, $\varphi \in [\bar{\varphi}^O, \bar{\varphi}^O)$, interact with their manufacturers at arm's-length, while the most productive firms, with $\varphi \geq \bar{\varphi}^I$, integrate their producers into firm boundaries.

Consider now the effect of cultural distance c on the prevalence of the two organizational forms in industry equilibrium. As illustrated in Figure 1b, both welfare curves pivot to the right as cultural distance increases to $c' > c$ and the relevant cutoffs ($\bar{\varphi}^O$ and $\bar{\varphi}^I$) shift to the right (to $\bar{\varphi}^{O\prime}$ and $\bar{\varphi}^{I\prime}$, respectively). We show in Appendix A.4 that, for a given increase in c, the right-ward shift of $\bar{\varphi}^I$ is more pronounced than the right-ward shift of $\bar{\varphi}^{O\prime}$ and, hence, the share of firms choosing integration over outsourcing decreases. We summarize this result in

Proposition 1. *In a given industry, the prevalence of integration vs. outsourcing decreases the higher cultural distance c between the HQ's and the supplier's managers.*
Proof. See Appendix A.4. □

Lastly, consider the choice of the organizational form from the perspective of a single firm. Substituting for π from equation (3) using equation (17) immediately yields the following result:

Proposition 2. *For any given relationship between a HQ and a manufacturing supplier, the relative attractiveness of integration decreases in cultural distance c between the HQ's and the supplier's managers. This effect is less pronounced the higher firm productivity, φ.*
Proof. Follows immediately from Lemma 1. □

Intuitively, the HQ manager's incentive to integrate a supplier into firm boundaries in order to better coordinate the decisions between firm units is lower the higher cultural frictions encountered by this manager during this coordination process. The reason why the relative disadvantage of integration under a higher cultural distance is reduced with higher firm productivity is related to the fact that coordination of decisions and goods' quality is higher under integration than under outsourcing. The higher the firm's productivity, the larger this advantage relative to the loss of non-monetary job satisfaction due to cultural frictions under integration. Since managers of more productive HQ firms receive a relatively higher monetary payoff, they may have an incentive to integrate their manufacturers despite the associated cultural frictions, in order to ensure that their monetary profits are not impaired by a poor coordination of decisions across firm units.

3 The Empirical Analysis

In the previous section, we hypothesized that cultural distance decreases the attractiveness of integration vs. arm's-length transaction, and that this effect is mitigated by the productivity of the HQ firm. To investigate whether these predictions are borne out in the data, we use several datasets that measure cultural distance, the intensity of intra-firm cross-border import flows, ownership structure of firms, and a number of other potential determinants of international make-or-buy decisions. We conduct our analysis in three consecutive steps, employing at each step an increasingly disaggregated measure of cultural distance. We start our analysis using broad country-pair measures of cultural distance. In the second step, we construct a novel measure of cultural distance that varies across countries *and* industries. Finally, we exploit unique firm-level data on managerial nationalities to construct a firm-pair specific measure of cultural distance. To rule out alternative explanations, each econometric model uses an extensive list of controls and a broad spectrum of fixed effects. Across datasets, controls and estimation approaches, we consistently find that cultural distance is associated with decreased incidence of integration vs. arm's-length transactions. Moreover, we also find that the negative effect of cultural distance on the relative attractiveness of integration is mitigated by the HQ's productivity.

3.1 Cross-country Variation of Cultural Distance

3.1.1 Data and Econometric Specification

We start the empirical analysis with 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, HS6) 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.[16] We use the share of related-party imports in total imports as the dependent variable (henceforth intra-firm import share, $IFIS$). 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 start by investigating the direct relationship between cultural distance and intra-firm imports.[17] The baseline specification in this section reads:

$$IFIS_{p\ell t} = \gamma\, Cultural\ distance_{US,\ell} + \boldsymbol{x}\boldsymbol{X}_{US,\ell} + \boldsymbol{z}\boldsymbol{Z}_{\ell t} + \phi_p + \phi_t + \varepsilon_{p\ell t}, \tag{19}$$

where $IFIS$ is the U.S. intra-firm import share, and p, ℓ, and t index products, foreign countries, and years, respectively. Our key explanatory variable $Cultural\,distance_{US,\ell}$ measures cultural distance between the U.S. and country ℓ, with the expected sign of the coefficient $\gamma < 0$. Vector $\boldsymbol{X}_{US,\ell}$ (with the associated coefficient vector $\boldsymbol{x}$) contains standard gravity controls, and vector $\boldsymbol{Z}_{\ell t}$ (with the coefficient vector $\boldsymbol{z}$) includes additional controls that vary by country and year. An important feature of our analysis is the inclusion of product fixed effects, ϕ_p, which account for

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

[17] We consider the interaction between cultural distance and firm productivity in sections 3.2 and 3.3.

heterogeneity across goods (e.g., with respect to capital intensity, contractibility, transportability, etc.); ϕ_t denotes year fixed effects, and $\varepsilon_{p\ell t}$ is an error term.

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); and *(iv)* 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.[18] Figure B.1 in Appendix presents the map of individualism scores. Original scores vary on a scale between 0 and 100, where a higher score means a higher level of individualism. For expositional purposes, we rescale the scores to a unit interval. Conveniently, the U.S. is the country with the highest individualism score. The cultural distance of country ℓ to the U.S. is calculated as $Cultural\ distance_{US,\ell} = |I_{US} - I_\ell|$, where I is a country's individualism score.

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 bilateral controls, $\boldsymbol{X}_{US,\ell}$. More specifically, we draw from the CEPII database by Mayer and Zignago (2011) the following standard set of control variables used in gravity regressions: $Geographic\ distance_{US,\ell}$ is the log distance between the biggest cities of the two countries; the dummy variable $Common\ border_{US,\ell}$ is set to 1 for pairs of countries that share a border; $Common\ language_{US,\ell}$, $Common\ legal\ origin_{US,\ell}$, and $Colonial\ links_{US,\ell}$ 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 $Common\ language_{US,\ell}$ does not sufficiently account for linguistic distance between the countries, see, e.g., Melitz and Toubal (2014). To account for this potential confounding factor, we draw from Spolaore and Wacziarg (2015) an additional distance measure $Linguistic\ distance_{US,\ell}$, which captures the expected linguistic distance between two randomly chosen individuals, one from the U.S. and one from country ℓ. In addition to the above-mentioned standard set of gravity controls, we include a proxy for $Freight\ costs_{US,\ell}$, 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. Summary statistics for the main

[18] We provide the robustness checks using other Hofstede's dimensions in section 3.3.

estimation sample are provided in Table B.1 in Appendix B.

To further mitigate the omitted variables bias, we include time-varying country-level controls $\boldsymbol{Z}_{\ell t}$. In particular, 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.[19] To rule out this alternative explanation, we include the log of a country's GDP per capita, $\log \mathit{(GDPpc)}_{\ell t}$ 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, $\log \mathit{(GDP)}_{\ell t}$ 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., Eppinger and Kukharskyy (2021). We draw from the World Bank's Worldwide Governance Indicators the rule of law index, Rule_{ℓ} – 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). Lastly, we control for the foreign country's level of Trust_{ℓ}, taken from the World Values Survey.

3.1.2 Results

As a first pass at the data, Figure 2 plots the share of U.S. intra-firm imports aggregated at the country level and averaged over 2000-2011 against the cultural distance between the U.S. and a given country ℓ. The line depicts the fitted linear relationship between the variables and the results for the fitted line are reported in the top right corner. 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 1 reports estimates of equation (19). 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 significant after the inclusion of a range of gravity variables and controlling for trade cost 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 $\mathit{Cultural\ distance}_{US,\ell}$ remains significant after controlling for a foreign country's economic development and market size in column 4, as well as institutional

[19] 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 per capita income to intra-firm trade.

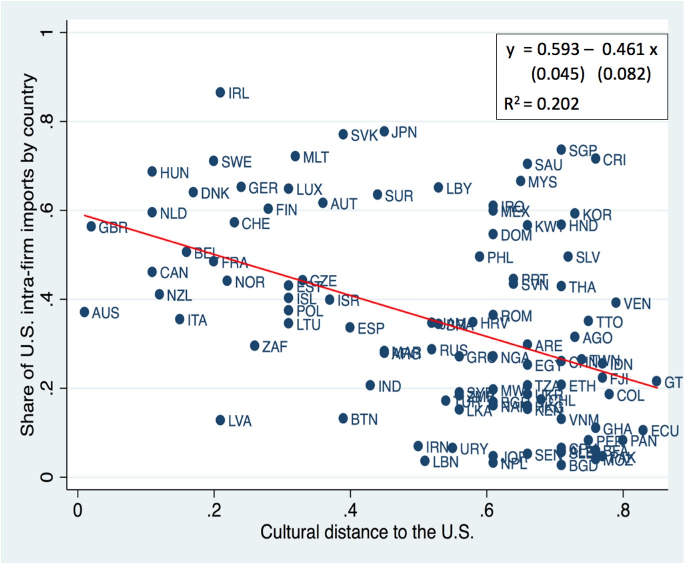

Figure 2. *Cultural distance and the share of intra-firm imports by country.*

quality and trust level in column 5. 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%.

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 rather than 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 or not to source products from a given country, 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 ℓ in a given year by the following Probit regression:[20]

$$\Pr(\Psi_{p\ell} = 1|\mathbf{K}_{p\ell}) = \Phi\left(\boldsymbol{\kappa}\mathbf{K}_{p\ell}\right), \tag{20}$$

where the vector $\mathbf{K}_{p\ell}$ (with associated coefficient vector $\boldsymbol{\kappa}$) contains product fixed effects ϕ_p, as well as all the country and country-pair specific variables contained, respectively, in vectors $\boldsymbol{Z}_{\ell t}$ and $\boldsymbol{X}_{US,\ell}$ from equation (19), see column 5 of Table 1.

