OVERCOMING INSTITUTIONAL DIVIDES: HISTORICAL TIES, ECONOMIC INTEGRATION POLICIES, AND THE SELECTION OF PARTNERS FOR INTERNATIONAL TECHNOLOGICAL ALLIANCES

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Abstract

While management research documents a strong negative effect of institutional distance on cross-border interactions, we know relatively little about whether and how firms can overcome this snag. Using transaction costs and institutional arguments we posit that the negative effect of institutional distance on selection of international alliance partners will be weaken by the extent of informal (i.e., colonial duration) and formal (i.e., economic integration policies) ties between home-countries of prospective partners. The relative strength of these ties will reduce uncertainty and risks, as well as provide better mutual knowledge of partners' cognitive, normative, and regulatory backgrounds. Empirical results based on a panel of firms in the global tire industry and addressing endogeneity issues confirm these predictions. Our findings offer a more comprehensive view of international partner selection for alliances, attesting the role of institutions in this process and their interplay with the macro context of organizations which includes historical links and current economic policies.

INTRODUCTION

Strategic alliances provide organizations with multiple opportunities to engage in exploitation and exploration to improve their competitiveness (Lavie & Rosenkopf, 2006; Mukherjee et al., 2013; Bernal, Carree, & Lokshin, 2022; Choi, Kim, & Kim, 2022: Jacob, Belderbos, & Lokshin, 2023). However, despite these advantages, alliances remain inherently risky (Park & Ungson, 2001; Heidl, Steensma & Phelps, 2014) and organizations need to establish a judicious selection of partners to avoid costly failures (Shah & Swaminathan, 2008; Findikoglu & Lavie, 2019). In an international context, a critical component of this selection process involves dealing with institutional idiosyncrasies of prospective partners that govern their behaviour and performance (Vasudeva, Spencer & Teegen, 2013; Dorobantu, Lindner & Müllner, 2019). Broadly, this institutional embeddedness has been encapsulated by scholars studying organizational interactions using the concept of "distance", i.e., cross-country institutional differences (Xu & Shenkar, 2002; Aguilera-Caracuel et al., 2013).

Prior research shows compellingly that greater institutional distance between prospective partners reduces their chances to partner up in an alliance. The needs and objectives of prospective partners differ substantially when comparing firms from different environments (Hitt et al., 2000; Hitt et al., 2004). As such, the negative impact of institutional differences on the logic of partner selection manifests through both formal and informal channels such as the rule of law, control of corruption (Roy & Oliver, 2009), degree of marketization (Shi, Sun, & Peng, 2012), corporatist structures (Vasudeva et al., 2013), culture, managerial practices, protection of intellectual property (Krammer, 2018) or political risk (Dorobantu et al., 2019). Notwithstanding this growing evidence on the *direct effects* of institutional differences on alliances, there is still little understanding of

whether and *how* organizations can overcome these negative effects of institutional differences when engaging international partners.

The dearth of studies on this issue have focused exclusively on a handful of firm-specific explanations, such as internal capabilities (Henisz, 2003), ownership choices (Gaur & Lu, 2007) and international diversification (Chao & Kumar, 2010). In turn, we combine institutional (Kostova, 1999) and transaction costs rationales (Gulati & Singh, 1998) to argue that focal firms seeking to form alliances can effectively reduce the negative effects of institutional differences by selecting partners from countries with whom they have stronger *formal* (i.e., codified, mutually agreed and binding) and *informal* (i.e., tacit, serendipitous, exogenous, and non-binding) *ties* (Makino & Tsang, 2010). Specifically, we theorize that the existence of strong formal and informal ties between countries will indirectly diminish a focal firm's coordination and appropriation concerns of otherwise institutionally distant partners, and moreover provide a better mutual understanding of their cognitive and normative backgrounds. As a result, powerful ties between home countries of prospective partners will reduce the overall uncertainty and risks stemming from institutional distance between them, making an alliance more appealing to a focal firm.

We test these hypotheses using a hand-collected panel that includes all firms in the global tire industry and their technological alliances between 1985 and 2003, complemented with data on formal and informal ties between countries. We follow prior literature (Makino & Tsang, 2010) and conceptualize the latter using the duration of colonial relations between countries, while for capturing the extent of formal relations we focus on the level of economic integration between two countries in the form of bilateral (i.e., economic integration agreements -EIAs-) and multilateral integration agreements (i.e., membership in the World Trade Organization -WTO-, or its precursor, the General Agreement on Tariffs and Trade- GATT). The longitudinal dimension of our dataset

allows us to capture the rise of bilateral and multilateral economic integration around the world because of increased flows of trade and foreign investments due to globalization (Rodrik, 2000; Baier, Bergstrand, Egger & McLaughlin, 2008). Moreover, our empirical analysis accounts for potential endogeneity between institutional distance and the formal and informal country ties.

We propose several contributions. First, we extend institutional theory by advancing two important macro contingencies that can help organizations mitigate the negative effects of institutional distance, namely formal (economic) and informal (colonial) ties between countries. We contend that the relative strength of these ties lessens the liability of foreignness experienced by focal firms when engaging institutionally distant partners through reducing the perceived uncertainty (Zhang & He, 2013) and ensuring greater familiarity with cognitive and normative backgrounds of prospective partners (Feasel & Kanazawa, 2013). We thus complement theoretical insights (Hagedoorn, Letterie & Palm, 2011) as well as prior evidence regarding firms' strategies for dealing with institutional distance (Delios & Beamish, 2010; Chao & Kumar, 2010).

Second, we answer multiple calls by management scholars (Jones & Khanna, 2006; Klüppel, Pierce & Snyder, 2017; Wadhwani, Suddaby, Mordhorst, & Popp, 2018) to "bring back history" into the field by examining the potential effects of historical ties between countries on contemporaneous firm strategies. Apart from their perennial implications for economic performance (Acemoglu, Johnson & Robinson, 2001), trade (Head, Mayer & Ries, 2010), cross-border investments (Makino & Tsang, 2010) and social development (Feyer & Sacerdote, 2009), colonial ties have been shown to affect organizations by shaping competitive advantage (Frynas, Mellahi & Pigman, 2006), supporting legitimacy (Jones, 1996), and triggering certain strategic responses (Chakrabarty, 2009). We expand this body of work on historical insights by showing how *the extent of historical links* between countries, in the form of colonial duration, provides

important, and often omitted, insights into current business interactions, specifically international technological alliances (Parkhe, 2003).

Third, we contribute to the ongoing debate on the benefits and pitfalls of economic integration and more broadly, globalization (Rodrik, 2000)- a conversation which has been recently reignited due to a surge in nationalism and protectionism around the world (Witt, 2019) and more recently due to the COVID-19 crisis (Espitia et al., 2020). Specifically, we focus on the indirect and positive impact of having formal, codified links of economic nature and show that both bilateral (e.g., EIAs) and multilateral (WTO/GATT) economic ties between countries can reduce the negative consequences of institutional distance, complementing prior findings on the importance of such policies for firm international success (Frantianni & Oh, 2009; Alhorr, Moore & Payne, 2008).

Finally, our insights fill in the sparse knowledge on the selection of international partners (Hitt et al., 2004; Roy & Oliver, 2009; Dorobantu et al., 2019) by drawing attention to the contextual and historical macro-environment of firms as a salient consideration for selection choices in technological alliances. While previous studies in this area has mostly focused on firms' degree of compatibility, complementarity and commitments (Gulati, 1995; Rothaermel & Boeker, 2008; Robson et al., 2019), we make the case that, in addition to these important firm- and alliance-specific factors, the macro-institutional context and bilateral country-level relationships are just as important for international inter-firm interactions (Liu & Nicholson, 2017; Arikan et al., 2020).

THEORY AND HYPOTHESES

Technological alliances for exploitation and exploration

Past decades witnessed a significant increase in the number of alliances, many involving transfers of technology and international partners, as avenues to achieve and maintain competitive advantage (Anand & Khanna, 2000). Formally defined as inter-firm cooperative agreements designed to impact the long-run product and market positioning of partners (Hagedoorn, Cloodt & Van Kranenburg, 2005), technological alliances are a vehicle for procuring resources (Furlotti & Soda, 2018), minimizing risks associated with research and development (R&D) activities, and dealing with competitive pressures (Garcia-Canal et al., 2008).

