Extending Comparative Advantage Through Cross-Border Acquisitions

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October 12, 2014

ABSTRACT

We document that acquirers from more specialized industries are more likely to buy foreign targets in countries that are less specialized in these same industries. The magnitude of this specialization effect is large with 14.7% more deals when the difference in industry specialization between two countries increases by one standard deviation. This relationship is stronger when the cross-country difference in measures of educational attainment and intangible capital is higher. Post-acquisition performance is higher when specialized acquirers purchase assets in less specialized industries. These results are consistent with management and industry know-how providing a comparative advantage that can be extended across countries.

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"A firm's motive for international expansion and its success are largely determined by its intangible resources", Richard E. Caves (2007)

I Introduction

The last thirty years has witnessed a boom in cross-border mergers and acquisitions, with a large range of countries and industries participating in the globalization of corporate acquisitions. Existing research highlights that country characteristics play an important role in explaining the intensity and direction of cross-border acquisition flows. In particular, differences in countries' institutional quality, corporate governance, labor regulation, currency and stock market valuation, or cultural traits have been found to explain the flow of cross-border transactions. Surprisingly, little is known about the role of industry characteristics in explaining the geography of global acquisitions.

This paper fills part of this gap by focusing on the role of one peculiar industry characteristic: Comparative advantage or specialization. Industry specialization reflects differences in the relative efficiency of industries across countries. Such heterogeneity arises because of countries' unequal endowments (e.g. labor costs), but also because of differences in the prevalence of industry-specific assets, such as knowhow, expertise, or human capital that confer some countries a comparative advantage in certain economic areas. We examine the proposition that cross-border acquisitions are motivated by firms' desire to extend this comparative advantage abroad.

We test whether cross-country acquisitions increase with the specialization of an acquirers industry and involve the purchase of target firms in countries that exhibit a comparative *dis*-advantage in the acquirer's industry. We further examine whether the importance of industry specialization for global expansion is related to intangible assets as stressed by Caves (1971) and Hymer (1976) and formalized by recent theoretical models of international acquisitions by Neary (2007) and Nocke and Yeaple (2007).

We conjecture that the advantage of intangible resources in specialized industries can potentially be used outside of the home country, unlike other relatively immobile

factors of production. However, market inefficiencies may prevent some of these assets to be sold or contracted out abroad without putting their owners' claim on them at risk.[1] For instance, sales or licensing contracts of specialized knowledge may disclose important competitive information and contracts may be difficult to enforce in certain foreign markets. In this context, the value of acquiring assets abroad arises from the complementarity between target firms' immobile capabilities (e.g. existing machines and equipment, distribution network, or political connections) and acquiring firms' intangible industry-specific resources. This motive is distinct from other motives for cross-border acquisitions such as sourcing cheaper factors of production (e.g. Yeaple (2003)), tariff jumping and foreign market access (e.g. Brainard (1997)), buying undervalued assets (e.g. Erel, Liao, and Weisbach (2012)), extending governance practices abroad (e.g. Bris and Cabolis (2008), Rossi and Volpin (2004)), or the presence of institutional investors (Ferreira, Massa, and Matos (2010)).

We measure the relative comparative advantage or specialization of a country in a given industry by comparing the domestic share of production of that industry to the average share of that industry worldwide. Accordingly, countries are specialized in industries whose share of production (i.e. economic importance) are large compared to the rest of the world. Countries that are strong in specific industrial areas, such as watch-making in Switzerland, mining in Brazil, or information technology in the United States, have accumulated specific expertise and competencies in these areas. We argue that these specialized capabilities can be profitably deployed abroad through acquisitions.[2]

Using a large sample of 38,821 horizontal cross-border transactions involving private and public firms from 46 countries and 97 industries, we find strong evidence that relative industry specialization is an important driver of global acquisitions. Because extending comparative advantage mainly operates within industries, our main tests

[1] In a domestic context, Bresnahan and Levin (2012) describe the literature which includes Penrose (1959) and Wernerfelt (1984) that theoretically develops how firms may vertically integrate to leverage their intangible assets such as managerial skill and know-how. We extend these ideas to an international context and focus on horizontal mergers.