We follow Helpman et al. (2008) and use *Religious distance*$_{US,\ell}$ as the selection variable.[21]

[20] As suggested by Wooldridge (2010), we estimate the Probit model for each year t.

[21] This variable is drawn from Spolaore and Wacziarg (2015) and captures the probability that two randomly selected individuals (one from each country) adhere to different world religions, as categorized by the World Christian Database.

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

	Dependent variable: Intra-firm import share, $IFIS_{p\ell t}$					
	(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
		(0.024)	(0.029)	(0.029)	(0.034)	(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**	-2.474***
			(0.573)	(0.679)	(0.849)	(0.890)
$\log(GDPpc)_{\ell t}$				-0.015	-0.042**	-0.048**
				(0.016)	(0.019)	(0.020)
$\log(GDP)_{\ell t}$				-0.006	-0.002	0.010
				(0.008)	(0.009)	(0.012)
Rule$_{\ell}$					0.043**	0.053**
					(0.021)	(0.022)
Trust$_{\ell}$					-0.035*	-0.034
					(0.020)	(0.021)
$IMR_{\rho\ell t}$						0.048**
						(0.022)
Product FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Observations	1,460,334	1,460,334	1,420,879	1,412,085	1,389,657	1,389,321
R^2	0.151	0.163	0.169	0.169	0.171	0.171

Notes: The table reports OLS estimates of equation (19) 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.

The idea behind this approach is that religious beliefs may affect a multinational firm's decision to enter a given foreign market but once the entry decision is made, the choice whether to co-operate with a given business partner at arm's-length or within firm boundaries is likely to be independent of religious distance. After we verify that *Religious distance*$_{US,\ell}$ enters negatively and significantly the first-stage (selection) regression (20), we use the estimated specification (20) to compute the inverse Mills ratios ($IMR_{p\ell t}$), which we include in the second-stage equation (19) to correct for potential selection bias, see Wooldridge (2010). Column 6 from Table 1 reports the estimates of equation (19) after sample selection correction. The coefficient of *Cultural distance*$_{US,\ell}$ remains negative, albeit slightly diminished 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. First, we find that the link between *Cultural distance*$_{US,\ell}$ and $IFIS_{p\ell t}$ 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 Antràs 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 (e.g., a country's human and physical capital abundance using time-varying proxies from Penn World Tables), and we also experiment with alternative proxies for institutions (using World Bank's Doing Business database or International Country Risk Guide data). Throughout specifications, the negative coefficients on $Cultural\ distance_{US,\ell}$ remain 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 (e.g., historical commercial ties). 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 Industry/Country Variation of Cultural Distance

3.2.1 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 HS6 product-level data, we now exploit industry-level information, categorized according to the 6-digit North American Industry Classification System (NAICS). This slightly less disaggregated data contains information on intra-firm imports by 390 manufacturing industries from 232 countries over 2000-2011.

Our baseline specification in this section is as follows:

$$IFIS_{i\ell t} = \gamma\, Cultural\ distance_{i\ell} + \phi_i + \phi_{\ell t} + \boldsymbol{\chi} \boldsymbol{X}_{i\ell(t)} + \varepsilon_{i\ell t}, \tag{21}$$

where $IFIS$ is the U.S. intra-firm import share and i, ℓ and t index industries, countries, and years, respectively. The key feature in this section is that our explanatory variable, $Cultural\ distance_{i\ell}$ now varies across countries *and* industries.[22] This approach allows us to address the above-

[22] We omit the subscript "US" to simplify on notation.

mentioned concern related to unobserved heterogeneity across foreign countries using country/year fixed effects, $\phi_{\ell t}$. Importantly, since the U.S. is the only source country in our analysis, the country fixed effects also fully account for country-*pair* specific factors. To mention just one example, $\phi_{\ell t}$ controls for differences in *bilateral* trust between the U.S. and a given source country (see Guiso et al. 2009). To account for industry-specific characteristics that have been identified in the literature as important determinants of the international make-or-buy decision (such as capital intensity, contractibility, relationship-specificity, etc.), we include industry fixed effects, ϕ_i. Lastly, we account for factors that vary by industry/country using a vector of (time-varying) industry/country-level controls, $\boldsymbol{X}_{i\ell(t)}$.

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. Decennial 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 the make-or-buy decision is made by a firm's managers (rather than employees), 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).[23] In addition to the ethnicity and occupation of a given respondent, the 2000 U.S. Census reports the industry affiliation of the respondent's occupation.[24] We exploit this information to calculate the ethnic shares of managers in a given industry. Finally, we use these shares as weights for the individualism levels of the ancestor's country of origin to obtain U.S. industry-specific individualism scores:

$$I_{i,US} = \sum_{\ell} \lambda_{\ell i} I_{\ell}, \tag{22}$$

[23] 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.

[24] This information is reported according to the NAICS Industry (INDNAICS) classification, which we map to NAICS codes using the crosswalk provided by the U.S. Census.

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

We construct 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 $Cultural\ distance^{(1)}_{i\ell} = |I^{(1)}_{i,US} - I_\ell|$. For the second measure, we assign the average U.S. individualism score to those respondents of the U.S. Census who do not report their ancestry, $I^{(2)}_{i,US} = \sum_\ell \tilde{\lambda}_{\ell i} I_\ell$. We denote the corresponding distance measure as $Cultural\ distance^{(2)}_{i\ell} = |I^{(2)}_{i,US} - I_\ell|$. 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) and Rauch and Trindade (2002). 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 i and Germany, we exclude German managers in this industry. Formally, we use $I^{(3)}_{i,US,Germany} = \sum_{\ell:\ell\neq Germany} \breve{\lambda}_{\ell i} I_\ell$ to compute $Cultural\ distance^{(3)}_{i,Germany} = |I^{(3)}_{i,US,Germany} - I_{Germany}|$. We take $Cultural\ distance^{(1)}_{i\ell}$ as our baseline measure of cultural differences and consider the other two proxies in the robustness checks.

Before introducing further variables, it is worth pausing to discuss two potential concerns regarding our industry/country measures of cultural distance. First, since managerial choice of industry affiliation is endogenous, one might be worried about reverse causality. In particular, one can envision a situation, in which a manager from a given cultural background decides in favor of a certain industry due to this industry's strong commercial ties with the country of origin of this manager's ancestors. Second, if ethnic composition of an industry is co-determined by its geographic location within the U.S., one might be concerned about the omitted variables bias. We believe that our results are not systematically driven by the two above-mentioned concerns, due to the following two reasons. First, while it is well conceivable that managers choose their industry affiliation or place of residence based on the overall connectedness of the industry or region to the country of their ancestors, it is unlikely that these choices are driven by the fact that firms in this industry import their inputs within firm boundaries rather than at arm's-length (our outcome variable). Second, our third measure of cultural distance, $Cultural\ distance^{(3)}_{il}$ excludes by construction those managers that might have chosen their industry affiliation based on its commercial ties to country of origin of their ancestors.[25]

Although country/year fixed effects fully control for the direct effect of a foreign country's economic development on the make-or-buy decision, it is conceivable that the role of economic de-

[25] We have also experimented with alternative variants of this index that exclude broadly defined ancestry groups 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 non-negligible share of population (e.g., Belgium). These alternative measures yield very similar results.

velopment varies depending on industry-specific characteristics. For instance, a foreign country's income level may have a differential impact on the intra-firm import share depending on income elasticity of the sourced goods. To address this concern related to industry/country-specific confounding factors, we follow the approach by Levchenko (2007) and include in 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 the economic development on firm boundaries across industries. On a related note, Eppinger and Kukharskyy (2021) show that a foreign country's contracting institutions (as measured by the rule of law index) have a differential impact on the integration decision depending on the industry's relationship-specificity. We control for this alternative explanation by adding a full set of interaction terms of industry dummies with $Rule_\ell$, defined as in section 3.1.1.[26]

We mitigate the potential concerns regarding the omitted variables by including in vector $\boldsymbol{X}_{i\ell(t)}$ the following industry/country(-year) controls. To account for standard Heckscher-Ohlin explanations of the structure of international trade, we include the following two interaction effects. To account for a differential impact of a foreign country's capital abundance depending on the capital intensity of an industry, we include $\textit{Capital interaction}_{i\ell t}=\log(K/L)_{\ell t}\times\log(K/L)_i$, where $\log(K/L)_{\ell t}$ 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, and $\log(K/L)_i$ is an industry's capital intensity, calculated as the (log of the) average real capital stock per worker in a given U.S. sector (see Antràs, 2015). Similarly, we control for $\textit{Skill interaction}_{i\ell t} = HC_{\ell t} \times \log(S/E)_i$, where $HC_{\ell t}$ 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, and $\log(S/E)_i$ is a measure of an industry's skilled intensity, drawn from Antràs (2015) and measured as the (log of the) average number of non-production (skilled) workers divided by total employment. 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. In particular, one could argue that a manager's ethnic background affects his or her understanding of (or reliance on) formal institutions, which, in turn, may have an impact on the make-or-buy decision. To address this concern, we include an industry/country-specific measure of $\textit{Institutional distance}_{i\ell} = |Rule_\ell - \sum_\ell \lambda_{\ell i} Rule_\ell|$, where $Rule_\ell$ is the rule of law index defined in section 3.1.1, and $\lambda_{\ell i}$ is the share of ethnic group ℓ in industry i, see equation (22). In the robustness checks, we consider further industry-country covariates introduced below.

[26] Note that this approach not only accounts for a differential impact of institutional quality depending on relationship-specificity of an industry's goods, but also across *arbitrary* industry-level characteristics.