Acknowledging the use of alliances for both exploitation and exploration purposes (Lavie & Rosenkopft, 2006), previous studies have applied the organizational learning framework of March (1991) to examine alliance formation. Thus, firms may form explorative alliances, forged with the explicit purpose of discovery and development of innovative technologies (e.g., R&D alliances, technical cooperation agreements), or exploitative ones (e.g., licensing deals, supply agreements) that target an efficient utilization of existing technological assets and complementary resources (Koza & Lewin, 1998). This choice between exploration and exploitation alliances is a function of a complex interaction between firm's strategic intent, learning objectives, and expected returns (Yamakawa et al., 2011). Despite this distinction, in practice, firms balance the conflicting needs for exploration and exploitation and develop ambidextrous portfolios which include both types of alliances (Lavie & Rosenkopf, 2006).

Institutional distance and selection of international alliance partners

In an international context, alliances need to also overcome numerous idiosyncratic differences between home countries of partners (e.g., regulations, development levels, cultural aspects, HR practices, human capital available, tax regimes, infrastructure, etc.). These differences stem from their social, economic, and political configurations (Parkhe, 2003) and often can be quite sizeable.

Chief among them, institutional factors have been found to be particularly relevant for firms' international strategies (Brouthers & Brouthers, 2000; Dorobantu et al., 2019).

Institutions have an essential role in supporting the proper functioning of markets by reducing the risks and costs associated with inter-firm transactions (North, 1990). These societal rules of conduct are reflected in firms' strategies (Hitt et al., 2000), as the mechanisms that govern them are embedded in the broader political and social context, which shapes the way firms do business, manage resources, or interact with governments, clients, and other firms (Scott, 2001). Commonly, these formal and informal aspects are conceptualized in the form of three institutional "pillars" (Scott, 2001). The cognitive and normative pillars tend to focus on the informal and tacit facets of institutions, guiding indirectly firms and individuals to interpret information and react to different stimuli based on a set of beliefs, frameworks, and inferences about how the world should and does operate (Kostova & Zaheer, 1999). Complementarily, the regulatory pillar of institutions focuses on codified rules and regulations that govern interactions within society (Meyer et al., 2009).

The few studies in this area have mostly focused on the direct effects of distance on the appeal of certain partners. Thus, qualitative findings suggest significant and persistent differences in terms of expectations and commitments of partners from different institutional backgrounds (Dacin et al., 1997; Hitt et al., 2000; Hitt et al., 2004) which in turn reduce the appeal of alliances between organizations. These insights are also resonated by more recent quantitative investigations on the effects of institutional distance (ID) between partners across a variety of proxies such as rule of law and corruption (Roy & Oliver, 2009), corporatist structures (Vasudeva et al., 2013), cognitive, normative, and regulatory elements (Krammer, 2018), and political risk (Dorobantu et

al., 2019). Overall, these studies confirm that international alliances and selection of partners are negatively affected by greater ID.

Taking stock of these findings, we focus on *how organizations can overcome institutional distance when it comes to selection of international partners for alliances*. For this, we will focus only on selection of partners for *exploitation*, as a strategy which has been clearly linked both theoretically and empirically to negative effects stemming from ID, as opposed to selection for alliances of explorative nature (Rothaermel, 2001; Yang et al., 2014; Krammer, 2018).

Specifically, when it comes to technological alliances for exploitation, there are several reasons for which focal firms will prefer partners from closer or similar institutional environments (i.e., less distant). First, larger cognitive and normative distance between prospective partners will involve higher coordination costs because of greater mismatches in terms of operation, management, and technological capabilities (Delerue & Simon, 2009; Gulati & Singh, 1998), all of which will reduce their appeal as an alliance partner. Second, larger cognitive and normative differences will significantly impede the flow of technological expertise between prospective partners, as this is often embedded into people and organizations (Volkoff, Strong & Elmes, 2007). Such differences will lower the appeal and trust regarding technological sharing (Michailova & Hutchings, 2006) therefore reducing the appeal of such an alliance. Finally, focal firms will prefer to select partners from countries with similar or better regulatory environments for exploitation alliances to minimize appropriation concerns vis-à-vis imitation or technology leakage (Pisano, 1990) and ensure a smooth flow of technological know-how to their partner (Gans, Hsu & Stern, 2008) by sharing compatible IPR standard and similar absorptive capabilities in the form of supporting national and regional institutions (Krammer, 2009).

Together, these arguments suggest that institutionally distant partners may entail additional costs and resources to bridge these differences, which makes them less appealing for an exploitative technological alliance. Subsequently, we incorporate these rationales and examine the potential role of formal and informal ties between the home countries of prospective partners in mitigating these negative effects of institutional distance on partner selection.

The moderating effect of informal (colonial) ties between countries

Informal ties are a result of exogenous events (e.g., geographic proximity, migration, colonization) that result in closer cultural, ethnic, and social relations between individuals and countries (Makino & Tsang, 2010: 546). Less employed in management research, informal ties between countries could provide important "omitted insights" in explaining present organizational interactions, particularly in an international context (Makino & Tsang, 2010; Witte et al., 2020).

We propose that the extent (duration) of colonial ties will weaken the negative effects of institutional distance on focal firm's selection of alliance partners for several reasons. First, the extent of colonization process creates a *deep mutual knowledge* of the cognitive and normative characteristics between colonizer–colony pairs of otherwise dissimilar countries. This knowledge of each other's values and norms is mostly tacit and gets accrued over time (Makino & Tsang, 2010) at different societal levels, including individuals, firms, and governments (Jones, 1996). In the case of alliances, this additional knowledge may alleviate the existing institutional mismatches between partners (Delerue & Simon, 2009) and the lower levels of trust and cooperation (Michailova & Hutchings, 2006), both of which are needed for a successful alliance. Thus, lengthier colonial links between countries will alleviate some of the coordination and technology transfer problems that come with distant cognitive and normative partners.

Second, colonial ties will stimulate inter-firm interactions by *lowering uncertainty, coordination and transaction costs* associated with these activities. In-depth knowledge of cognitive and normative elements of a country, acquired through lengthy colonial relations, results in less uncertainty and clearer expectations from the focal firm regarding partnering firms, thereby facilitating the selection of appropriate partners (Rangan & Segul, 2009). These expectations will already be embedded in focal firm's ex-ante partnering decisions as it will have a better understanding of such partners and more realistic expectations of the risks and rewards associated with forming an alliance with partners that share these colonial links. As a result, the focal firm will be able to both assess transaction costs better ex-ante and manage them ex-post by using this in-depth knowledge acquired via extensive historical interactions to deal effectively with existing institutional differences (Makino & Tsang, 2010).

Finally, colonial ties moderate the effects of institutional distance between countries through *shared regulatory elements* because of countries' *common legal traditions* and overall legal convergence over extended periods of colonial ruling. Legal traditions have been introduced in different countries through military conquest and colonization from a handful of homelands to the rest of the world (Watson, 1974). They provide the basic legislative principles of a country, and differ in terms of legal codes, principles, ideologies, and judicial organizational elements (i.e., French, German, Socialist and Scandinavian). Albeit countries with the same legal traditions can still be quite different in terms of overall institutions, lengthy colonial ties between them ensure that they have a significant common regulatory base (La Porta et al., 2008). Such a common base provides additional familiarity and confidence to the focal firm in the regulatory environment of a prospective partner, lowering the perceived appropriation concerns vis-à-vis a potential alliance, where technology leakages (Pisano, 1990) and technology transfer frictions (Gans et al., 2008) can

significantly reduce the appeal of a regulatory-distant partner. In view of all the arguments above we propose that:

H1: The duration of colonial ties between the home countries of the focal firm and its prospective partner will negatively moderate (i.e., weaken) the negative effects of cognitive, normative, and regulatory distances on partner selection.

The moderating effect of formal (economic) ties between countries

Besides informal ties between countries that occur because of exogenous factors, formal ties are also emerging, as countries adopt intentionally certain preferential relationships (i.e., agreements, treaties) to promote mutual interests (Makino & Tsang, 2010). These formal relations may differ in terms of objective (e.g., economic – European Union, political – United Nations, environmental – Kyoto protocol, or military – North Atlantic Treaty Organization) and scope (i.e., bilateral or multilateral), but they all share a *codified structure* and *clear enforcement mechanisms* that warrant their uniform implementation across all signatory parties.