[2] Hence, the reasons why industry specialization should procure a comparative advantage for global acquirers go beyond traditional Ricardian or Heckscher-Ohlin-Samuelson theories of international trade.

focus on horizontal transactions – transactions taking place between firms from the same industry but from *different* countries. Univariate tests reveal that cross-border horizontal transactions occur primarily between firms operating in relatively specialized industries. However, we observe large differences in the degrees of specialization between acquirers and targets. Overall, more than 60% of all transactions involve acquirers than are more specialized than targets. Across all industries, we find that more specialized firms buy (or merge with) less specialized firms. The difference in specialization is economically large as acquirers display levels of specialization that are roughly 25% larger than that of targets. This pattern is strong and pervasive as it holds with various measures of specialization, in every year of the sample period, and is present across most countries and industries.

We further analyze the determinants of cross-border acquisition flows (both in numbers of transactions and dollar value) using a gravity model. Traditionally gravity models are used to examine how geographic distance explain the intensity of cross-border relations (e.g. trade or portfolio flows). We follow a similar approach but focus on distance in specialization space, while controlling for other known determinants of cross-border acquisitions. We find strong evidence that the intensity of acquisition flows across country-industry pairs is positively related to differences in (country-industry) specialization. The larger is the difference in specialization between two countries, the larger is the flow of bilateral acquisitions.

The magnitude of the specialization effect is large. For the average industry, a one standard deviation increase in the difference in specialization between two countries leads to an increase of 14.7% in the number of deals, and a 52.9% increase in aggregate transaction value. Remarkably, the influence of specialization on the flow of international acquisitions is distinct from that of countries' characteristics such as country size, the level of economic development, exchange rates, common legal origin, language, or geographical distance between countries.

We also show that the role of specialization in cross-border transactions is distinct from that of product market competition. We find that firms are more likely to buy foreign assets in less competitive industries, consistent with Caves (1971) and Neary (2007). We further find that the specialization effect we document mitigates the

competitive effect, as firms from more specialized industries are more likely to buy assets in competitive industries, consistent with their industry expertise allowing them to withstand the effects of competitive pressure.

In support of the conjecture that intangible resources are related to the specialization effect we uncover, we find that the impact of industry specialization on acquisition intensity varies systematically with country-level proxies for human and technological capital. In particular we document that, all else equal, differences in industry specialization have the largest effect on acquisition flows when the acquirer country has a higher level of educational attainment than the target country The economic effect of differences in specialization is roughly 50% larger when the acquirer country features a larger share of its population with a tertiary education or when it allocates a larger fraction of public resources to education. Similarly, the effect of industry specialization is magnified when the acquirer country benefits from a larger stock of patents, trademarks or published scientific articles per capita. Overall, our analysis indicates that horizontal cross-country acquisitions flow from more specialized to less specialized industries, and even more so when country pairs exhibit larger differences in intangible resources.

Finally, we report that differences in specialization are also related to transaction outcomes. In particular, we find that (one- and three-year) operating performance following an international acquisition (by public firms) is significantly better when the acquirer is more specialized than the target. These results suggest that the benefit of extending comparative advantage into less specialized foreign markets is related to the ability of specialized buyers to operate the purchased assets more efficiently.

Our results hold across a host of robustness checks. They hold when we control for the size and growth prospects of the acquirer and target country-industry. Our conclusions remain unaffected when we discard the largest acquirer and target countries, when we modify the estimation method, and when we estimate panel models to further control for time, and country-industry pairs unobserved heterogeneity. In addition, we show that our results are unlikely to reflect reverse causality that would imply that acquirers use their acquisitions in less specialized countries to accentuate the observed differences in specialization. For instance, the role of industry special-

ization remains strong when we measure specialization over the 1990-1995 period, and use it to explain cross-border acquisitions over the 2006-2010 period.

Overall our paper adds to the growing literature examining the determinants of cross-border acquisitions. We depart from most existing studies by focusing on industry determinants, and identify that industry specialization is an important component in the geography of worldwide acquisitions. To the best of our knowledge, ours is the first study to show that the direction and intensity of cross-border acquisitions is related to comparative advantage and firms' willingness to extend this advantage abroad.[3] Our results are consistent with the prediction of Caves (1971) and Neary (2007) that capital is reallocated across borders to take advantage of the complementarity between existing assets in foreign countries that are immobile and specialized industry-specific assets (such as knowhow and expertise) that can be deployed anywhere.

Our paper is also related to the existing studies that examines the determinants and consequences of firms' internationalization. Existing research highlights various connections between firms' multinationality and intangible assets (see Caves (2007) for a comprehensive survey). First, firms with a multinational presence tend to have a high proportion of intangible assets (e.g. Harris and Ravenscraft (1991)). Second, foreign expansions follow the development and accumulation of intangible assets (e.g. Yeaple (2003)). Third, the value of being a multinational firm increases with firms' intangible resources (e.g. Morck and Yeung (1992) or Morck and Yeung (1991). Fourth, multinationals transfer some of their comparative advantage (e.g. IT usage or patented technology) to their overseas affiliates (e.g. Bloom, Sadun, and Reenen (2012) or Branstetter, Fisman, and Foley (2006)). Our findings indicate that accounting for differences in the distribution of comparative advantages across countries and industries helps to explain the volume and direction of multinationals' acquisition activity.