3.2.2 Results

Table 2 reports estimates of equation (21) using the baseline measure of *Cultural distance*$_{i\ell}^{(1)}$. In line with our hypothesis from Proposition 1, the negative and significant raw correlation in column 1 suggests that firms tend to source inputs at arm's-length (rather than within firm boundaries) from countries that are culturally dissimilar to the firms' managers. This relationship alone accounts for almost 8 percent of the variation in intra-firm import shares, which is a large number given the multitude of possible country- and industry-level determinants of the international make-or-buy decision.

To ensure that this relationship is not confounded by omitted variables, columns 2 through 5 gradually include fixed effects and control variables. In column 2, we account for industry-specific differences using industry fixed effects. As mentioned above, the key advantage of our industry/country measure of cultural distance is that it allows for the inclusion of country/year fixed effects to account for unobserved heterogeneity across countries. As can be seen from columns 2 and 3, the direct effect of cultural distance is fully robust to the inclusion of these fixed effects. In column 4, we control for differential effects of a foreign country's economic development and institutions across U.S. industries using interactions of industry dummies with $\log(GDPpc)_{lt}$ and $Rule_\ell$, respectively. As we include the above-mentioned industry/country(-year) control variables in column 5, our key estimate remains virtually unchanged. Across specifications, we find that cultural distance has a negative and significant effect on the relative attractiveness of integration vs. arm's-length contracting.

Table 2. *U.S. Intra-firm Import Shares: Industry/country Variation of Cultural Distance (baseline measure).*

	Dependent variable: Intra-firm import share, $IFIS_{i\ell t}$				
	(1)	(2)	(3)	(4)	(5)
Cultural distance$_{i\ell}^{(1)}$	-0.421***	-0.439***	-0.417**	-0.389**	-0.398**
	(0.026)	(0.024)	(0.163)	(0.195)	(0.195)
Capital interaction$_{i\ell t}$					0.028*
					(0.015)
Skill interaction$_{i\ell t}$					-0.026
					(0.042)
Institutional distance$_{i\ell}$					1.852
					(5.811)
Industry FE	no	yes	yes	yes	yes
Country/Year FE	no	no	yes	yes	yes
Industry dummies×$\log(GDPpc)_{\ell t}$	no	no	no	yes	yes
Industry dummies×$Rule_\ell$	no	no	no	yes	yes
Observations	23,055	22,998	22,942	22,942	22,674
R^2	0.077	0.375	0.413	0.414	0.412

Notes: The table reports OLS estimates of equation (21) using the baseline measure of *Cultural distance*$_{i\ell}^{(1)}$. 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.

Table B.2 in Appendix B reruns the specification from Table 2 using alternative measures of cultural distance introduced in section 3.2.1. More specifically, panel A of the Appendix Table uses *Cultural distance*$^{(2)}_{i\ell}$, while panel B employs *Cultural distance*$^{(3)}_{i\ell}$ as the main explanatory variable. Throughout specifications, we continue to find a negative and significant effect of cultural differences on intra-firm import shares, in line with our hypothesis from Proposition 1.

We further validate these strong results in a wide range of unreported robustness checks. First, we construct the industry/country covariates from Table 2 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 *Institutional distance*$_{i\ell}$, we experiment with alternative measures of institutions from the World Bank and ICRG. Second, we exploit the World Values Survey to construct further industry/country-indices that might capture managerial traits. For instance, to control for differences in (managerial) work ethics, we construct an index $Work\ ethics_{i\ell} = |Work_\ell - \sum_\ell \lambda_{\ell i} Work_\ell|$, where $\lambda_{\ell i}$ is the share of ethnic group ℓ in industry i (constructed by analogy to equation (22)) and $Work_\ell$ is the percentage of population in country ℓ that pick "Hard Work" as the answer to the WVS question "What should children be taught at home?" Throughout robustness checks, we continue to find a negative and significant effect of cultural distance on intra-firm import shares.

3.3 Firm-pair Variation of Cultural Distance

3.3.1 Data and Econometric Specification

This section zooms even further into the link between cultural differences and firm boundaries by considering a novel firm-pair specific measure of cultural distance. All firm-level data used in the current section are drawn from the Orbis database by Bureau van Dijk (BvD) for the year 2014. This dataset has four unique features which are particularly useful for our analysis of cultural determinants of firm boundaries.[27] 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, Orbis data provide information on the nationality of the HQ's and subsidiary's top managers, which allows us to calculate *firm-pair* specific measures of cultural distance between parents and their affiliates. Third, 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. Lastly, it contains firms' balance sheet information, which allows us to construct measures of firm productivity and study the interaction thereof with cultural distance.

[27] See also Kalemli-Ozcan et al. (2015) for more details on this database.

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

$$\begin{aligned} O_{hs} = \gamma\, Cultural\ distance_{hs} + \rho\, Cultural\ distance_{hs} \times Productivity_h \\ + \phi_k + \phi_\ell + \phi_j + \phi_i + \phi_{kj} + \phi_{\ell i} + \phi_{k\ell} + \phi_h + \boldsymbol{\upsilon} \boldsymbol{X}_s + \epsilon_{hs}, \end{aligned} \tag{23}$$

where O_{hs} denotes one of the two alternative measures of the ownership intensity of a HQ h in its subsidiary s, introduced below; $Cultural\ distance_{hs}$ represents the firm-pair specific measure of cultural distance; $Productivity_h$ denotes one of the two alternative measures of h's productivity, introduced below; $\{\phi_k, \phi_\ell, \phi_j, \phi_i, \phi_{kj}, \phi_{\ell i}, \phi_{k\ell}, \phi_h\}$ is a set of fixed effects, where k and j index a HQ's country and industry, respectively (see below for details); $\boldsymbol{X}_s$ (with the associated coefficient vector $\boldsymbol{\upsilon}$) denotes the vector of subsidiary controls, and ϵ_{hs} is an error term. The expected signs of the coefficients are $\gamma < 0$ and $\rho > 0$.

We consider two alternative outcome variables. The first one, O_{hs}^{maj} is a binary variable, which takes the value one if the HQ owns the majority of the subsidiary's equity stake, and zero otherwise. The idea behind this approach is that an ownership link in which a HQ holds more than 50% of a subsidiary's equity stake resembles an integrated relationship, whereas firm pairs in which HQs do not have a controlling interest in the subsidiary are comparable to arm's-length cooperations.[28] For the construction of the second variable, we exploit the entire spectrum of direct ownership shares (in percent) of HQs in their subsidiaries.[29] Arguably, the same mechanisms that we developed in our theoretical framework for a binary organizational decision are at play for a continuous choice of the ownership share: By increasing her equity share in the subsidiary's company, the HQ manager gains additional voting rights, which allows her to better coordinate the decisions across firm units, but comes at a cost of lower non-monetary job satisfaction due to a push-back from a culturally distant subsidiary's manager. Hence, we expect to find the effect of cultural distance not only for the binary outcome variable but also for continuous ownership shares. For each outcome variable, $O_{hs} \in \{O_{hs}^{maj}, O_{hs}^{\%}\}$, we estimate the econometric model from equation (23) by OLS, where the regressions with the binary dependent variable O_{hs}^{maj} are interpreted as a linear probability model.[30]

To construct a firm-pair specific measure of cultural distance, we exploit the unique information on the nationality of firms' top managers (CEO, CFO, board of directors, etc.), as reported in the Orbis database. Using Hofstede's individualism scores, we compute the average level of individualism by firm.[31] Figure 3 illustrates as an example the histogram of these scores for

[28] Unfortunately, the relationships between strictly independent parties are not reported in the Orbis dataset.

[29] To facilitate the interpretation and comparability between the two measures, we rescale these percentages to a unit interval, i.e., $O_{hs}^{\%} \in (0, 1]$.

[30] All econometric models in this paper are estimated using Stata routine `reghdfe` by Correia (2014), which efficiently absorbs high-dimensional fixed effects. It should be noted that the battery of fixed effects used in our analysis render the non-linear models (such as probit or logit) computationally infeasible.

[31] In the robustness checks, we consider distance measures based on the other four Hofstede's cultural dimensions

firms in Belgium (left) and China (right).[32] Not surprisingly, we observe the spikes around the country's average individualism score (.75 for Belgium and .2 for China). At the same time, there is a substantial variation in cultural backgrounds of firms' managers even within individual countries. We exploit this fact to calculate the firm-pair measure of cultural distance, $Cultural\ distance_{hs} = |I_h - I_s|$, where I_h and I_s denote the individualism index of the HQ and the subsidiary firm, respectively.