Global economic integration has been accelerating over the past decades. The GATT, founded in 1947, and its successor the WTO, remain the world's largest (164 members to date) inter-governmental platform that functions as a *multilateral economic agreement* to promote free trade with provisions for contingent areas of interest, such as industrial subsidies or intellectual property rights. In parallel, there is a rapid proliferation of *bilateral* EIAs, which promote regionalism through preferential treatment regarding the exchange of goods, investments, and people between partnering countries (Baier et al., 2008). Both types of agreements bear important implications for the signatory countries, and previous studies suggest that they increase significantly trade (Baier et al., 2008) and capital flows (Alhorr et al., 2008; Chen, 2009), while reducing domestic barriers for international business (Zhang & He, 2013).

We posit that the extent of economic ties between countries will reduce the negative effects of institutional differences on partner selection in alliances through several mechanisms. First, economic ties will lower the focal firm's appropriation concerns in an alliance through their *formal nature* and their *strict enforcement mechanisms*. Formalized economic agreements between the home countries of prospective partners provide a significant buffer for appropriation concerns, as they signal irreversible commitments at the national level to adopt and uphold international regulatory standards. Moreover, breaches of these provisions are subject to severe penalties from economic partners (in the case of bilateral EIAs) or the rest of the world (GATT/WTO). Therefore, strong economic ties between countries can successfully mitigate the effects of large institutional differences given their formal nature and significant power of enforcement.

Second, the *codified nature* of these agreements provides the focal firm with better information regarding the regulatory standards in the home countries of partners, thereby reducing the informational asymmetry and uncertainty it faces when dealing with alliance partners from these markets. For instance, a critical regulatory criterion for focal firms when choosing a market is the strength of intellectual property regimes (Khoury & Peng, 2011), with ubiquitous implications when it comes to technological alliances (Hagedoorn et al, 2005; Krammer, 2018). Both the GATT/WTO and many EIAs cover aspects related to IPR (Kohl, 2016), implicitly reducing the gap between the legislative treatment ("de jure") and the actual enforcement ("de facto") of IPR laws in an international context. Hence, for the focal firm, having a partner from an economically integrated country will lower the risks (e.g., of losing equity, leaking technologies) of such alliance, given the clear and enforceable provisions regarding sensitive issues, such as IPR.

Third, appropriation and coordination concerns are further escalated by *nationalist views* and *security constraints*, which can interfere with otherwise sensible market transactions. Often,

alliances require formal approvals from national governments (e.g., adhering to antimonopoly regulations, accessing joint public–private R&D programs or benefitting from tax incentives) that are particularly sensitive to nationalistic views and sentiments towards the focal firm or its home country (Nigh, 1985). Economic ties contribute towards forming favourable *public opinions* and *sentiments* towards foreign entities (Feasel & Kanazawa, 2013; Li, Makino & Jiang, 2019). While these views will transcend societies, they will also frame generic business interests and executive decisions (Kuno & Naoi, 2018). Thus, strong economic ties will have the potential to moderate the negative effects of cognitive-normative dissonances between the home countries of firms, thereby increasing the attractiveness of prospective partners.

Finally, economic ties trigger *spillovers* to contingent institutional domains, which are not explicitly covered by these agreements, thus lowering the focal firm's coordination costs and appropriation concerns regarding an alliance partner. Economic ties benefit from powerful constraints (i.e., official, explicit, and binding) and significant penalties in the case of failures to comply. Together, these mechanisms ensure the greater conformity of all signatory parties to the prescriptions of these agreements, and, in turn, this conformity is often transplanted in other contingent areas of interest. For instance, although a bilateral FDI treaty between two countries is likely to focus on key investment provisions such as protection of investments, dispute settlement, etc., it will also stimulate convergence in terms of other regulatory aspects (e.g., labour or IPR regulations) that are important for foreign investors. Moreover, in addition to their effects in the regulatory domain, economic ties will also expose countries to foreign partners' normative and cognitive traits, thereby enhancing trust at all societal levels and increasing economic cooperation between nations (Feasel & Kanazawa, 2013). Through this process, firms from different countries become familiar with each other's normative (e.g., management style, decision process,

organizational structures, etc.) and cognitive (e.g., language, work ethics, risk attitudes) characteristics, and can adapt to them more effectively (Beechler & Yang, 1994). This translates into lower relational risks for firms coming from signatory countries, which provides additional motivation for the focal firm to select them as partners for an alliance.

Based on all the above, we hypothesize that:

H2: The extent of economic ties between the home countries of the focal firm and its prospective partner will negatively moderate (i.e., weaken) the effects of cognitive, normative, and regulatory distances on partner selection.

METHOD

Data and sample

To test these hypotheses, we use data from the global tire industry hand-collected from various issues of the European Rubber Journal (ERJ). This industry which provides an appropriate setting given its international representation (70+ countries), the richness of horizontal alliances (Phelps, 2010), and technological focus among top firms (Acha & Brusoni, 2005). Historically, the origins of the tire industry can be traced back to the industrial revolution era in the 19th century Britain and break-through innovations like the vulcanization process by Charles Goodyear (1839) and the pneumatic tire by R.W. Thomson (1846). Driven by both an increase in automobile demand as well as significant technological and production advancements, the industry has grown to encompass today more than 300 factories worldwide that produce annually more than 1 billion units. Further details about the data collection are presented in Appendix A.

Dependent variable. Following prior operationalization schemes in the alliance literature (Koza & Lewin, 1998; Lavie & Rosenkopft, 2006; Yamakawa et al., 2011), we define *exploitative*

alliances as agreements involving "the use and development of things [i.e., technologies] already known" (March, 1991) and consider several types of agreements (i.e., long-term agreements involving joint marketing, service, OEM, licensing, supply and joint-production deals) in which the focal firm provides existing technologies to its partners in exchange for other benefits (e.g., access to production facilities, services, etc.). Using the text provided by the ERJ, we code our dependent variable (*Partner selection*) as a binary one that equals 1 if the two firms in a dyad form a cross-border technological alliance for exploitation in a year, and zero otherwise.

Independent variables. In line with previous studies (Gaur et al., 2007; Parboteeah et al., 2008; Estrin, Baghdasaryan & Meyer, 2009; He et al., 2013), we measure *cognitive* institutions using Hofstede's five dimensions of culture (Hofstede, Hofstede & Minkov, 2010), *normative* institutions using managerial practices from IMD's World Competitiveness Yearbook (Xu et al., 2004; He et al., 2013), and *regulatory* distance using data on intellectual property rights protection from Park (2008). For normative institutions we perform factor analysis (see **Table B.1,** Appendix B) and derive one indicator from seven items related to managerial practices (Cronbach alpha =0.93) using the principal component method (Eigenvalue= 4.53). Cognitive and normative distances between two countries are computed using the Mahalanobis formula (scale-invariant and accounts for the variance-covariance matrix of components) while regulatory distance is operationalized as a simple difference to allow for asymmetry and ranking in terms of strength regulations (Zaheer et al., 2012). Given that we have multiple reference countries for our distance measures we do not also include the levels of these institutional measures (Beugelsdijk, Kostova, & Roth, 2017).

The extent of informal ties is calculated using the years of colonial rule between home countries of firms in a dyad (*colonial duration*). We compute an index of the extent of colonial

relations for 224 countries based on colonial links data (CEPII), and their actual duration (Olsson, 2009). For countries that have had multiple colonial relationships, we consider the one with the longest duration. We capture both bilateral and multilateral *economic ties* using two variables: (1) the GATT/WTO membership within a dyad (*GATT*/*WTO*) which can take the value of 2 if both countries in the dyad are members in GATT (prior to 1995) or WTO (after 1995), 1 if only one country in the dyad is a member, and 0 otherwise; and (2) the Economic Integration Agreements (*EIA*), coded as 1 if there is an EIA between the two nations in the dyad, and 0 otherwise[1].

Controls. We consider an extensive batch of controls that includes both firm- and country-specifics which can explain partnering preferences within the industry. With regards to the former, we use data on production to compute firm *size differential* and data on establishment for firm *age differential* both serving as proxies for market success and experience (Gulati, 1995) as drivers of potential for alliances. Moreover, since we are looking at technological alliances for exploitation, we also compute firm *knowledge differential* using firms' annual patent stocks and a standard 15 percent annual depreciation rate (Griliches, 1990). The rationale behind this is that greater technological imbalances between members of a dyad will provide more opportunities for exploitation of technological exploitation. In addition, we include the *previous alliance experience* using a 3-year window (Annand & Khanna, 2000), a *prior interactions* dummy for the dyad (Kale & Singh, 2007), as well as any equity links between the firms in the dyad using several dummies (*majority*, *minority* ownerships or *joint-venture*s). Prior literature suggests that similarity in terms of product portfolios might be inductive when it comes to alliance or acquisition decisions (Wang & Zajac, 2007). Furthermore, differences in terms of unionization (Brunello, 1992) and ownership

[1] In terms of variation, about 50 countries have acquired membership of GATT (or WTO, post 1995) of which 20 are also represented in the tire industry, most notably the accessions of countries like Mexico (1986) or China (2001) with multiple domestic tire producers.