[3]Two papers present results that are related to ours. Brakman, Garretsen, and Marrewijk (2007) look at a sample of cross-border mergers between five OECD countries in 20 aggregate sectors over the period 1980-2004. They document that acquirers are more likely to come from sectors that have a comparative advantage in exporting. Similarly, Feliciano and Lipsey (2010) document the acquisitions of U.S. firms tend to occur in industries in which the acquiring country has a comparative advantage at exporting.

While we extensively examine cross-border acquisitions in this paper, we do not analyze new investments in foreign countries through building new plants or capacity and thus we do not address the choice between building new capacity (greenfield investments) and acquiring existing producers (brownfield investments).[4] We restrict our attention to international acquisitions for reasons of data availability rather than principle. Company-level transactions data available for a large set of countries allow us to identify two dimensions of bilateral foreign investment flows: by country (country of origin and destination), *and* by industry (industry of origin and destination). This disaggregation, which is not available for greenfield investment, is central to our examination of the role of industry specialization for global expansion.

The rest of the paper is organized as follows. We discuss theoretical foundations and develop our hypotheses in Section II. Section III describes the measures of specialization and the sample of cross-border acquisitions. Section IV presents the specialization profiles of acquiring and target firms. Section V presents empirical tests of the effect of industry specialization on cross-border acquisitions. Section VI presents results from a detailed cross-country analysis. Section VII examines post transaction outcomes, whereas Section VIII concludes.

II Comparative Advantage and Global Acquisitions

Our paper draws on the literature on multinational firms and international mergers and acquisitions. Going back to David Ricardo's classical example of trade in wine and cloth, industry specialization plays a prominent role in explaining trade patterns around the world. Countries trade because they produce goods at different relative prices, which means that they differ in the relative efficiency of their industries, and hence they specialize to capitalize on their comparative advantage. Such comparative advantage might not only arise because of country-level differences in labor costs, productivity, natural resources or factor endowments, but also through industry-specific endowment differences. We focus on mergers and acquisitions as the purchase

[4]See Nocke and Yeaple (2007).

of assets in foreign countries are a way for acquirers to use their specialized assets that can be extended across foreign markets, and hence extend their comparative advantage abroad.

Our hypotheses arise from theory literature on the motives of international acquisitions that is based on formal industrial organization-type models. Our first hypothesis is based on the value of industry specialization for foreign expansion. Neary (2007) and Nocke and Yeaple (2007) develop rationales for cross-border acquisitions based on product market specificities. Their work pertains particularly to horizontal acquisitions that we study. According to Neary (2007), after market liberalization that allows for foreign expansion through acquisitions, firms with a cost advantage – specialized firms – will buy assets in markets with a comparative cost disadvantage. In Cournot-Nash-type models, a horizontal acquisition typically eliminates a competitor and thus produces a bigger advantage for the remaining competitors than for the acquirer itself. Neary (2007) shows that if the cost differential is sufficient, the acquirer will find the acquisition worth its while nonetheless when the acquirer can lower the production cost of its target.

While these papers suggest a link between industry specialization and cross-border acquisitions, they are silent on the sources of comparative advantage (they assume exogenous differences in "costs"). In traditional trade theory, industry specialization is typically the consequence of comparative advantage and not one of its origins. However, the recent trade literature paints a more complex picture of the relationship between industry specialization and comparative advantage. First, comparative advantage is not solely generated by country-level endowment differences, but also by industry-specific endowment differences. Second, it recognizes that external economies (producers in a specialized industry benefiting from externalities, in particular agglomeration economies) are frequently a key determinant of comparative advantage (e.g. Krugman, Obstfeld, and Melitz (2011) or Grossman and Rossi-Hansberg (2010)). Prominent among these is the importance of industry clusters of development and production know-how (e.g. Porter (1990)). Third, the theory of multinational firms recognizes firm-specific assets, such as technological know-how, marketing knowledge, management expertise and human capital, as the

main driver behind a firm's decision to make cross-border acquisitions (e.g. Caves (2007)). Many of these assets are likely to benefit from spillovers from industry specialization and agglomeration effects.