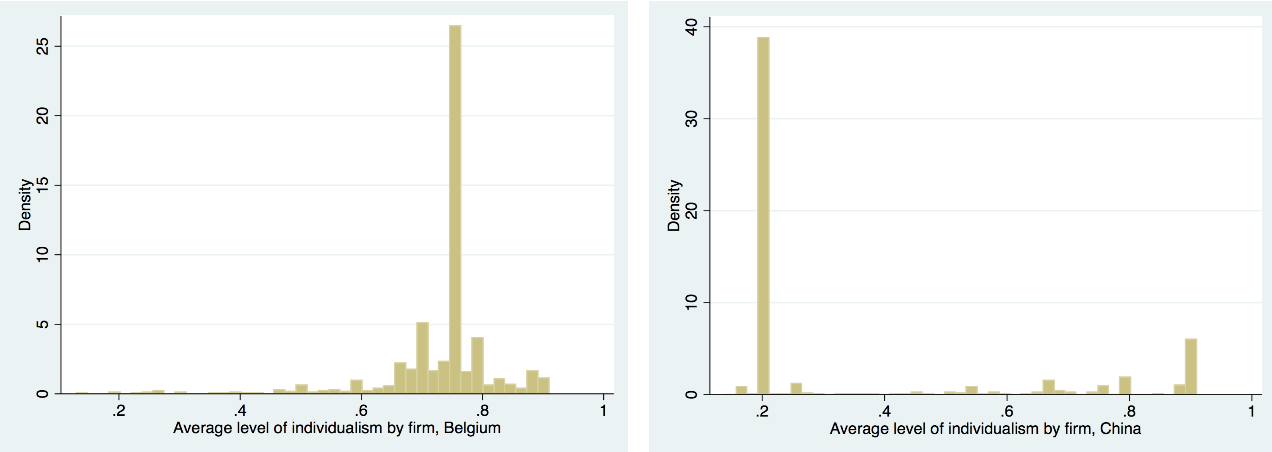

Figure 3. *Histogram of individualism levels by firm in Belgium (left) and China (right).*

Using balance sheet information from the Orbis data, we construct two alternative measures of HQ firm productivity, $Productivity_h$. Our baseline measure is the (log) of total factor productivity (TFP) estimated using the method by Levinsohn and Petrin (2003), henceforth $\log(TFP)_h$.[33] Furthermore, we readily observe in our data the (log of) HQ's value added, $\log(VA)_h$, which we use in the robustness checks as an alternative proxy for HQ's productivity.

Before introducing the set of fixed effects, it is important to understand first the structure of our data. The HQs and their subsidiaries can be located either in the same of in different countries.[34] Furthermore, the two firms can be active either in the same or in different industries, categorized according to the 4-digit NAICS classification.[35] Clearly, the location and industry affiliation of the cooperation partners is likely to affect the firm's ownership structure. We effectively account for all country- and industry-specific characteristics using a battery of fixed effects. More specifically, we control 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 HQ and subsidiary *country* fixed effects, ϕ_k and ϕ_ℓ. HQ and subsidiary industry fixed effects, ϕ_j and ϕ_i, account for industry-specific factors that have been identified in the literature as important drivers of firm boundaries (such as capital intensity, relationship-specificity, contractibility, etc.), see Antràs (2015). As

and alternative cultural categories by Schwartz (2006).

32 The number of firms underlying this histogram is 21,830 for Belgium and 20,875 for China.

33 We implement this estimation algorithm in Stata using the `levpet` command by Petrin et al. (2003).

34 The Orbis data report for each firm a unique country code based on the firm's country of incorporation.

35 The industry code is provided based on the firm's main industry affiliation reported to the BvD.

mentioned in the previous section, the effect of country-level factors on firm boundaries is likely to vary depending on industry-specific characteristics. For instance, the role of contracting institutions in the affiliate's country may be more pronounced in industries with high degree of relationship-specificity. We fully account for this and other country/industry-level determinants of firm boundaries with HQ and subsidiary country/industry fixed effects, ϕ_{kj} and $\phi_{\ell i}$.[36]

The econometric model from equation (23) further includes country-pair fixed effects, which fulfill two important functions. First, they account for whether a given firm pair constitutes a domestic or foreign ownership link. Second, in case of a foreign ownership link, they control for a wide range of country-pair specific factors that may confound the role of cultural distance on firm boundaries (e.g., bilateral investment costs, bilateral trust, historical connectedness, geographical distance, etc.). It should be further noted that country-pair fixed effects account for differences in cultural traits and ethnic ties between countries, allowing us to distill the role of firm-pair specific cultural distance *within* a given country-pair. This approach appears to be well-suited to test our theoretical hypotheses, which emphasize the effect of cultural frictions between firm managers whose cultural backgrounds may or may not be representative of the national culture of their current country of residence.

Although the above-mentioned battery of fixed effects controls for potential confounding factors related to country- and industry-specific factors, there remains a concern regarding omitted variables at the level of HQ firms. For instance, the HQ's productivity has been shown theoretically and empirically to have an impact on firm boundaries, see, e.g., Kohler and Smolka (2021) and Tomiura (2007). Fortunately, our data provide a way to control for unobserved heterogeneity across HQs. More specifically, because parent firms can have multiple subsidiaries located in different countries in our data, we can include HQ firm fixed effects ϕ_h and investigate the role of cultural distance *within* the same HQ. To illustrate the value-added of this within transformation with an example, consider a HQ of a multinational company with, say, an American CEO which has multiple subsidiaries around the globe. Using ϕ_h, we hold the HQ-firm culture fix (in the example above, American) and test whether this HQ owns lower shares in culturally distant subsidiaries (with, say, a Belgian manager) rather than culturally more proximate subsidiaries (with, say, an Australian manager).

The vector $\boldsymbol{X}_s$ contains two observable characteristics of the subsidiary firm: the (log of) revenue, $\log(Revenue)_s$ – a proxy for a subsidiary's size – and the (log of) capital intensity, $\log(K/L)_s$.[37]

[36] Since all firms in our database have a unique country and industry affiliation, HQ and affiliate country and industry fixed effects $\{\phi_k, \phi_\ell, \phi_j, \phi_i\}$ are nested within country/industry fixed effects $\{\phi_{kj}, \phi_{\ell i}\}$.

[37] Kukharskyy (2020) documents a negative relationship between ownership shares and subsidiary's capital intensity in the Orbis data.

3.3.2 Results

We start our empirical investigation of the econometric model from equation (23) using the binary variable O_{hs}^{maj} as an outcome variable. Table 3 develops our preferred specification step by step.[38] In the basic specification of column 1, we regress O_{hs}^{maj} against *Cultural distance*$_{hs}$, controlling for HQ and subsidiary country and industry fixed effects. Consistent with our first theoretical prediction, we find that the HQ is less likely to hold a majority (rather than minority) ownership stake in its subsidiary the higher cultural distance between the firms' managers. In column 2, we apply a more demanding test, by including HQ and subsidiary country/industry FE. In so doing, we effectively control for a differential impact of country-specific factors depending on an industry's characteristics. The estimated coefficient on *Cultural distance*$_{hs}$ somewhat decreases in size but remains significant. In column 3, we further add country-pair fixed effects, which fully account for all factors specific to a pair of countries. The estimate of *Cultural distance*$_{hs}$ increases in magnitude and retains the significance at the 1% level. Most importantly, we continue to find a negative and significant effect of cultural distance on the HQ's probability to choose a majority rather than a minority ownership share in the subsidiary's company after controlling for HQ firm fixed effects in column 4. To illustrate the economic significance of this effect, consider a HQ firm managed by a French manager, which has two subsidiaries, with the first one being managed by a Belgian and the second by a Chinese manager. Our estimate from column 4 suggests that, on average, a French-led HQ firm is 17% less likely to hold a majority ownership in the affiliate managed by a Chinese manager compared to the one led by a Belgian manager.[39] It should be noted that these estimates are not confounded by the location of the two affiliates, since all country-specific factors (including policy restrictions on foreign equity ownership) are fully accounted for via country and country-pair fixed effects. Furthermore, they are not driven by the fact that the two affiliates are active in different industries, which is controlled for via industry fixed effects. Most importantly, since the effect is estimated *within* a HQ firm, it fully accounts for unobserved heterogeneity across parent companies (e.g., with respect to productivity).

In column 5, we add to our specification the interaction term of *Cultural distance*$_{hs}$ and firm productivity, $\log(TFP)_h$. In line with our hypothesis from Proposition 2, the estimate of this interaction effect is positive and significant, suggesting that the negative effect of cultural distance on firm boundaries is mitigated in high-productivity firms. Both the direct and the interaction effect retain the predicted sign and are significant in column 6, which additionally controls for the subsidiary's revenue and capital intensity. The latter estimates suggest that HQs are less likely to hold majority stakes in larger and more capital-intensive subsidiaries.

[38] It should be noted at the outset that, since the measure of firm productivity are available only for a subset firms, we examine its interaction with cultural distance only after the inclusion of all fixed effects to maximize the number of observations.

[39] The distance between French and Belgian cultural backgrounds with respect to individualism is 0.04 points on the unit interval, while it is 0.51 points between French and Chinese cultures.

Table 3. *Majority Ownership and Firm-pair Variation of Cultural Distance.*

	Dependent variable: Majority ownership dummy, O_{hs}^{maj}					
	(1)	(2)	(3)	(4)	(5)	(6)
Cultural distance$_{hs}$	-0.149***	-0.141***	-0.263***	-0.373***	-1.281***	-1.916***
	(0.019)	(0.019)	(0.021)	(0.026)	(0.278)	(0.398)
Cultural distance$_{hs}\times\log(TFP)_h$					0.125***	0.215***
					(0.040)	(0.060)
$\log(Revenue)_s$						-0.017***
						(0.003)
$\log(K/L)_s$						-0.024***
						(0.002)
HQ country FE	yes	nested	nested	nested	nested	nested
Subsidiary country FE	yes	nested	nested	nested	nested	nested
HQ industry FE	yes	nested	nested	nested	nested	nested
Subsidiary industry FE	yes	nested	nested	nested	nested	nested
HQ country/industry FE	no	yes	yes	nested	nested	nested
Subsidiary country/industry FE	no	yes	yes	yes	yes	yes
Country-pair FE	no	no	yes	yes	yes	yes
HQ firm FE	no	no	no	yes	yes	yes
Observations	347,265	344,002	343,492	226,725	50,751	27,002
R^2	0.197	0.283	0.288	0.673	0.619	0.675

Notes: The table reports OLS estimates of equation (23) with a binary outcome variable O_{hs}^{maj}, which is equal to one if the HQ (h) owns the majority of the subsidiary's (s) equity stake and zero otherwise. See text for details on the definition of variables. Robust standard errors are clustered at the level of HQ firm and presented in parentheses. ***, **, * denote 1, 5, 10 % significance, respectively.