(Li, Xia & Lin, 2017) profiles could entail additional adaptation costs and frictions which otherwise would deter from the appeal of a prospective partner. Hence, we consider also *product differentials* as simple differences in terms of number of tire types produced[2], *unionization differentials* which is a dummy variable that captures whether the two firms in a dyad are both unionized or non-unionized (equals one then, and zero otherwise) and *ownership differentials* measured again using a dummy which equals one if both firms in a dyad are either private- or state-owned, and zero if one is private and one is state-owned.

At the country level, we include both *market size differential* and *market growth differential,* the idea being that focal firms will be attracted towards partners from larger and more dynamic markets than their own, where they will have more opportunities to take advantage of. We compute these two variables using data on GDP from the World Penn Tables 8. In addition, from the CEPII database, we employ a continuous measure of *geographic distance* and dummy variable for *geographic contiguity* (i.e., whether two home countries of firms share a border or not) to control for any significant "border effects" (Schulze & Wolf, 2009). With these two proxies we want to capture the effects of geography on international alliances. We also include a dyadic measure of *schooling differential* as the difference between average schooling years in the home countries of firms from Barro & Lee (2013), and a measure of *resource differential* based on the countries' yearly production of natural rubber (value in constant USD) drawn from FAOSTAT (The Food and Agriculture Organization Corporate Statistical Database). The intuition behind these controls is that larger differences in terms of human capital (schooling levels) might deter partnerships while greater differences in terms of natural resources (i.e., rubber) might induce them. Finally, we add time dummies throughout all our models to capture changes over time.

[2] ERJ taxonomy included 9 tire types (passenger, light truck, heavy truck/bus, agricultural, motorcycle, all terrain, industrial, aircraft, racing) and most producers tend to specialize in about 3 types (53 percent).

Endogeneity of moderators vis-à-vis institutional distance

To deal with the potential endogenous relationship between institutional distance (ID) and the formal and informal ties between countries, we instrument ID by using the length of the period from independence to the present (2020). The identifying assumption is that if this time interval (*independence*) is short then ID between two countries will be smaller, as the colonial heritage will persist more than in cases where independence was acquired earlier. In turn, our instrument is not correlated with the moderators, as the duration of independence could not affect in any plausible way the duration of colonial ruling or whether a country joins a bilateral EIA or the GATT/WTO. The results of the Wald Chi-square tests conducted confirm that exogeneity of ID vis-à-vis the moderators can be rejected at 5 percent or better, which validate the use of IV techniques, namely an IV probit due to the binary nature of our DV. More details about the instrumentation procedure are found in Appendix B, including the first stage results (i.e., instrumentation equations) in **Table B.4** which overwhelmingly indicate a positive and significant effect of independence duration on institutional distance, as expected.

RESULTS

Main findings

Table1 presents the descriptive statistics while the variables' correlation matrix is shown in **Table B.2** (Appendix B). Our main results (i.e., hypothesis testing) using an IV probit estimator (Models 2-10) where institutional distances are instrumented using the duration of independence are presented in **Table 2** (only Model 1 is a simple probit with control variables only). We cluster all standard errors on the dyad. In terms of controls (Model 1) we get confirmation that the degree of partner interdependence (i.e., firm differentials in terms of product portfolios and size), existing

formal ties (i.e., JVs, minority or majority holdings, with the omitted category being "no relationship"), as well as previous experience in terms of alliances, or prior interactions between firms are all significant predictors for selection of partners. At the country-level, larger differences in terms of growth rates or resources (i.e., natural rubber) as well as long-lasting colonial links favour selection of partners. Importantly, cognitive, normative, and regulatory distances between prospective partners appear to hinder (both individually and jointly) the appeal of forming a technological alliance for exploitation; the coefficients of all these variables are negative and statistically significant. In terms of magnitudes, one standard deviation increase in cognitive distance between two potential partners will reduce the log odds of selection for a technological alliance by 0.23, compared to 0.10 (normative), and respectively 0.15 (regulatory distance).

In all remaining Models (2 through 10) we instrument institutional distances (across the three pillars- cognitive, normative, and regulatory) using the duration of independence to avoid potential overlap with our moderators (colonial duration and strength of economic ties between home countries of potential partners in a dyad). The direct effect of colonial duration is positive and significant suggesting that, ceteris paribus, firms from countries which has colonial links in the past are more likely to form alliances. The coefficients of instrumented distances are larger in magnitudes and remain statistically significant, just as the interactions with colonial duration (Models 2, 3 and 4). Overall, these results suggest that the moderation via colonial duration occurs through all institutional channels postulated, namely cultural-cognitive elements, managerial norms and practices, as well as laws and regulations.

Economic integration via bilateral EIAs (Models 5, 6 and 7) or participation in the GATT/WTO (Models 8, 9, and 10) appears not to have a direct effect on the selection of alliance

partners. Nevertheless, the interactions with the proposed cognitive-normative-regulatory distances are all positive and statistically significant supporting our theoretical conjectures.

Robustness checks

To further check the validity of our findings, we performed several additional analyses. Most of these results are not reported in the paper due to the space constraints but are available upon request. First, in relation to potential omitted variables, we have also checked the robustness of our findings by including several other controls against the proposed institutional distance measures. Thus, one can argue that the quality of infrastructure in a country can appeal to foreign tire producers seeking domestic alliance partners for co-production purposes. To capture the differentials in terms of *quality of infrastructure* we employ the *connectedness distance* in a dyad developed by Berry et al. (2010). This index captures nicely the relative connectivity between two countries (which can be distant geographically) and the differentials in terms of IT infrastructure (which we feel should be more important in the case of an alliance, then the physical one (roads, train tracks, etc.) which is anyways highly correlated with GDP differentials for which we control. When we include all our distance measures and this connectedness proxy, this variable has a negative sign as expected but it is not significant.

Second, from the same source (Berry et al., 2010) we include other country distance measures that capture distinct aspects of cross-country differences (e.g., *knowledge* distance, *political* distance, and *economic* distance). Although the sample size suffers a significant reduction (to 82,281 dyads), we find that our cognitive and normative measures of institutions retain high statistical significance upon introduction of these additional variables. Throughout these specifications, our regulatory distance becomes insignificant while knowledge and economic distance are the only ones with mild statistical significance (at 10 percent).

Finally, one may suspect that these results are driven by the large dimension of the dataset or the predominance of zeros (i.e., unrealized alliances) in the data. To ensure that our results are not driven by sample size we have re-run the analysis employing a random 5 percent of the zeros in our dataset (i.e., dyads where no partner was selected for exploitation alliance) alongside all the ones. Moreover, the realization of our DV is extremely low (only 0.18 percent of all dyads form an exploitation alliance). To further check that our results are not driven by this artefact of data we employ a rare-event logit model that relies on maximum likelihood estimation to generate coefficients with lower mean square errors than the standard logit model (King & Zeng, 2001). In both cases, the results are similar, confirming our main findings.

DISCUSSION AND CONCLUSIONS

Institutional differences remain a salient decision criterion for international activities of organizations (Gaur, Delios & Singh, 2007; Brouthers & Brouthers, 2000). While the negative *direct effects* of institutional distance (ID) have received significant attention in the literature, we know much less of the ways in which focal firms can potentially mitigate these costs and risks when seeking alliance partners. In this study we shed light on the role played by formal and informal ties between countries in reducing the negative effects of ID in the case of a specific activity –i.e., selection of partners for exploitative technological alliances – that is often used to secure competitive advantage and exploit technological assets (Yamakawa et al., 2011).

To examine these issues, we combine two theoretical lenses, which have not been hitherto used for this purpose. The first lens focuses on the complexity and diversity of the institutional environment, following Scott's (2001) distinction of cognitive, normative, and regulatory pillars, which was encapsulated in the concept of ID (Berry et al., 2010). The second lens employed looks

at the historical relationships between countries as indicative of contemporaneous firm interactions in an international context (Makino & Tsang, 2010; Klüppel et al., 2017), leading us to examine the effects of informal and formal ties between nations on the collaborative activities of by organizations from these countries, specifically the issue of partner selection for alliances.