This literature forms the basis for our first hypothesis:

Hypothesis 1 *Cross-border acquisition intensity increases with industry comparative advantage of acquiring firms and the relative comparative disadvantage of target firms in the same industry.*

Our second hypothesis is based on the importance of intangible assets and the difficulties in finding contractual or market solutions in view of market frictions when the use of these assets is extended to foreign markets by multinational firms, as was emphasized in early work by Hymer (1976) and Caves (1971). This work is closely related to the transaction cost theory of the firm (e.g. Williamson (1979)) and the property rights theory of the firm (e.g. Grossman and Hart (1986)), that emphasizes the difficulties and impossibilities of contracting for the use of intangibles firm-specific assets. Even if contracts are feasible, firms may be reluctant to rely on them for fear that they cannot effectively protect their property rights or expose themselves to hold-ups and similar problems. The papers in this tradition of the international business literature frequently refer to the resource-based view of the firm (e.g. Penrose (1959) or Wernerfelt (1984)) according to which a firm's competitive advantage is rooted in its complementary capabilities or intangible assets. These papers invariably view intangible assets, in particular firm-specific knowledge, technological know-how, marketing knowledge, management expertise and human capital, as the proprietary resources and capabilities that generate a competitive advantage in international acquisition and foreign direct investment (e.g. Hymer (1976)), but also as the resources that firms can most easily deploy abroad (e.g. Caves (2007)).

In the industrial organization-based literature, Nocke and Yeaple (2007) also emphasize the different role of mobile (intangible assets) and immobile factors of production. Finally, there is substantial empirical evidence showing that firms generate value in international acquisitions when they expand the use of their specific assets abroad (e.g. Doukas and Travlos (1988), Morck and Yeung (1991), Morck and

Yeung (1992), or Markides and Ittner (1994)). Based on these theories and findings, we formulate our second hypothesis:

Hypothesis 2 *The flow of cross-border acquisitions explained by industry specialization increases in measures of human capital and intangible assets.*

III Data

This section describes our sample and how we construct the data used in the tests. It consists of three main blocks: (1) the measures of industry specialization, (2) the mergers and acquisition data, and (3) country-level variables.

A Industry Specialization

Our objective is to develop a measure of comparative advantage for each country and industry. To do so, we follow the concept of "revealed comparative advantage" that is extensively used in the literature on international trade. As explained in Krugman, Obstfeld, and Melitz (2011) a country is considered to have a comparative advantage in a given industry when the importance of that industry's exports relative to the rest of the world's exports in that industry is large. Following our theoretical considerations in Section II, countries tend to be specialized in industries in which they have a comparative advantage, and specialization further enhances comparative advantage, through economies of scale, external economies and agglomeration effects. Thus we measure comparative advantage in terms of total economic importance of industries, or industry specialization, and not exports.

Following the original formulation by Balassa (1965) and replacing exports by measures of total output or total employment, we define $w_{i,c,t}$ as the share of industry i's production (or employment) in country c's total production (or employment) in year t and compute industry specialization, SP, as follows:

$$SP_{c,i,t} = \frac{w_{c,i,t}}{\frac{1}{N_c}\sum_k w_{k,i,t}} \tag{1}$$

where N_c is the number of countries in our sample. At time t, country c is defined as being specialized in industry i if the share of i's production ($w_{c,i}$) in country c's total

production is larger than the average share of i's production worldwide ($\frac{1}{N_c}\sum_k w_{k,i}$). A country is relatively specialized in industries for which $SP_{c,i,t}$ is higher than one, i.e., when production in these industries is more than expected on the basis of the average importance in worldwide production. As a result, a higher value of SP indicates a higher degree of specialization.

To fix ideas, this definition implies for instance (as shown empirically below) that Switzerland is highly specialized in manufacturing watches and clocks. This is because the share of the watch industry (in the total Swiss output) is much larger in Switzerland than in any other country. In our analysis we remain agnostic about the origin of specialization.[5] We hypothesize that industry specialization reveals strengths in specific economic sectors. This strength could originate from unique country- or industry-specific factors such as natural resources, know-how, expertise, scale, cluster effects, or specific governmental policies. To wit, we abstract from the reasons Switzerland is highly specialized in manufacturing watches, but use the fact that Switzerland has a clear comparative advantage in producing watches relative to the rest of the world to analyze the geography and industry composition of cross-border acquisitions.[6]

We use disaggregated firm-level data for publicly listed companies from Worldscope to measure specialization for each country-industry-year observation ($SP_{c,i,t}$). We focus on the period 1990 to 2010. We consider two variables to capture industries' importance: total sales and total employment. We define industries based on three-digit International Standard Industrial Classification of All Economic Activities (ISIC Rev. 3) used by the United Nations Statistics Division.[7] We thus classify each firm in Worldscope into a three-digit ISIC code using the primary SIC codes provided by Worldscope and the correspondence between ISIC and SIC described in the Appendix.