Table 4 reruns the regressions from Table 3 using the continuous ownership share $O_{hs}^{\%}$ as a dependent variable. Throughout specifications, we find a negative and significant effect of cultural distance on the HQs' ownership shares in their subsidiaries. A quantitative interpretation of the effect of cultural distance on ownership shares estimated in column 4, which controls for HQ firm fixed effects, can once again be provided using the above-mentioned example of a HQ and its two affiliates. The HQ firm governed by a French manager chooses on average a 16% lower ownership share in the affiliate company led by a Chinese manager, as compared to an affiliate led by a Belgian manager. In line with our hypothesis from Proposition 2, we also find that the negative effect of cultural distance on ownership shares is mitigated in more productive firms.

In our analysis so far, we have measured cultural distance using the individualism vs. collectivism index by Hofstede. Table 5 verifies the robustness of our results to considering a wide range of alternative cultural dimensions. In panel A, we consider the remaining four Hofstede's dimensions: power distance (strength of social hierarchy), uncertainty avoidance (sensitivity to ambiguity and uncertainty), masculinity-femininity (task orientation versus person-orientation), and long-term orientation (focus on future rather than present outcomes). In panel B, we exploit alternative cultural dimensions suggested by Schwartz (2006): harmony, embeddedness, hierarchy, mastery, affective autonomy, intellectual autonomy, and egalitarianism. To economize on space, Table 5 reports the results both for the binary (O_{hs}^{maj}) and the continuous dependent vari-

Table 4. *Ownership Shares and Firm-pair Variation of Cultural Distance.*

	Dependent variable: Ownership share, $O^{\%}_{hs}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$Cultural\ distance_{hs}$	-0.142***	-0.135***	-0.245***	-0.340***	-1.097***	-1.368***
	(0.016)	(0.016)	(0.018)	(0.022)	(0.209)	(0.283)
$Cultural\ distance_{hs} \times \log(TFP)_h$					0.101***	0.146***
					(0.031)	(0.044)
$\log(Revenue)_s$						-0.012***
						(0.002)
$\log(K/L)_s$						-0.020***
						(0.001)
HQ country FE	yes	nested	nested	nested	nested	nested
Subsidiary country FE	yes	nested	nested	nested	nested	nested
HQ industry FE	yes	nested	nested	nested	nested	nested
Subsidiary industry FE	yes	nested	nested	nested	nested	nested
HQ country/industry FE	no	yes	yes	nested	nested	nested
Subsidiary country/industry FE	no	yes	yes	yes	yes	yes
Country-pair FE	no	no	yes	yes	yes	yes
HQ firm FE	no	no	no	yes	yes	yes
Observations	347,265	344,002	343,492	226,725	50,751	27,002
R^2	0.246	0.341	0.347	0.723	0.680	0.728

Notes: The table reports OLS estimates of equation (23) with continuous outcome variable $O^{\%}_{hs}$, measuring the direct ownership share (in percent) of a HQ h in its subsidiary s. See text for details on the definition of variables. Robust standard errors are clustered at the level of HQ firm and presented in parentheses. ***, **, * denote 1, 5, 10 % significance, respectively.

able ($O^{\%}_{hs}$). For each outcome variable, the first column reports the estimates of γ from equation (23), whereas the second column presents the estimates of ρ. For each cultural dimension, we report only the preferred specification, which includes the full set of fixed effects and controls from Table 3.

As can be seen from Table 5, the relative attractiveness of integration continues to be negatively and generally significantly associated with cultural distance regardless of the employed definition of the latter variable, both for the binary (column 1) and the continuous outcome variable (column 3). In particular, the coefficient of $Cultural\ distance_{hs}$ is significant at least at the 5% level in nineteen out of twenty two cases. Furthermore, in line with our hypothesis from Proposition 2, the interaction effect of cultural distance and firm productivity is positive and mostly significant throughout specifications (cf. columns 2 and 4). Note that many of these cultural distance variables are not as strong as cultural distance along the individualism-collectivism dimension. These results tend to suggest that cultural differences along the individualism-collectivism dimension matter most robustly in terms of cultural frictions in business and firm relationships.

Table B.3 in Appendix B reruns the econometric model from equation (23) using $\log(VA)_h$ (instead of $\log(TFP)_h$) as a proxy for HQ's productivity, $Productivity_h$. The results are very similar to the ones reported in Tables 3, 4, and 5. More specifically, the effect of cultural distance on both O^{maj}_{hs} and $O^{\%}_{hs}$ is negative and highly significant regardless of the cultural dimension at

Table 5. *Alternative Measures of Cultural Distance.*

	Dependent variable: O_{hs}^{maj}		Dependent variable: $O_{hs}^{\%}$	
	Coefficients of			
	Cultural distance$_{hs}$	*Cultural distance*$_{hs}$ $\times\log(TFP)_h$	*Cultural distance*$_{hs}$	*Cultural distance*$_{hs}$ $\times\log(TFP)_h$
Cultural dimensions:	(1)	(2)	(3)	(4)
Panel A. Hofstede				
Power distance	-0.924***	0.091*	-0.719***	0.062*
	(0.328)	(0.049)	(0.241)	(0.036)
Uncertainty avoidance	-1.083***	0.117**	-0.859***	0.087**
	(0.383)	(0.055)	(0.290)	(0.042)
Masculinity-femininity	-1.240***	0.132**	-1.077***	0.105**
	(0.398)	(0.060)	(0.303)	(0.045)
Long-term orientation	-1.988***	0.244***	-1.708***	0.196***
	(0.524)	(0.076)	(0.391)	(0.056)
Panel B. Schwartz				
Harmony	-0.721**	0.074*	-0.549**	0.047
	(0.294)	(0.044)	(0.221)	(0.033)
Embeddedness	-0.686**	0.071	-0.667***	0.066**
	(0.307)	(0.043)	(0.240)	(0.033)
Hierarchy	-0.502**	0.050	-0.473***	0.045*
	(0.235)	(0.035)	(0.162)	(0.025)
Mastery	-1.508***	0.142*	-1.108***	0.104*
	(0.533)	(0.078)	(0.382)	(0.056)
Affective autonomy	-0.300*	0.028	-0.364***	0.034*
	(0.174)	(0.025)	(0.130)	(0.019)
Intellectual autonomy	-0.464	0.050	-0.443*	0.047
	(0.292)	(0.041)	(0.228)	(0.031)
Egalitarianism	-0.707***	0.072*	-0.471**	0.039
	(0.255)	(0.038)	(0.187)	(0.028)

Notes: The table reports OLS estimates of equation (23) with the full set of fixed effects and control variables from column 6 of Table 3. The outcome variable in columns 1 and 2 is O_{hs}^{maj}, and the outcome variable in columns 3 and 4 is $O_{hs}^{\%}$. Panels A and B consider alternative measures of *Cultural distance*$_{hs}$, constructed using cultural dimensions by Hofstede and Schwartz, respectively. Columns 1 and 3 present direct correlations of *Cultural distance*$_{hs}$ with O_{hs}^{maj} and $O_{hs}^{\%}$, respectively. Columns 2 and 4 report the interactions of *Cultural distance*$_{hs}$ with $\log(TFP)_h$ in their impact on O_{hs}^{maj} and $O_{hs}^{\%}$, respectively. The R^2 and the number of observations vary by the employed measure, but are generally comparable to column 6 of Table 3. Robust standard errors are clustered at the level of a HQ firm and presented in parentheses. ***, **, * denote 1, 5, 10 % significance, respectively.

hand. Furthermore, the positive interaction effect between cultural distance and firm's value added is significant throughout at least at the 5% level for O_{hs}^{maj} as a dependent variable and in 9 out of 12 cases for $O_{hs}^{\%}$ as a dependent variable.

Table 6 further verifies the robustness of our results to considering only those firm-pairs in which a HQ is active in a different industry than its subsidiaries (i.e., $j \neq i$). The idea behind this robustness check is that the theoretical framework by Antràs (2003) is commonly interpreted as the model of vertical (rather than horizontal) integration. Since a subsidiary active in a different industry from its parent company is less likely to replicate the activity of the HQ, by excluding firm-pairs active in the same industry, the restricted sample is more likely to contain vertical rather than horizontal relationships.[40] Table 6 shows that both the direct and the interaction effects are in line with our theoretical predictions, regardless whether we consider a binary or a

[40] The same approach has been applied by Alfaro and Charlton (2009) and Fajgelbaum et al. (2015).

continuous dependent variable. Overall, the evidence uncovered in the three-pronged approach suggests that higher cultural distance decreases the relative attractiveness of integration, yet this effect is less pronounced the higher HQ firm productivity.

Table 6. *Ownership Structure and Firm-pair Cultural Distance (alternative industry samples).*

	Dependent variable: O_{hs}^{maj}	Dependent variable: $O_{hs}^{\%}$
$Cultural\ distance_{hs}$	-2.003***	-1.453***
	(0.581)	(0.379)
$Cultural\ distance_{hs} \times \log(TFP)_h$	0.209**	0.144**
	(0.087)	(0.059)
Subsidiary country/industry FE	yes	yes
Country-pair FE	yes	yes
HQ firm FE	yes	yes
Subsidiary controls from Table 3	yes	yes
Observations	17,988	17,988
R^2	0.697	0.748

Notes: The table reports OLS estimates of equation (23) with the full set of fixed effects and control variables from column 6 of Table 3. The outcome variable is O_{hs}^{maj} in column 1 and $O_{hs}^{\%}$ in column 2. This Table restricts the sample to those firm-pairs in which a HQ is active in a different industry than its subsidiaries, $j \neq i$. Robust standard errors are clustered at the level of HQ firm and presented in parentheses. ***, **, * denote 1, 5 % significance, respectively.