Subsequently, we contribute in several ways. First, we examine theoretically and empirically potential contingencies for overcoming the detrimental effects of institutional distance. Our current knowledge of how firms can hedge or mitigate the costs and risks of engaging with institutionally distant environments is limited, and moreover confined to firm-specific mechanisms (Delios & Beamish, 2001; Henisz, 2003; Gaur & Lu, 2007; Chao & Kumar, 2010). Complementing these insights, we demonstrate that formal (economic) and informal (colonial) ties between countries have the potential to reduce the negative effects of institutional distance in the selection of partners for international exploitative alliances. In this way, we theorize and analyse empirically in a large setting two alternative explanations on how organizations can successfully mitigate the effects of institutional distance when dealing with international partners.

Second, our findings showcase the role of "omitted insights" such as countries' colonial past or current economic integration strategies in affecting organizations conducting international business. In this way we answer recent calls to bring history back in the field (Jones & Khanna, 2006; Klüppel et al., 2017; Wadhwani et al., 2018) and to pay more attention to the role of economic integration on organizational behaviour and strategies (Alhorr et al., 2008; Frantianni & Oh, 2009). Our results suggest that alliances between distant partners might still be attractive if their host countries are linked by formal or informal ties, promoting the idea that both historical antecedents and current economic integration efforts of countries are conducive of more inter-firm technological cooperation via exploitative alliances.

Finally, we advance the research on strategic alliances by providing insights from international relations on how the macro-contextual environment of organizations matters for their strategies and choices in a cross-border context. Thus, partner selection for exploitation is negatively related to all types of institutional distance but having an extensive colonial past or strong economic ties between countries will mitigate some of the institutional distance-related costs, particularly through cognitive and normative channels. Also, the type of economic agreements (EIAs or WTO) matters, and our results suggest that bilateral treaties to be more effective in mitigating the negative effects of institutional distance across all domains. Broadly, we can say that institutional differences express what sets countries (and the firms embedded in their environments) apart, whereas colonial and economic ties articulate what brings them closer together. Overall, these contrasting forces provide a balanced and realistic view of the selection process.

Theoretically, our conjectures support the confluence of institutional theory (Scott, 2001) with insights from political science and international relations, particularly on the role of dyadic historical and economic ties in firms' strategies and behaviours. Specifically, prior work on such country ties has focused on their direct effect, and mostly in narrow settings that include only a few countries (Frynas et al., 2006; Zhang & He, 2013; Liou & Nicholson, 2017). We move this discussion forward and show that a firm's decision to select a partner are contingent not only on the level of institutional differences it exhibits but also, on the ties between the home countries of firms. The mechanisms through which this moderation occurs are intricately related to the formal (i.e., codified and enforceable prescriptions, institutional spillovers) and informal (i.e., deep mutual tacit knowledge, common legal traditions, nationalism) nature of these ties.

Practical Implications

These findings will hopefully draw the attention of managers and policy makers to the joint importance of institutional background as well as the macro-context of prospective partners for inter-firm alliances and technological transfers. Thus, managers should be mindful of engaging in alliances with very dissimilar cognitive, normative, and regulatory partners, as these differences will be difficult to overcome and will require additional resources to be committed (Gulati & Singh, 1998; Chan & Makino, 2007; Delerue & Simon, 2009). Our results suggest that an effective way to mitigate these negative effects is to form alliances for technological exploitation with partners where there are either formal or informal country links established. Thus, the existence of a lengthy colonial relationship in the past or greater economic integration via multilateral (WTO) or bilateral (EIAs) agreements have the potential to reduce uncertainty and risks stemming from institutional distance across cognitive, normative, and regulatory elements. On the policy side, our results suggest that deficits in terms of regulatory provisions such as IPR, education or technology investments (Krammer, 2009; Khoury & Peng, 2011) may stifle foreign firms from seeking to form alliances with domestic firms in a country. Our results confirm the effects of history and geopolitics on inter-firm international alliances as both powerful and enduring, suggesting that national policies that support economic integration (e.g., joining of the GATT/WTO, signing of bilateral EIAs) can alter firms' perception of risks regarding distant partners and increasing their appeal as technological partners. Subsequently, governments in these countries seeking to make domestic firms more attractive to technological partnerships can actively pursue engagement in such bilateral and multilateral agreements to confer comparative advantage to their domestic organizations in terms of attracting foreign partners.

Limitations and Opportunities for Future Research

This study is subject to several limitations that provide avenues for further research. First, we have focused exclusively on a specific type of inter-firm interaction (i.e., horizontal technological alliances for exploitation) because we wanted to have clearer theoretical argumentation for selection rationales (Phelps, 2010) and to better emphasize the role of institutional differences as our baseline story. The international orientation of alliance activities between tire producers (Acha & Brusoni, 2010), and the clear effects of ID for exploitation agreements have prompted us to focus on these types of agreements for our study. However, future studies may want to venture outside this context and probe, both theoretically and empirically, the effects of formal and informal ties on firms in different settings (e.g., high tech industries, vertical versus horizontal alliances, technological versus non-technological alliances). Particularly those that will be able to draw on large samples with good representation of countries and industries would be able to triangulate and test competing predictions stemming from a large, yet eclectic, alliance literature.

Second, our theoretical predictions do not rely on any idiosyncratic feature of the tire industry, and therefore are generalizable to other empirical settings (e.g., high-tech, fast-growing industries). Hence, future studies may want to examine empirically whether the negative effects of institutional differences, as well as other types of formal and informal ties between countries (e.g., migration; conflicts, etc.), have direct or indirect effects on dyadic interactions at the firm level in other international contexts.

Finally, we wanted to draw attention upon possible "omitted insights" stemming from historical accounts (Makino & Tsang, 2010), which can provide additional explanations for the selection of alliance partners in an international context. To this end, we focused on the duration of colonial interactions between countries as a historical bridge between organizations and

individuals in these countries, a channel which has allowed mutual exposure and implicitly, greater knowledge and familiarity with each other's cognitive and normative characteristics. However, colonial histories often represent messy, ugly experiences that can have both positive and negative connotations for the parties involved. This could result in national sentiments that will affect also economic interactions (Li et al., 2019). A promising line of inquiry which can be exploited by future work is to examine whether the type (e.g., good or bad) and extent (e.g., length, degree of integration) of these episodes or overall relationships bear any effects on contemporaneous international interactions (at various levels) between former colonizer-colony pairs.

Concluding remarks

Institutional differences present prominent obstacles for organizations seeking to engage successfully in business across borders. While the negative effects of institutional distance have been well documented in prior studies, we lack sufficient knowledge on potential mitigating factors. This study provides an answer to this question by examining the role of formal and informal dyadic ties between countries. Using exploitative technological alliances with foreign partners in the global tire industry as the empirical testing ground for these conjectures, it shows that both informal (colonial) and formal (economic agreements) ties between countries reduce the impact of institutional distance on selection of partners for alliances. These results provide evidence for the role of historical and current connections between countries as means to reduce transaction costs in international interactions between organizations.

Table 1. Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
Partner selection exploit	204,312	0.002	0.04	0.00	1.00
Size differential*	204,312	10.615	1.76	0.00	14.82
Age differential*	204,312	3.021	0.95	0.00	4.77
Knowledge differential*	204,312	0.761	1.61	0.00	6.86
Product differential*	204,312	0.982	0.55	0.00	2.20
Unionization differential	204,312	0.529	0.50	0.00	1.00
Ownership differential*	204,312	0.008	0.09	0.00	1.00
Minority	204,312	0.000	0.02	0.00	1.00
Majority	204,312	0.001	0.02	0.00	1.00
JV	204,312	0.001	0.03	0.00	1.00
Previous alliance experience	204,312	0.163	0.94	0.00	10.00
Prior interactions	204,312	0.002	0.04	0.00	1.00
Market size differential*	204,312	1.622	1.10	0.00	6.51
Market growth differential	204,312	0.041	0.03	0.00	0.24
Geographic contiguity	204,312	0.065	0.25	0.00	1.00
Geographic distance*	204,312	8.889	0.70	5.09	9.88
Schooling differential	204,312	3.466	2.34	0.00	9.69
Resource differential*	204,312	8.926	6.29	0.00	15.10
Colonial duration (COL)*	204,312	0.299	1.24	0.00	6.10
Cognitive distance (CD)	204,312	0.020	1.05	-2.80	2.09
Normative distance (ND)	204,312	-0.082	0.85	-1.25	4.45
Regulatory distance (RG)	204,312	0.250	1.02	-2.34	2.90
EIA	204,312	0.123	0.33	0.00	1.00
GATT/WTO	204,312	1.857	0.35	0.00	2.00

Note: Variables marked with an * have followed a logarithmic transformation.