The starting sample comprises 1,182,103 observations on 56,343 distinct firms, corresponding to 46 countries, 101 industries, and 21 years. Ideally, we would like to compute $SP_{c,i,t}$ for every country-industry-year observation, that is 97,566 obser-

[5] See Costinot (2009) for more about the origin of comparative advantage and specialization.
[6] We discuss the potential endogeneity of our measure of comparative advantage in Section V.C.
[7] https://unstats.un.org/unsd/cr/registry/regcst.asp?Cl=2

vations (46×101×21). However, Worldscope does not contain sales or employment data for each possible country-industry-year observation.[8] Thus, we impose a minimum of three countries with non-missing industry-year observations on sales or employment (across 46 countries) to remain in the sample, and exclude all industry-year that do not meet this requirement. This steps eliminates 6,348 industry-year observations with missing sales, and 6,670 observations with missing employment, corresponding to four industries. For the remaining observations, we assume that a missing country-industry-year observations reflects the absence of economic activities in these industries, and set $w_{i,c,t}$ to zero.[9] Out of 97,766 possible observations, we have 91,218 (non-missing) measures of specialization based on sales ($SP(sales)$) and 90,896 based on employment ($SP(emp)$) spanning 97 distinct industries.

[Insert Table 1 Here]

Table 1 presents descriptive statistics on our measures of industry specialization (based on sales and employment) across countries. Panel A reveals that, by construction, the average level of specialization worldwide is equal to unity. Notably, the within-country distribution of specialization appears highly skewed. While there are many industries that are present in each countries in similar proportion (i.e. nonspecialized industries), a few industries account for a disproportionately large fraction of each country' activities. We also note an important heterogeneity in the average degree of specialization across countries. For instance, the United States, Japan, Australia, or Switzerland display a large average degree of specialization (all well above unity – indicating the presence of various highly specialized industries) compared to countries like Venezuela, Hungary, or Czech Republic.[10]

To further illustrate the differences in specialization patterns across countries and industries, Panel B of Table 1 reports the two most specialized industries in each country, where specialization is based on sales and averaged over the period 1990-2010. For instance, and as indicated above, we observe that the most specialized industry in Switzerland is the "Manufacture of watches and clocks". Similarly, Aus-

[8]This happens because of incomplete coverage or because of the absence of publicly traded companies in every sector and every country.

[9]All our results continue to hold if we only consider non-missing observations to compute $w_{i,c,t}$. The resulting sample is however much smaller.

[10]The link between average country specialization and economic development is strong.

tralia and Brazil are (relatively) specialized in the "Mining of iron ores", Germany in "Retail trade", the UK in "Legal, accounting, and auditing activities", Russia in "Transport via pipeline", and the US in "Renting of transport equipment" and "Education". Overall, Table 1 underlines an important heterogeneity in industry specialization across countries.

We acknowledge that, while informative, our measure of industry specialization is imperfect. Indeed, Worldscope only includes data on public firms, rendering our measures probably biased towards activities that feature more public equity capital. Yet, one advantage of using Worldscope's is that its broad coverage enables us to measure specialization for a large set of countries, industries, and years. Nevertheless, as an alternative, we use aggregated industry-level data on total output and employment from the United Nation Industrial Development Organization (UNIDO) Indstat4 database. This database has output and employment data that covers all firms - both private and publicly traded. Industries in the UNIDO database are defined at the ISIC three-digit level, covers the manufacturing sector between 1990 and 2006, and is limited to a subset of countries. We have information on 47 manufacturing industries (out of 101) and 43 countries (out of 46).[11] As before, we only retain observations if at least three countries report non-missing industry-year observations on sales or employment, and set $w_{c,i,t}$ to zero for the missing country-industry-year observations. Among the 42,441 possible observations, we have 33,637 measures of specialization based on sales and 32,766 measures of specialization based on employment. Reassuringly, the correlation between Worldscope-based and UNIDO-based measures of specialization is 0.28 (for $SP(sales)$) and 0.24 (for $SP(emp)$).