4 Conclusion

This paper provides a systematic analysis of the relationship between cultural distance and multinational firm boundaries. To guide our empirical investigation, we develop a simple theoretical model which suggests that multinational firms are less likely to integrate their business partners into firm boundaries the higher the cultural distance between the firms' managers. Moreover, our model predicts that the negative effect of cultural distance on the relative attractiveness of integration is mitigated in more productive firms. Combining product/country, and industry/country and firm-pair data with various proxies for cultural differences, we find strong empirical support for the model's predictions. These results are robust to controlling for a host of unobserved country-, industry-, and firm-specific factors via fixed effects. We conclude that cultural distance is an important determinant of the multinational firms' boundaries that has been previously understudied by the economics literature.

While our paper sheds new light on the interaction between cultural distance and capital intensity in their impact on firm boundaries, we see it merely as a stepping stone towards obtaining a more profound picture of the differential effect of culture across various country- and industry-specific characteristics. In particular, it may be interesting to explore whether the relationship between cultural distance and firm boundaries systematically varies depending on the institutional quality (in particular, with respect to contracting institutions). Given that introduction of this additional interaction effect into our theoretical model and its empirical investigation would go beyond the scope of the current paper, we relegate it to future research.

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A Theoretical Appendix

A.1 Proof of Lemma 1

The partial derivative of Θ_A from equation (12) with respect to Π, reads after simplification:

$$\frac{\partial \Theta_A}{\partial \Pi} = \frac{c(\Pi+1)\Phi}{s\Pi^2(\Pi^2+\Pi(2-sc^2)+1-c^2)^2(2\Pi+1)^2},$$

where

$$\Phi = \Pi^5[4+c(2-4s)]+\Pi^4[16-2c]+\Pi^3[25+c^3(2-3s)+c^2(4-8s)+c(3s-2)]+\Pi^2[19-c^3s-8c^2s+cs]+\Pi[7-c^2(2s+3)]+[1-c^2].$$

Note that the sign of $\frac{\partial \Theta_A}{\partial \Pi}$ is equal to the sign of Φ. It is straightforward to show that $\Phi > 0$, due to the fact that $\Pi > 0$ and all terms in squared brackets are positive for any $c \in [0,1]$ and $s \in (0,1)$. Hence, we have $\frac{\partial \Theta_A}{\partial \Pi} > 0$.

Taking the partial derivative of Θ_A with respect to c, reads after simplification:

$$\frac{\partial \Theta_A}{\partial c} = -\frac{(\Pi+1)^2\Psi}{s\Pi(\Pi^2+\Pi(2-sc^2)+1-c^2)^2(2\Pi+1)}, \tag{24}$$

where

$$\Psi = 2\Pi^3[1+c(1-2s)]+2\Pi^2[2.5-cs(1-c)]+\Pi[c^2(s+2)+4]+c^2+1.$$

Note that, since all terms in squared brackets are positive for any $c \in [0,1]$ and $s \in (0,1)$, we have $\Psi > 0$ and, therefore, $\frac{\partial \Theta_A}{\partial c} < 0$.

Lastly, consider the cross-partial derivative of Θ_A with respect to c and Π. Differentiating equation (24) with respect to Π yields:

$$\frac{\partial^2 \Theta_A}{\partial c \partial \Pi} = \frac{(\Pi+1)\Gamma}{s\Pi^2(\Pi^2+\Pi(2-sc^2)+1-c^2)^3(2\Pi+1)^2},$$

where

$$\begin{aligned}\Gamma = {} & 4\Pi^7[1+c(1-2s)]+4\Pi^6[6+c^3s(1-2s)+3c^2s+c(1-4s)]+\Pi^5[61+12c^3(1-2s)+24c^2(1+s)-2c(4+s)] \\ & +\Pi^4[85+4sc^4(1-2s)+c^3(6s^2-32s+12)+c^2(72+3s)+c(14s-12)] \\ & +\Pi^3[70+4c^4(1-2s(1+s))+2c^3(2-s(7-s))+c^2(78-21s)+c(10s-4)] \\ & +\Pi^2[34-sc^4(2s+11)-2sc^3+c^2(36-15s)+2sc]+3\Pi[3-(s+1)c^2](c^2+1)+[1-c^4].\end{aligned}$$

A tedious but straightforward analysis shows that all terms in squared brackets are positive for any $c \in [0,1]$ and $s \in (0,1)$. Therefore, $\Gamma > 0$ for any $\Pi > 0$ and we have $\frac{\partial^2 \Theta_A}{\partial c \partial \Pi} > 0$. This concludes the proof of Lemma 1.

A.2 Maximizing Total Welfare

In contrast to the benchmark case of no lump-sum transfers considered in the main text, we now allow for these side payments from B to A under outsourcing. In this case, A's welfare under outsourcing reads $W^O = W_A^O + W_B^O$, where W_A^O and W_B^O are given by (7). Hence, the relative attractiveness of integration is now defined as $\Theta(c) \equiv \frac{W_A^I}{W^O}$, where W_A^I is given by equation (11). Our variable of interest with lump-sum transfers thus reads:

$$\Theta = \frac{(\Pi(2\Pi+1) - c(1+\Pi(c+2)))\,(\Pi+1)^2}{\Pi(\Pi^2 + \Pi(2 - c^2(1-2s(1-s))) + 1 - c^2)(2\Pi+1)}. \tag{26}$$

A partial derivative of Θ with respect to Π reads after simplification:

$$\frac{\partial\Theta}{\partial\Pi} = \frac{c(\Pi+1)\Omega}{(\Pi(\Pi^2 + \Pi(2 - c^2(1-2s(1-s))) + 1 - c^2)(2\Pi+1))^2},$$

where

$$\begin{aligned}\Omega = {} & 2\Pi^5[2 - c(1-2s)^2] + 2\Pi^4[8-c] + \Pi^3[25 + (c^3 - c)(6s(1-s) - 1) - 4c^2(1-2s)^2] \\ & + \Pi^2[19 + (c - c^3 - 8c^2)(1 - 2s(1-s))] + \Pi[7 - c^2(5 - 4s(1-s))] + [1 - c^2].\end{aligned}$$

It can be shown that all terms in squared brackets are positive for any $c \in [0,1]$ and $s \in (0,1)$. Hence, we have $\Omega > 0$ for any $\Pi > 0$ and, therefore, $\frac{\partial\Theta}{\partial\Pi} > 0$.

Differentiating Θ with respect to c reads after simplification:

$$\frac{\partial\Theta}{\partial c} = -\frac{(\Pi+1)^2\Lambda}{\Pi(\Pi^2 + \Pi(2 - c^2(1-2s(1-s))) + 1 - c^2)^2(2\Pi+1)}, \tag{28}$$

where

$$\Lambda = 2\Pi^3[1 - c(1-2s)^2] + \Pi^2[5 + 2(c^2 - c)(1 - 2s(1-s))] + \Pi[4 + c^2(3 - 2s(1-s))] + c^2 + 1.$$

Once again, since all terms in squared brackets are positive for any $c \in [0,1]$ and $s \in (0,1)$, we have $\Lambda > 0$ and, therefore, $\frac{\partial\Theta}{\partial c} < 0$.

Lastly, the cross-partial derivative of Θ with respect to c and Π reads:

$$\frac{\partial^2\Theta}{\partial c\partial\Pi} = \frac{(\Pi+1)\Upsilon}{\Pi^2(\Pi^2 + \Pi(2 - c^2(1-2s(1-s))) + 1 - c^2)^3(2\Pi+1)^2},$$

where

$$
\begin{aligned}
\Upsilon &= 4\Pi^7[1 - c(1-2s)^2] + 4\Pi^6[6 - c^3(8s^4 - 16s^3 + 14s^2 - 6s + 1) + 3c^2(1 - 2s(1-s)) - c(3 - 8s(1-s))] \\
&+ \Pi^5[61 - 12c^3(1-2s)^2 + 48c^2(1 - s(1-s)) - c(10 - 4s(1-s))] \\
&+ \Pi^4[85 - 4c^4(8s^4 - 16s^3 + 14s^2 - 6s + 1) - 2c^3(-12s^4 + 24s^3 + 8s^2 - 20s + 7) + c^2(75 - 6s(1-s)) + 2c(1 - 14s(1-s \\
&+ \Pi^3[70 - 4c^4(8s^4 - 16s^3 + 20s^2 - 12s + 3) - 4c^3(-2s^4 + 4s^3 + 3s^2 - 5s + 2) + c^2(57 + 42s(1-s)) + c(6 - 20s(1-s))] \\
&+ \Pi^2(34 - (8s^4 - 16s^3 + 38s^2 - 30s + 13)c^4 - 2c^3(1 - 2s(1-s)) + c^2(21 + 30s(1-s)) + 2c(1 - 2s(1-s))) \\
&+ 3\Pi(3 - 2(1 - s(1-s))c^2)(c^2 + 1) + [1 - c^4].
\end{aligned}
$$

A tedious but straightforward analysis shows that all terms in squared brackets are positive for any $c \in [0,1]$ and $s \in (0,1)$. Therefore, $\Upsilon > 0$ for any $\Pi > 0$ and we have $\frac{\partial^2 \Theta}{\partial c \partial \Pi} > 0$. Hence, Lemma 1 holds also in the setting with ex-ante lump-sum transfers.