Table 2. Partner selection and the moderating effects of colonial and economic ties on institutional distance. IV Probit - second stage-

Variables / Models	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Firm-level controls										
Firm size differential	0.051+	0.053+	0.206***	-0.032	0.039	0.357***	-0.085	0.117***	0.247***	0.253***
	[0.027]	[0.032]	[0.051]	[0.046]	[0.034]	[0.102]	[0.059]	[0.036]	[0.060]	[0.065]
Firm age differential	-0.052	0.002	0.073+	0.079+	-0.008	0.086	0.065	0.047	0.057	-0.054
	[0.035]	[0.041]	[0.044]	[0.043]	[0.042]	[0.053]	[0.043]	[0.043]	[0.044]	[0.050]
Firm knowledge differential	0.081**	0.151***	-0.244**	0.325***	0.208***	-0.495**	0.589***	-0.072	-0.015	-0.204**
	[0.035]	[0.046]	[0.102]	[0.089]	[0.064]	[0.198]	[0.166]	[0.067]	[0.042]	[0.093]
Firm portfolio differential	-0.171***	-0.215***	-0.627***	-0.158**	-0.216***	-0.985***	-0.073	-0.286***	-0.048	-0.213***
	[0.060]	[0.067]	[0.134]	[0.073]	[0.068]	[0.265]	[0.089]	[0.068]	[0.097]	[0.070]
Firm unionization differential	-0.029	-0.192**	0.053	-0.398***	-0.212**	0.306+	-0.536***	-0.141+	0.033	-0.121
	[0.071]	[0.082]	[0.093]	[0.121]	[0.083]	[0.166]	[0.154]	[0.083]	[0.098]	[0.085]
Firm ownership differential	0.288	0.597+	1.890***	0.557+	0.766**	3.788***	0.903***	-0.556	0.44	-2.350***
	[0.290]	[0.308]	[0.586]	[0.292]	[0.337]	[1.289]	[0.339]	[0.475]	[0.333]	[0.889]
Minority	2.740***	2.765***	1.877***	2.715***	2.839***	0.485	2.958***	1.858***	2.109***	3.069***
	[0.225]	[0.247]	[0.686]	[0.323]	[0.275]	[1.499]	[0.501]	[0.484]	[0.785]	[0.664]
Majority	2.791***	3.084***	3.939***	2.930***	3.385***	5.001***	3.561***	2.143***	3.147***	2.968***
	[0.201]	[0.262]	[0.704]	[0.295]	[0.361]	[1.408]	[0.514]	[0.383]	[0.674]	[0.555]
JV	0.867***	1.108***	1.616***	1.046***	1.244***	1.877+	1.383***	0.797***	-0.404	0.931+
	[0.166]	[0.187]	[0.535]	[0.240]	[0.218]	[1.043]	[0.387]	[0.293]	[0.708]	[0.485]
Previous alliance experience	0.097***	0.141***	-0.083	0.036	0.160***	-0.324**	0.007	0.114***	0.014	0.051**
	[0.012]	[0.017]	[0.063]	[0.024]	[0.024]	[0.154]	[0.032]	[0.015]	[0.033]	[0.023]
Prior interactions	3.180***	3.002***	1.415**	3.368***	2.902***	0.513	3.722***	3.607***	4.375***	3.042***
	[0.092]	[0.108]	[0.605]	[0.187]	[0.124]	[1.107]	[0.330]	[0.299]	[0.581]	[0.329]
Country-level controls										
Market size differential	0.068**	0.072**	0.292***	0.045	0.068**	0.329***	0.004	-0.017	-0.117	0.992***
	[0.031]	[0.033]	[0.069]	[0.034]	[0.033]	[0.093]	[0.040]	[0.051]	[0.078]	[0.283]
Market growth differential	2.432**	0.257	3.352***	3.950***	-0.64	4.071***	4.400***	-1.482	-0.398	-14.898***
	[1.061]	[1.296]	[1.178]	[1.153]	[1.430]	[1.380]	[1.213]	[1.736]	[1.457]	[5.437]

Geographic contiguity	-0.271	-0.117	-1.702***	0.064	-0.009	-3.132***	0.259	-0.581**	2.668***	-1.361***
	[0.201]	[0.223]	[0.596]	[0.210]	[0.236]	[1.185]	[0.227]	[0.277]	[0.847]	[0.479]
Geographic distance	-0.227***	-0.095	-0.505***	0.095	-0.050	-0.495***	0.270**	-0.006	0.344**	-0.343***
	[0.051]	[0.067]	[0.150]	[0.082]	[0.081]	[0.152]	[0.134]	[0.085]	[0.150]	[0.110]
Schooling differential	0.012	0.008	0.500***	0.527***	0.007	1.039***	1.060***	0.044+	-0.263***	-0.307***
	[0.019]	[0.019]	[0.163]	[0.156]	[0.019]	[0.368]	[0.319]	[0.026]	[0.087]	[0.112]
Resource differential	0.007	0.017**	-0.011	-0.044+	0.013	-0.111**	-0.086**	0.011	0.048***	0.118***
	[0.006]	[0.007]	[0.016]	[0.022]	[0.008]	[0.050]	[0.034]	[0.008]	[0.010]	[0.031]
COL	0.113***	0.068**	0.104***	0.043	0.046	-0.587**	0.310***	0.024	-0.001	0.083**
	[0.023]	[0.032]	[0.028]	[0.033]	[0.037]	[0.245]	[0.060]	[0.045]	[0.051]	[0.036]
CD	-0.229***	-0.773***			-1.211***			-8.401***		
	[0.037]	[0.215]			[0.395]			[3.392]		
ND	-0.104***		-6.226***			-13.633***			-45.110***	
	[0.038]		[1.997]			[4.834]			[13.749]	
RD	-0.145***			-2.394***			-4.784***			-28.055***
	[0.050]			[0.703]			[1.433]			[8.655]
Main effects										
COL * CD		0.056+								
		[0.032]								
COL * ND			1.165***							
			[0.356]							
COL * RD				0.270***						
				[0.092]						
EIA					-0.549	1.615	-0.130			
					[0.478]	[1.178]	[0.429]			
EIA * CD					1.746***					
					[0.645]					
EIA * ND						12.299***				
						[4.698]				
EIA * RD							4.069***			
							[1.347]			
GATT/WTO								-0.823	-4.188***	0.261
								[0.503]	[1.222]	[0.193]
GATT/WTO * CD								4.740**		
								[1.866]		
GATT/WTO * ND									23.098***	

									[7.035]	
GATT/WTO * RD										14.484***
										[4.434]
Constant	-1.416+	-4.418***	1.619	-6.753***	-5.750***	1.699	-11.970***	0.912	1.024	-0.389
	[0.748]	[1.043]	[1.690]	[1.419]	[1.605]	[1.786]	[3.015]	[1.844]	[1.381]	[1.149]
N	204,312	204,312	204,312	204,312	204,312	204,312	204,312	204,312	204,312	204,312
Log Likelihood	-736.41	1722.14	459.08	1164.74	1520.56	191.73	658.31	901.54	365.60	461.35
Wald Chi-Square	-	7.39***	10.58***	10.00***	6.46**	11.31***	10.74***	7.19***	12.60***	11.36***

Notes: The dependent variable equals 1 if the potential partner in the dyad is selected for an exploitative technological alliance, and 0 otherwise; All models include time dummies and an intercept, not reported given space constraints; +, ** and *** indicate variables that are significant at the 10%, 5% and respectively 1%.
These results are estimated using IVprobit (Stata 16.1) command and using all exogenous variables as potential instruments

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APPENDIX A. DATA SOURCES AND PROCESSING

We compile a dataset of all tire producers worldwide and their alliances, manually collected from various issues of the *European Rubber Journal* (ERJ). Since our DV is partnering for an exploitative technological alliance, we limit the sample to the years where the alliance data is available in ERJ (i.e., the period 1985 to 2003) and consider *all possible dyads* between firms in the industry to capture the selection of a partner for an alliance as well as the rejection of other potential partners. We collect additional data for both members of the dyad on basic firm characteristics -i.e., size, age and ownership type- (ERJ) and firm patents (Derwent Innovation Index- ISI Thomson) from which we compute a knowledge stock using the perpetual inventory method and the common (15%) depreciation rate in this literature (Griliches, 1990). Using a patent-related measure to capture knowledge stock fits well with our institutional arguments towards appropriation concerns and difficulties in knowledge transmission in the case of institutionally-distant partners. Furthermore, Derwent Innovation Index covers 14 million inventions from almost 60 world-wide patent issuing authorities, making it a better choice than a single patent office (e.g., USPTO, EPO) given our international scope in terms of origins of firms. Finally, despite the maturity of the industry and overall low R&D intensity, lots of technological developments are still undergoing in the tire industry, as reflected by patenting activities (Acha and Brusoni, 2010). An overview of the most common technological classes for patents in this industry in provided in **Table B.3** in the Appendix B.