B Mergers and Acquisitions Data

Our sample of transactions is obtained from the Security Data Corporation's (SDC) Mergers and Corporate Transaction database and includes all deals (domestic and cross-border) announced between 1990 and 2010 that are completed by the end of 2012. Similar to Erel, Liao, and Weisbach (2012) we exclude LBOs, spinoffs, recapitalizations, self-tender offers, exchange offers, repurchases, partial equity stakes,

[11] The missing countries are Hong Kong, Taiwan, and Venezuela.

acquisitions of remaining interest, privatizations, as well as deals in which the target or the acquirer is a government agency. We consider public, private and subsidiary acquirers and targets. We limit our attention to the 46 largest countries (see Table 1). This subset represents 93% of all SDC transactions and 96% of the world equity market capitalization (in 2010).[12] We only retain transactions where both the acquirer and target have non-missing measures of specialization (this eliminates 1,048 transactions). Our sample includes 388,699 transactions with a total value of $24 trillion. We use the primary Standard Industrial Classification (SIC) provided by SDC to assign each acquirer and target to one of 97 distinct ISIC industries.

[Insert Table 2 Here]

Table 2 displays the characteristics of our sample of global mergers and acquisitions. Panel A indicates that during our sample period 22.4% of all transactions (87,134) involve firms from different countries. Cross-border deals have a total value of $6.5 trillion, or 27.7% of all deal value.[13] In line with Erel, Liao, and Weisbach (2012) and Ahern, Daminelli, and Fracassi (2010), Panel B reveals that the world market for acquisitions exhibits a substantial geographic heterogeneity. The US, the UK, Canada and Japan account for the majority of transactions. Among the possible 2,116 country pairs (46×46), 1,571 (70.8%) feature at least one transaction. On average, firms in a given country are involved in deals in 34 different countries. Notably, 73% of all cross-border transactions (and 83% of total deal value) occur between firms from developed countries, where development levels are taken from the Standard and Poor's Emerging Market Database.

Relevant for our investigation, acquisitions comprise a strong industry component. Across all deals (domestic and cross-border) 44% occur between firms operating in the same industries. This fraction is roughly similar between domestic deals and cross-border deals. There is a total of 38,826 cross-border horizontal transactions, representing a total value of $3.5 trillion or 54% of all cross-border transactions. These transactions are the main focus of our analysis. Notably cross-border horizon-

[12]This figure is based on data from the Worldbank in 2010.

[13]UNCTAD (2013) reports a cumulative cross-border M&A volume of $7.18 trillion worldwide for the 1990-2010 period. Thus, our sample appears to cover 90% of the global volume based on values.

tal deals span a non-negligible part of the potential global network in each industry. Across the 200,790 possible horizontal cross-border pairs ($46 \times 45 \times 97$) 12,008 (or 6%) feature at least one transaction. The average industry has horizontal deals involving 125 country-pairs. The analysis below indicates that industry specialization plays an important role in explaining observed acquisition patterns in cross-border horizontal mergers and acquisitions.

C Country Characteristics

Existing research indicates that countries' economic, institutional, cultural, and geographical characteristics are associated with the direction and intensity of cross-border acquisition activity. Since such characteristics are likely related to the patterns of industry specialization, we control for a host of country factors in our tests. All the variables used in the analysis are further detailed in the Appendix.

Following Ahern, Daminelli, and Fracassi (2010), we use data from the Worldbank on annual GDP and GDP per capital to capture a country's size and level of development. Using data from the same source, we define a country's (annual) openness to trade as the ratio of imports and exports to GDP. We obtain data on the average corporate tax rate for each country from the Economic Freedom Index. We also identify if two countries have double-taxation and bilateral investment treaty agreements for each year in our sample from the United Nation Conference on Trade and Development (UNCTAD) database. We obtain national exchange rates from Datastream, and define the nominal exchange rate returns (between each pairs of countries) as the average annual difference in the logarithm of the monthly exchange rate. We obtain real exchange rate returns by using each country's consumer price index and convert all nominal returns to the 2000 price level for Europe.

We use data from Djankov, Porta, de Silanes, and Shleifer (2008) to capture different institutional characteristics. Similar to Ahern, Daminelli, and Fracassi (2010) we consider a country's legal origin. We also consider language and religion as cultural factors related to cross-border acquisitions. As in Stulz and Williamson (2003) we gather data on the primary language spoken in each country (English, Spanish, or

Others) from CIA World Factbook 2008. We also consider the dominant religion in each country (Catholic, Protestan, Muslim, Buddhist or Others). We further obtain the geographical distance between each country' largest city (in terms of population) or its capital from the Centre d'Etude Prospective et d'Information Internationale (CEPII). To alternately measure the geographic closeness between countries, we use a dummy variable that is equal to one if two countries share a common border.