A.3 Derivations from section 2.2

Preferences. A representative consumer's budget constraint reads $PX_i + z_i = Y_i$, where Y_i denotes income, $P = \left(\int_{v \in V} p(v)^{1-\sigma} q(v) \mathrm{d}v\right)^{\frac{1}{1-\sigma}}$ 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:[41]

$$
z_i = Y_i - \mu \quad , \quad X_i = \mu P^{-1} \quad , \quad p(v) = q(v)^{\frac{1}{\sigma}} x(v)^{-\frac{1}{\sigma}} \mu^{\frac{1}{\sigma}} P^{\frac{\sigma-1}{\sigma}}. \tag{30}
$$

Plugging these results back in equation (13), we obtain an individual's indirect utility (welfare):

$$
W_i = Y_i - \kappa,
$$

where $\kappa = \mu \ln P - \mu(\ln \mu - 1)$. Since κ is constant across all individuals, we normalize it to zero (by the choice of μ). Note that an individual's indirect utility (welfare) is linear in her income Y_i.

Production. Ignoring the variety index v, the revenue from the sale of the final goods is $R = px$. Using equation (30), this revenue can be expressed as

$$
R = (qD)^{\frac{1}{\sigma}} (x)^{\frac{\sigma-1}{\sigma}}, \tag{31}
$$

where $D = \mu P^{\sigma-1}$ is an exogenous (demand) shifter containing the price index P, which is constant across all firms. Substituting for x using equation (14) yields the revenue expression in the main text, see equation (15).

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

A.4 Industry Equilibrium

Differentiating W_A^O from equation (7) and W_A^I from equation (11) with respect to Π yields:

$$\frac{\partial W_A^O}{\partial \Pi} = \frac{s(\Pi^3 + 3\Pi^2 + (3 + (1-2s)c^2)\Pi + 1 - c^2)}{(\Pi+1)^3} > 0 \quad , \quad \frac{\partial W_A^I}{\partial \Pi} = \frac{4\Pi(1+\Pi) + 1 - c^2}{(2\Pi+1)^2} > 0.$$

Since $\frac{\partial \Pi}{\partial \varphi} > 0$, this immediately implies $\frac{\partial W_A^O}{\partial \varphi} > 0$ and $\frac{\partial W_A^I}{\partial \varphi} > 0$. Further, note that we have $\frac{\partial W_A^I}{\partial \varphi} > \frac{\partial W_A^O}{\partial \varphi}$ whenever

$$\frac{\partial W_A^I}{\partial \Pi} - \frac{\partial W_A^O}{\partial \Pi} = \frac{Z}{(2\Pi+1)^2(\Pi+1)^3} > 0,$$

where

$$Z = (4\Pi^5+16\Pi^4)[1-s]+\Pi^3[25(1-s)-c^2(1+4s(1-2s))]+\Pi^2[19(1-s)+c^2(8s^2-3)]+\Pi[7(1-s)-c^2(3-s(3+2s))]+[1-c^2(1-s)-s]. \tag{32}$$

Since all terms in squared brackets are positive for any $c \in [0,1]$ and $s \in (0,1)$, we have $Z > 0$ and, therefore, $\frac{\partial W_A^I}{\partial \varphi} > \frac{\partial W_A^O}{\partial \varphi}$. Furthermore, since $\lim_{\varphi\to\infty} W_A^I \to \infty$ and $\lim_{\varphi\to\infty} W_A^O \to s(\infty)$, the fact that $\lim_{\varphi\to\infty} W_A^I > \lim_{\varphi\to\infty} W_A^O \ \forall\, s \in (0,1)$ ensures a unique crossing point of W_A^I and W_A^O.

Consider now the change in cutoffs $\bar{\varphi}^O$ and $\bar{\varphi}^I$ due to an increase in cultural distance c. The cutoff $\bar{\varphi}^O$, above which outsourcing is lucrative from A's perspective is implicitly defined by $W_A^O(\bar{\Pi}^O(\bar{\varphi}^O(c))) - f^O = 0$, where W_A^O is given by (7). Since $\Pi(\varphi)$ in the latter equation is a positive monotone function of φ for all $\sigma > 1$, it suffices to show that $\frac{\partial \bar{\Pi}^O}{\partial c} > 0$ to prove that $\frac{\partial \bar{\varphi}^O}{\partial c} > 0$. Implicit differentiation of the above cutoff condition yields:

$$\frac{\partial \bar{\Pi}^O}{\partial c} = \frac{2\Pi c(\Pi+1)(\Pi s+1)}{\Pi^3 + 3\Pi^2 + \Pi(3 + c^2(1-2s)) + 1 - c^2} > 0 \quad \forall c \in [0,1], s \in (0,1), \Pi > 0, \tag{33}$$

which immediately implies $\frac{\partial \bar{\varphi}^O}{\partial c} > 0$.

Similarly, the cutoff $\bar{\varphi}^I$, above which integration dominates outsourcing is implicitly defined by $W_A^I(\bar{\Pi}^I(\bar{\varphi}^I(c))) - f^I = W_A^O(\bar{\Pi}^I(\bar{\varphi}^I(c))) - f^O$, where W_A^O and W_A^I are given by (7) and (11), respectively. Again, since $\Pi(\varphi)$ monotonically increases in φ, it suffices to show that $\frac{\partial \bar{\Pi}^I}{\partial c} > 0$ to prove that $\frac{\partial \bar{\varphi}^I}{\partial c} > 0$. Implicit differentiation of this cutoff condition yields:

$$\frac{\partial \bar{\Pi}^I}{\partial c} = \frac{(\Pi+1)(2\Pi+1)(1+2\Pi^3[1+c(1-2s^2)] + \Pi^2[5+2c(2-s(s+2))] + 2\Pi[2+c(1-s)]}{Z} > 0, \tag{34}$$

where $Z > 0$ is given by equation (32). Since all terms in squared brackets are positive for any $c \in [0,1]$ and $s \in (0,1)$, we have $\frac{\partial \bar{\Pi}^I}{\partial c} > 0$ and, therefore, $\frac{\partial \bar{\varphi}^I}{\partial c} > 0$.

Lastly, to prove that $\frac{\partial \bar{\varphi}^I}{\partial c} > \frac{\partial \bar{\varphi}^O}{\partial c}$, it suffices to show that $\frac{\partial \bar{\Pi}^I}{\partial c} - \frac{\partial \bar{\Pi}^O}{\partial c} > 0$. Using equations

(33) and (34), we have:

$$\frac{\partial \bar{\Pi}^I}{\partial c} - \frac{\partial \bar{\Pi}^O}{\partial c} = \frac{(\Pi+1)^3 E}{Z(\Pi^3 + 3\Pi^2 + \Pi(3 + c^2(1-2s)) + 1 - c^2)}, \tag{35}$$

where $Z > 0$ is given by (32) and the sign of the above relationship is determined by E, defined as follows:

$$E = 4\Pi^5[1+c(1-2s)]+\Pi^4[6c+16(1-cs)]+\Pi^3[25+(4-6s)c^3+(4-8s)c^2+(2-10s)c]+\Pi^2[19-2cs(c^2+4c+1)]+\Pi[7-(3+2s)c^2]+[1-c^2]. \tag{36}$$

Since all terms in squared brackets are positive for any $c \in [0,1]$ and $s \in (0,1)$, we have $E > 0$, which immediately implies $\frac{\partial \bar{\varphi}^I}{\partial c} > \frac{\partial \bar{\varphi}^O}{\partial c}$.

B Appendix Tables and Figures

Table B.1. *Descriptive Statistics*

Variables	Obs	Mean	Std. Dev.	Min	Max
Cross-country variation of cultural distance:					
Intra-firm import share, $IFIS_{p\ell t}$	1,340,371	0.234	0.346	0.000	1.000
Cultural distance$_{US,\ell}$	1,340,371	0.432	0.248	0.010	0.850
Geographical distance$_{US,\ell}$	1,340,371	8.986	0.488	7.639	9.650
Common border$_{US,\ell}$	1,340,371	0.071	0.257	0.000	1.000
Common language$_{US,\ell}$	1,340,371	0.235	0.424	0.000	1.000
Common legal origin$_{US,\ell}$	1,340,371	0.263	0.440	0.000	1.000
Linguistic distance$_{US,\ell}$	1,340,371	0.906	0.149	0.352	1.000
Freight costs$_{US,\ell}$	1,340,371	1.080	0.027	1.019	1.181
log*(GDPpc)*$_{\ell t}$	1,340,371	9.681	0.887	6.062	11.28
log*(GDP)*$_{\ell t}$	1,340,371	13.14	1.344	8.680	16.27
Rule of law$_{\ell}$	1,340,371	0.690	0.935	-1.791	1.943
Trust$_{\ell}$	1,340,371	0.634	0.317	0.079	1.48
Industry/country variation of cultural distance:					
Intra-firm import share, $IFIS_{i\ell t}$	22,674	0.338	0.285	0.000	1.000
Cultural distance$^{(1)}_{i\ell}$	22,674	0.229	0.189	0.000	0.690
Cultural distance$^{(2)}_{i\ell}$	22,674	0.200	0.164	0.000	0.636
Cultural distance$^{(3)}_{i\ell}$	22,674	0.202	0.166	0.003	0.639
Capital interaction$_{i\ell t}$	22,674	52.25	9.114	23.18	87.55
Skill interaction$_{i\ell t}$	22,674	-3.633	1.233	-7.864	-0.693
Institutional distance$_{i\ell}$	22,674	0.008	0.006	0.000	0.030
Firm-pair variation of cultural distance:					
O^{maj}_{hs}	27,002	0.570	0.495	0.000	1.000
$O^{\%}_{hs}$	27,002	0.566	0.392	0.001	1.000
Cultural distance$_{hs}$ (Individualism)	27,002	0.016	0.052	0.000	0.710
$\log(TFP)_h$	27,002	5.734	1.309	-1.085	12.69
log(*Revenue*)$_s$	27,002	8.814	1.689	2.302	17.674
$\log(K/L)_s$	27,002	2.837	2.414	-5.743	13.93
Cultural distance$_{hs}$ (PDI)	27,002	0.034	0.085	0.000	0.890
Cultural distance$_{hs}$ (UAI)	27,002	0.037	0.086	0.000	0.720
Cultural distance$_{hs}$ (MAS)	27,002	0.037	0.089	0.000	0.860
Cultural distance$_{hs}$ (LTO)	27,002	0.032	0.075	0.000	0.670
Cultural distance$_{hs}$ (HAR)	27,002	0.059	0.133	0.000	1.340
Cultural distance$_{hs}$ (EMB)	27,002	0.043	0.103	0.000	1.320
Cultural distance$_{hs}$ (HIE)	27,002	0.062	0.147	0.000	2.000
Cultural distance$_{hs}$ (MST)	27,002	0.022	0.051	0.000	0.625
Cultural distance$_{hs}$ (AAU)	27,002	0.074	0.169	0.000	1.400
Cultural distance$_{hs}$ (IAU)	27,002	0.052	0.115	0.000	1.040
Cultural distance$_{hs}$ (EGA)	27,002	0.047	0.116	0.000	0.983