Then, we analyze the text provided in ERJ regarding technological alliances formed by tire producers for exploitation and identify both focal firms and their partners. In all dyads, we list the focal firm as the first one (i.e., the provider of technology) while the second firm is the recipient of technology via the alliance. For dyads in which firms do not form a technological alliance (i.e., there is no alliance announcement), we consider the focal firm to be the one with greater potential for technological exploitation within a given dyad, i.e., the larger knowledge stock (number of granted patents) of the two firms in the dyad. If both firms have the same number of patents, we arbitrarily consider the first firm listed in the dyad to be the focal one. In the case of firms that do not have any patents, we assume their technological knowledge stock to be zero.

APPENDIX B. SUPPLEMENTARY MATERIAL

Table B1. Factor loadings for normative institutions based on managerial values *

Variable	Factor1 Managerial Values	Uniqueness
Competence of managers	**0.69**	**0.52**
Credibility of managers	**0.89**	**0.20**
Corporate boards effectiveness	**0.81**	**0.35**
Employee training	**0.77**	**0.40**
Flexibility and adaptability	0.48	0.77
International experience of management	**0.72**	**0.49**
Remuneration of management	0.20	0.96
Social responsibility	**0.83**	**0.31**
Worker's motivation	**0.89**	**0.21**
Eigenvalue	4.53	
Alpha	0.93	

Notes: * Bold type indicates best factored items;
All items are obtained from IMD World Competitiveness Yearbook

Table B2. Paired correlations

No	Variables	1	2	3	4	5	6	7	8	9
1	Partner selection exploit	1.000								
2	Size differential*	0.028*	1.000							
3	Age differential*	0.019*	0.103*	1.000						
4	Knowledge differential*	0.097*	0.273*	0.138*	1.000					
5	Minority	0.417*	0.012*	0.006*	0.048*	1.000				
6	Majority	0.358*	0.016*	0.012*	0.048*	0.004*	1.000			
7	JV	0.260*	0.018*	0.011*	0.060*	0.030*	0.140*	1.000		
8	Product differential*	0.011*	0.091*	0.068*	0.146*	0.006*	0.012*	0.014*	1.000	
9	Unionization differential	-0.016*	-0.022*	0.038*	-0.102*	0.000	-0.013*	-0.012*	0.001	1.000
10	Ownership differential*	-0.006*	-0.032*	-0.008*	-0.030*	-0.005*	-0.003*	-0.004*	0.030*	0.052*
11	Market size differential*	0.012*	0.069*	0.005*	0.077*	0.010*	0.000	-0.001	0.007*	0.004*
12	Market growth differential	-0.003*	-0.072*	-0.005*	-0.060*	-0.003*	-0.007*	-0.004*	-0.009*	0.079*
13	Geographic contiguity	-0.005*	0.010*	-0.026*	-0.048*	-0.004*	0.001	-0.003*	-0.015*	0.033*
14	Geographic distance*	-0.014*	-0.009*	0.023*	0.013*	-0.009*	-0.012*	0.001	0.010*	-0.024*
15	IMR	-0.110*	-0.227*	-0.216*	-0.834*	-0.054*	-0.061*	-0.063*	-0.135*	0.083*

16	Previous alliance experience	0.088*	0.070*	0.088*	0.357*	0.046*	0.023*	0.012*	0.053*	-0.030*
17	Prior interactions	0.753*	0.026*	0.018*	0.094*	0.352*	0.326*	0.303*	0.011*	-0.020*
18	Schooling differential	0.003*	0.074*	0.059*	0.023*	-0.002	-0.001	-0.001	0.009*	0.026*
19	Resource differential*	-0.013*	-0.028*	-0.002	-0.143*	-0.009*	-0.011*	-0.006*	-0.003*	-0.001
20	COL*	0.009*	0.033*	0.050*	0.034*	0.001	-0.011*	-0.001	0.004*	-0.049*
21	CD	-0.018*	-0.091*	-0.049*	-0.030*	-0.005*	0.003*	-0.001	-0.002	-0.037*
22	ND	-0.013*	0.091*	-0.001	-0.014*	-0.007*	-0.002	-0.005*	-0.042*	0.074*
23	RD	0.008*	-0.027*	0.049*	0.183*	0.005*	0.007*	0.010*	0.046*	-0.113*
24	EIA	-0.005*	0.000	-0.053*	-0.032*	-0.002	0.004*	-0.003	-0.011*	-0.063*
25	GATT/WTO	0.010*	0.065*	-0.011*	0.107*	0.007*	0.008*	0.008*	-0.018*	-0.229*

No	**Variables**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
10	Ownership differential*	1.000								
11	Market size differential*	0.123*	1.000							
12	Market growth differential	0.197*	0.023*	1.000						
13	Geographic contiguity	0.000	-0.088*	-0.025*	1.000					
14	Geographic distance*	-0.054*	0.100*	0.039*	-0.355*	1.000				
15	IMR	0.016*	-0.077*	0.049*	0.053*	0.011*	1.000			
16	Previous alliance experience	-0.007*	0.025*	-0.009*	-0.024*	-0.008*	-0.404*	1.000		
17	Prior interactions	-0.006*	0.008*	-0.005*	-0.006*	-0.012*	-0.115*	0.090*	1.000	
18	Schooling differential	-0.008*	0.111*	-0.023*	-0.091*	0.149*	-0.038*	-0.004*	0.001	1.000
19	Resource differential*	-0.091*	-0.061*	0.062*	0.051*	0.179*	0.181*	-0.080*	-0.016*	0.066*
20	COL*	-0.037*	-0.005*	-0.082*	-0.041*	0.034*	-0.008*	0.023*	0.011*	0.023*
21	CD	0.030*	-0.038*	-0.057*	0.002	0.018*	0.130*	-0.036*	-0.014*	0.013*
22	ND	0.014*	0.020*	0.064*	-0.025*	-0.044*	-0.013*	-0.032*	-0.014*	0.103*
23	RD	0.009*	0.060*	-0.050*	-0.046*	0.100*	-0.102*	0.015*	0.013*	0.327*
24	EIA	-0.035*	-0.109*	-0.124*	0.322*	-0.529*	0.025*	-0.017*	-0.005*	-0.142*
25	GATT/WTO	-0.253*	-0.063*	-0.226*	-0.072*	0.042*	-0.097*	0.039*	0.013*	0.108*

No	**Variables**	**19**	**20**	**21**	**22**	**23**	**24**	**25**
19	Resource differential*	1.000						
20	COL*	-0.063*	1.000					
21	CD	-0.063*	0.029*	1.000				
22	ND	-0.090*	0.060*	-0.063*	1.000			
23	RD	-0.129*	0.108*	0.096*	-0.078*	1.000		
24	EIA	-0.079*	-0.046*	0.018*	0.031*	0.059*	1.000	
25	GATT/WTO	-0.127*	0.099*	0.085*	0.081*	0.135*	0.140*	1.000

Note: * denotes correlations significant at 5 % or better.