Finally, in order to examine more directly whether our results are related to country-level stock of intangible capital, we consider several factors related to human and technological capital. Following Barro and Lee (2013), we consider the fraction of public spending on eduction in total government expenditures as well as the fraction of the labor force with a tertiary eduction to measure the stock of human capital in a given country. These variables are from the Barro-Lee Educational Attainment Dataset.[14] Similarly, we measure countries' stocks of technological capital using information from the Worldbank on the number of patents per capita, the number of trademarks per capital, and the number of articles published in scientific journals per capita.

IV Profile of Acquirers and Targets

We start our investigation by examining the univariate patterns of specialization across all mergers and acquisitions. For each transaction, we compare the degree of specialization of the acquirer' industry to that of the target. We report these univariate comparisons in Table 3. Several notable results emerge from this table.

[Insert Table 3 Here]

In Panel A, we first observe that across all transactions (including domestic, cross-border, horizontal and non-horizontal), participating firms appear to be relatively specialized. The average values of SP for both acquirers and targets are larger than one. This suggests that, perhaps unsurprisingly, takeover transactions mostly involve firms operating in industries exhibiting high degrees of specialization. Across all deals, and with both measures of specialization ($SP(sales)$ and $SP(emp)$), we

[14] Available at http://www.barrolee.com/

observe almost no difference in the average (and median) degree of specialization between acquirers and targets.

Yet, we see a very different picture when we look separately at domestic and cross-border deals. In domestic deals, targets appear to be more specialized than acquirers (with average values of SP between 1.978 and 2.221 for targets and between 1.858 and 1.911 for acquirers). In sharp contrast, acquirers appear to be more specialized than targets in cross-border transactions (with average values of SP between 1.901 and 1.922 for acquirers and between 1.531 and 1.550 for targets).

The difference in specialization is even larger in Panel B where we focus only on horizontal transactions. Acquirers display degrees of specialization that are roughly 25% larger than targets. These differences are statistically and economically significant. For instance, while the average (median) value of $SP(sales)$ is 1.979 (1.252) for acquirers, it amounts to 1.515 (0.860) for targets. This clear pattern indicates that for cross-border transactions involving firms from the same industry, more specialized acquirers buy less specialized target.

The effect of specialization if sizeable. Panel C indicates that more than 60% of all horizontal cross-border transactions involve acquirers that operate in more specialized industries than targets. Together these transactions amount to $2.2 trillion, or 64% of the total value of cross-border horizontal transactions over our sample period. In all, a substantial fraction of assets ownership is reallocated across borders from less specialized firms in a country to more specialized firms in another country.

[Insert Figures A, B, C, and D Here]

Figures A, B, C and D highlight that the observed difference in specialization between acquirers and targets in horizontal cross-border deals is present across countries, time, and industries. Figures A and B display the average difference in SP (labeled ΔSP) by acquirer and target countries. Consider first acquirer countries. We observe that ΔSP is positive in 36 countries out of 46 countries in our sample. For target countries, ΔSP is positive in 41 countries.[15] Figure B further confirms the finding that acquirer is more specialized than target holds for every single year in

[15]Peru and Taiwan are outliers with very few deals.

our sample. Finally, Figure D displays ΔSP by industry (sorted in ascending order). Here again, ΔSP is positive in 76% of industries. Precisely, ΔSP is positive in 76 distinct industries. It is negative in only 18 industries.

The above univariate results reveal important differences in specialization between acquirers and targets in cross-border transactions that involve firms in the same industry. Overall, acquirers are significantly more specialized than targets. This is consistent with the hypothesis that firms acquire foreign assets to extend their comparative advantage overseas. Moreover, the univariate results highlight important variation between countries, industries, and time. We account for these differences in the next section.

V Multivariate Analysis

To more formally examine the interplay between differences in specialization and the distribution of acquisition activities across countries and industries, we turn to a multivariate analysis. We start by discussing the empirical specification, present the main results, and subject our estimates and interpretation to a battery of robustness tests.