Table B.2. *U.S. Intra-firm Import Shares: Industry/country Variation of Cultural Distance (robustness).*

	Dependent variable: Intra-firm import share, $IFIS_{i\ell t}$				
	(1)	(2)	(3)	(4)	(5)
Panel A.					
Cultural distance$_{i\ell}^{(2)}$	-0.458***	-0.483***	-0.325***	-0.384**	-0.410**
	(0.030)	(0.027)	(0.125)	(0.175)	(0.177)
Capital interaction$_{i\ell t}$					0.030*
					(0.016)
Skill interaction$_{i\ell t}$					-0.027
					(0.042)
Institutional distance$_{i\ell}$					3.002
					(5.945)
Observations	23,055	23,055	22,998	22,942	22,674
R-squared	0.069	0.214	0.375	0.414	0.411
Panel B.					
Cultural distance$_{i\ell}^{(3)}$	-0.448***	-0.468***	-0.317***	-0.378**	-0.398**
	(0.030)	(0.027)	(0.122)	(0.167)	(0.169)
Capital interaction$_{i\ell t}$					0.030*
					(0.016)
Skill interaction$_{i\ell t}$					-0.028
					(0.042)
Institutional distance$_{i\ell}$					2.840
					(5.923)
Observations	23,055	23,055	22,998	22,942	22,674
R-squared	0.067	0.211	0.375	0.414	0.411
Industry FE	no	yes	yes	yes	yes
Country/Year FE	no	no	yes	yes	yes
Industry dummies×log($GDPpc$)$_{\ell t}$	no	no	no	yes	yes
Industry dummies×$Rule_\ell$	no	no	no	yes	yes

Notes: The table reports OLS estimates of equation (21), with *Cultural distance*$_{i\ell}^{(2)}$ and *Cultural distance*$_{i\ell}^{(3)}$ as explanatory variables in panels A and B, respectively. See text for details on the definition of variables. The R^2 reports the goodness of fit averaged across the two panels. Robust standard errors are clustered at the industry/country level and presented in parentheses. ***, **, * denote 1, 5, 10 % significance, respectively.

Table B.3. *Alternative Measure of HQ productivity.*

	Dependent variable: O_{hs}^{maj}		Dependent variable: $O_{hs}^{\%}$	
	Coefficients of			
	Cultural distance$_{hs}$	*Cultural distance*$_{hs}$ $\times \log(VA)_h$	*Cultural distance*$_{hs}$	*Cultural distance*$_{hs}$ $\times \log(VA)_h$
Cultural dimensions:	(1)	(2)	(3)	(4)
Panel A. Hofstede				
Individualism	-1.576***	0.105***	-0.870***	0.043*
	(0.310)	(0.030)	(0.250)	(0.025)
Power distance	-1.044***	0.068**	-0.827***	0.051**
	(0.286)	(0.027)	(0.224)	(0.021)
Uncertainty avoidance	-1.204***	0.082***	-0.947***	0.064***
	(0.281)	(0.027)	(0.246)	(0.024)
Masculinity-femininity	-1.340***	0.092***	-1.111***	0.073***
	(0.301)	(0.029)	(0.239)	(0.023)
Long-term orientation	-1.859***	0.139***	-1.507***	0.107***
	(0.371)	(0.034)	(0.289)	(0.027)
Panel B. Schwartz				
Harmony	-0.774***	0.050***	-0.563***	0.031**
	(0.207)	(0.019)	(0.159)	(0.015)
Embeddedness	-1.026***	0.076***	-0.930***	0.067***
	(0.237)	(0.022)	(0.185)	(0.018)
Hierarchy	-0.568***	0.035**	-0.507***	0.029**
	(0.180)	(0.017)	(0.132)	(0.013)
Mastery	-1.718***	0.110***	-1.025***	0.055*
	(0.431)	(0.040)	(0.320)	(0.030)
Affective autonomy	-0.569***	0.040***	-0.508***	0.043***
	(0.139)	(0.013)	(0.104)	(0.010)
Intellectual autonomy	-0.772***	0.056***	-0.624***	0.047
	(0.201)	(0.019)	(0.150)	(0.015)
Egalitarianism	-0.775***	0.050***	-0.587***	0.035**
	(0.195)	(0.019)	(0.148)	(0.014)

Notes: The table reports OLS estimates of equation (23) with the full set of fixed effects and control variables from column 6 of Table 3. The outcome variable in columns 1 and 2 is O_{hs}^{maj}, and the outcome variable in columns 3 and 4 is $O_{hs}^{\%}$. Panels A and B consider alternative measures of *Cultural distance*$_{hs}$, constructed using cultural dimensions by Hofstede and Schwartz, respectively. Columns 1 and 3 present direct correlations of *Cultural distance*$_{hs}$ with O_{hs}^{maj} and $O_{hs}^{\%}$, respectively. Columns 2 and 4 report the interactions of *Cultural distance*$_{hs}$ with $\log(VA)_h$ in their impact on O_{hs}^{maj} and $O_{hs}^{\%}$, respectively. The R^2 and the number of observations vary by the employed measure, but are generally comparable to column 6 of Table 3. Robust standard errors are clustered at the level of a HQ firm and presented in parentheses. ***, **, * denote 1, 5, 10 % significance, respectively.

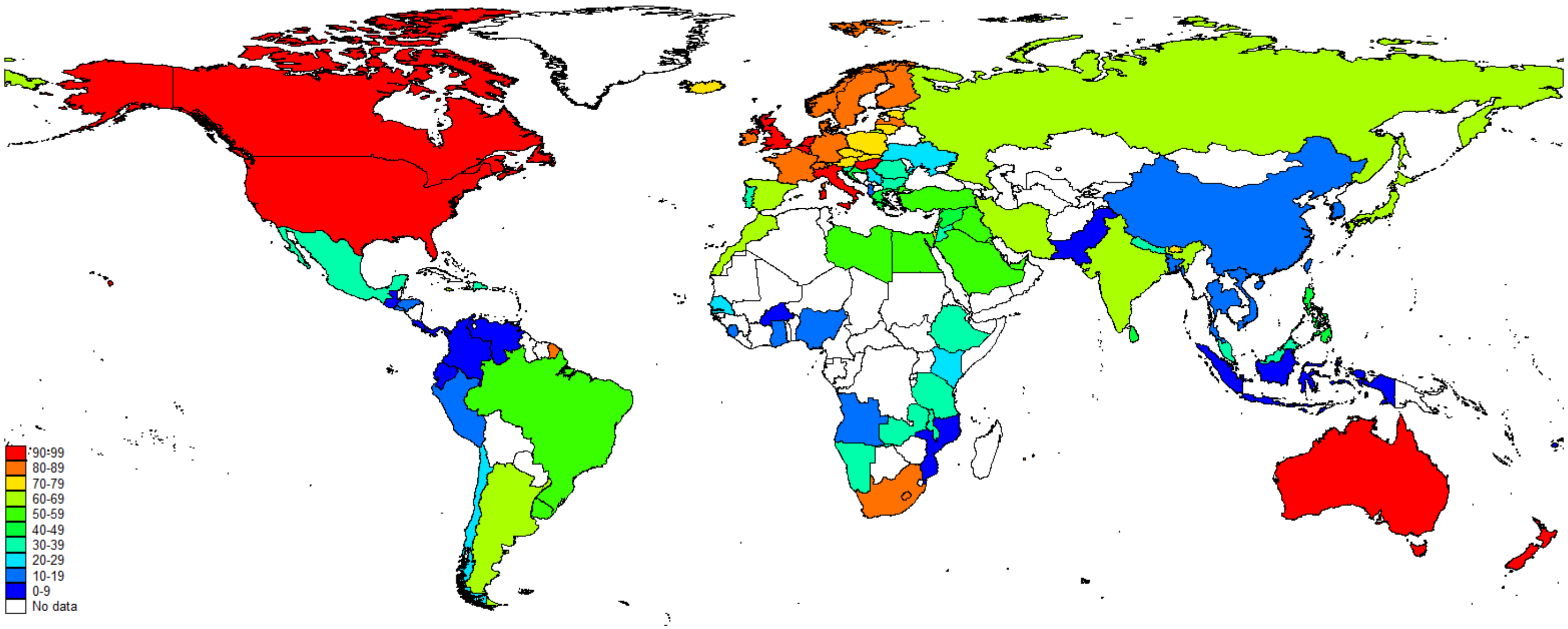

Figure B.1

The Distribution of Hofstede's Individualism Scores.

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