Table B.3 Top ten IPC patent classes for tire industry (frequency, 6-digit depth)*

Class	Class name	Subclass	Subclass name	Percent
B60C	Vehicle Tyres	23	Devices for measuring tyre pressure or temperature	15.81
B60C	Vehicle Tyres	01	Tyres characterised by the chemical composition	8.49
C08K	Inorganic and Organic Compounds	03	Use of inorganic ingredients	6.95
C08L	Composition of Macromolecular Compounds	09	Homopolymers or copolymers of conjugated diene hydrocarbons	5.18
B60C	Vehicle Tyres	05	Inflatable pneumatic tyres or inner tubes	4.53
B60C	Vehicle Tyres	19	Tyre parts or constructions not otherwise provided for	4.52
C08K	Inorganic and Organic Compounds	05	Use of organic ingredients	4.48
B60C	Vehicle Tyres	11	Tyre tread bands	4.42
B29D	Producing articles from plastic	30	Producing pneumatic or solid tyres or parts thereof	4.07
G01M	Testing static or dynamic balance	17	Mechanical or engine testing	3.23

Note: *Because patents are assigned by application, one patent can be assigned to more than one class. Therefore, percentages indicate the frequency of IPC classes for tire related patents but they are not indicative for the overall number of patents.

Endogeneity of moderators vis-à-vis institutional distance procedure

There is a potential endogeneity concern, as our main IDVs and the moderators might be interdependent. For instance, we know that the development of institutions is greatly influenced by exogenous factors like geography, genetics, or serendipitous historical events (Acemoglu, Johnson and Robinson, 2001; La Porta et al., 2008; Olsson, 2009). However, colonial past may also affect directly institutional distance between two countries by setting in the past common institutional framings which have effectively reduced ID between the two countries during the colonial period. After independence, some of these elements have persisted, others have been abolished, while other factors (including economic, social and political idiosyncrasies) have further shaped the level ID to the levels we experience today. Similarly, integration agreements such as EIAs or WTO membership may also affect the distance between countries in terms of institutions. Thus, it is quite plausible that our moderators have also an impact, albeit a small one, on the level of current ID between countries[1].

To deal with this potential bias, we instrument ID by using the length of the period from independence to the present (2020). The identifying assumption is that if this time interval (*independence*) is relatively short then ID between two countries will be smaller, as the colonial heritage will still persist more than in cases where independence was acquired earlier. In turn, our instrument is not correlated with the moderators, as the duration of independence could not affect in any plausible way the duration of colonial ruling or whether a country joins a bilateral EIA or the GATT/WTO. The results of the Wald Chi-square tests carried out confirm that exogeneity of ID vis-à-vis the moderators can be rejected at 5 percent or better, which validate the use of IV techniques, namely an IV probit due to the binary nature of our DV.

The first stage results of the IV probit estimation are presented below in Table B.4 (i.e., the instrumentation equations) while our hypothesized moderation effects (instrumented) are presented in the main body of the paper (Table 2).

[1] This fact is also supported by the statistically significant correlations between them and the three institutional measures (e.g., colonial: 0.03; -0.06; 0.10; EIA: 0.02; 0.03; 0.06; GATT/WTO: 0.08; 0.13; 0.14).

Table B.4. Partner selection and the moderating effects of colonial and economic ties on institutional distance. IV Probit estimation- first stage-

Variables / Models	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**	**Model 9**	**Model 10**
Instrumented var.	-	*CD*	*ND*	*RD*	*CD*	*ND*	*RD*	*CD*	*ND*	*RD*
Independence		0.564***	0.059***	0.097***	0.566***	0.060***	0.097***	0.594***	0.067***	0.088***
		[0.015]	[0.012]	[0.012]	[0.015]	[0.012]	[0.012]	[0.015]	[0.012]	[0.012]
Firm size differential		-0.036***	0.022***	-0.048***	-0.035***	0.022***	-0.048***	-0.034***	0.022***	-0.048***
		[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Firm age differential		-0.013***	0.005**	0.027***	-0.013***	0.005**	0.027***	-0.009***	0.006***	0.026***
		[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Firm knowledge differential		0.144***	-0.047***	0.122***	0.144***	-0.047***	0.123***	0.145***	-0.047***	0.122***
		[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Minority		0.242+	-0.166	0.049	0.245**	-0.164	0.05	0.216+	-0.174+	0.057
		[0.125]	[0.101]	[0.102]	[0.125]	[0.101]	[0.102]	[0.124]	[0.101]	[0.102]
Majority		0.726***	0.173**	0.143+	0.731***	0.176**	0.144+	0.727***	0.173**	0.143+
		[0.104]	[0.084]	[0.085]	[0.104]	[0.084]	[0.085]	[0.103]	[0.084]	[0.085]
JV		0.268***	0.066	0.048	0.267***	0.065	0.048	0.262***	0.064	0.05
		[0.093]	[0.076]	[0.077]	[0.093]	[0.076]	[0.077]	[0.093]	[0.076]	[0.077]
Firm portfolio differential		0.036***	-0.060***	0.045***	0.036***	-0.060***	0.045***	0.037***	-0.060***	0.045***
		[0.004]	[0.003]	[0.003]	[0.004]	[0.003]	[0.003]	[0.004]	[0.003]	[0.003]
Firm unionization differential		-0.067***	0.028***	-0.132***	-0.064***	0.030***	-0.131***	-0.037***	0.036***	-0.141***
		[0.005]	[0.004]	[0.004]	[0.005]	[0.004]	[0.004]	[0.005]	[0.004]	[0.004]
Firm ownership differential		0.372***	0.245***	0.080***	0.382***	0.253***	0.083***	0.413***	0.257***	0.068***
		[0.026]	[0.021]	[0.021]	[0.026]	[0.021]	[0.021]	[0.026]	[0.021]	[0.021]
Market size differential		-0.006***	0.025***	-0.009***	-0.006***	0.025***	-0.009***	-0.002	0.026***	-0.010***
		[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]	[0.002]
Market growth differential		-2.033***	0.146***	0.466***	-1.994***	0.175***	0.478***	-1.559***	0.280***	0.332***

		[0.068]	[0.055]	[0.055]	[0.068]	[0.055]	[0.056]	[0.069]	[0.056]	[0.056]
Geographic contiguity		0.012	-0.284***	0.007	0.000	-0.293***	0.003	0.050***	-0.274***	-0.004
		[0.010]	[0.008]	[0.008]	[0.010]	[0.008]	[0.008]	[0.010]	[0.008]	[0.008]
Geographic distance		0.053***	-0.065***	0.066***	0.067***	-0.055***	0.070***	0.051***	-0.066***	0.066***
		[0.004]	[0.003]	[0.003]	[0.004]	[0.003]	[0.003]	[0.004]	[0.003]	[0.003]
Previous alliance experience		0.050***	-0.034***	-0.030***	0.050***	-0.034***	-0.030***	0.050***	-0.034***	-0.030***
		[0.003]	[0.002]	[0.002]	[0.003]	[0.002]	[0.002]	[0.003]	[0.002]	[0.002]
Prior interactions		-0.073	-0.194***	0.149***	-0.071	-0.193***	0.150***	-0.059	-0.190***	0.145***
		[0.064]	[0.052]	[0.053]	[0.064]	[0.052]	[0.053]	[0.064]	[0.052]	[0.053]
Schooling differential		0.001	0.081***	0.223***	0.001	0.081***	0.223***	-0.004***	0.079***	0.224***
		[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]
Resource differential		-0.008***	-0.009***	-0.031***	-0.008***	-0.009***	-0.031***	-0.005***	-0.008***	-0.032***
		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
COL		-0.499***	-0.099***	-0.030**	-0.499***	-0.099***	-0.030***	-0.529***	-0.107***	-0.021+
		[0.014]	[0.011]	[0.012]	[0.014]	[0.011]	[0.012]	[0.014]	[0.011]	[0.012]
EIA					0.059***	0.044***	0.018**			
					[0.009]	[0.007]	[0.007]			
WTO/GATT								0.252***	0.071***	-0.071***
								[0.007]	[0.006]	[0.006]
constant		-3.044***	0.731***	-1.705***	-3.184***	0.627***	-1.747***	-3.620***	0.568***	-1.542***
		[0.050]	[0.040]	[0.041]	[0.054]	[0.044]	[0.044]	[0.052]	[0.042]	[0.043]
N	-	204,312	204,312	204,312	204,312	204,312	204,312	204,312	204,312	204,312
R Square	-	0.067	0.065	0.336	0.067	0.065	0.336	0.073	0.066	0.336

Notes: The dependent variable equals 1 if the potential partner in the dyad is selected for an exploitative technological alliance, and 0 otherwise; All models include time dummies and an intercept, not reported given space constraints; +, ** and *** indicate variables that are significant at the 10%, 5% and respectively 1%.
These results are estimated using IVprobit (Stata 16.1) command and using all exogenous variables as potential instruments