A Gravity Model

We model the distribution of horizontal acquisition flows across countries with a gravity specification. Gravity models have a long tradition in international economics to study the effect of "geographic" distance on the intensity of cross-country relations such as trade flows (e.g. Anderson and van Wincoop (2004) or Anderson (2011)) or portfolio flows (e.g. Portes and Rey (2005)). They have recently been used to analyze acquisition flows (e.g. Ahern, Daminelli, and Fracassi (2010) and Karolyi and Taboada (2014)). Instead of examining the effect of geographic distance on the intensity of cross-border flows, we focus on the effect of distance in the *specialization* space. Our baseline specification is as follows:

$$log(1 + V_{c,c',i}) = \alpha + \beta \Delta SP_{c,c',i} + \gamma X_c + \delta X_{c'} + \eta X_{c,c'} + \upsilon_i + \varepsilon_{c,c',i}, \qquad (2)$$

where $V_{c,c',i}$ is the aggregate volume of horizontal acquisitions in industry i between acquirer country c and target country c'. We use two measures for V: the total number of acquisitions (#Acq.) and the total dollar value of acquisitions ($Acq.). The variable of interest, $\Delta SP_{c,c',i}$ measures the difference in specialization between countries c and c' in industry i. The vectors X_c, $X_{c'}$, and $X_{c,c'}$ include acquirer and target country-level characteristics, as well as country-pair characteristics (e.g. common border or language). The vector υ_i includes industry fixed effects.

Arguably mergers and acquisitions occur only when the combined expected benefits of the acquirer and target are positive. When benefits are negative we should observe no transaction. As a result the dependent variable $V_{c,c',i}$ is naturally truncated at zero. In our context, this happens frequently as country-industry pairs featuring at least one transaction over the 1990-2010 period represents only 6% of the sample. We account for this truncation by estimating equation (2) using a Tobit specification. We further account for the possible within-country correlation by clustering standard errors at the acquirer and target country level.

In our baseline tests, we focus primarily on cross-sectional variation and ignore the time-series dimension that we consider in Section V.C. Thus in our cross-sectional tests, we take the average values of all variables over the sample period. We collapse all 21 years into a single cross-sectional regression with 200,790 country-industry pairs ($46 \times 45 \times 97$ combinations of acquirer country, target country, and industry). As a result of this aggregation, X_c and $X_{c'}$ capture country-level effects. For instance, any effect that occurs because the acquirer country is larger or more developed than a target country is absorbed by the country variables.[16] Similarly, any effect that occurs because of particular industry characteristic is absorbed by υ_i. Table 4 provides summary statistics for our all variables used in the gravity estimations.

[Insert Table 4 Here]

To wit, the coefficient of interest in equation (2) β measures whether, for a given industry i, the intensity of cross-border acquisitions between (acquirer) country A

[16]We obtain similar results if we include acquirer and target country fixed effects instead of country level variable, but prefer to use country variables to compare (and validate) the effects of country characteristics with that documented by existing research. We present the results in the Appendix.

and (target) country B is linked to differences in their specialization in i, after controlling for country and industry effects. In particular, a positive β coefficient would indicate that, for a given industry i, acquisitions flow from countries that are more specialized in i (e.g. watch-making in Switzerland) to countries that are less specialized in i (watch-making in the United States).

B Main Results

Table 5 presents the results of the gravity where the dependent variables are either the (log of the) number of deals (ln(#Acq.)) or the (log of the) aggregate value of deals (ln($Acq.)). The measures for the difference in specialization between country-industry pairs $\Delta SP_{c,c',i}$ are based on industry sales $\Delta SP(sales)$ and industry employment $\Delta SP(emp)$ (computed from Worldscope). Notably, the estimated coefficients on ΔSP (β) are positive across all specifications. All estimates are highly significant with t-statistics ranging between 7.4 and 11.4.

[Insert Table 5 Here]

The economic magnitude of the effect of specialization differences on the intensity of cross-border acquisitions is substantial. A one-standard deviation increase in $\Delta SP(sales)$ is associated with a 14.7% increase in the number of deals, and a 52.9% increase in the aggregate value of deals by a staggering 52.9%. Similarly, a one-standard deviation change in $\Delta SP(emp)$ is associated with 13.7% more deals, and an aggregate value of deals that is larger by 48.4%.[17]

The baseline gravity specifications contain a large number of control variables, capturing effects that are known to influence cross-border acquisition activity. The estimates reported in Table 5 are in line with previous research. For instance larger economies (measured by log GDP) participate more in cross-border acquisitions. More developed countries, as measured by their GDP per capita, also feature more cross-border horizontal transactions. We also see more cross-border deals when countries are more open to trade. Consistent with Erel, Liao, and Weisbach (2012), we find that an appreciation of the acquirer currency relative to the target currency posi-

[17]The variables ΔSP are normalized to a unit variance so the coefficients reported in Table 5 and following tables can be interpreted directly.

tively influences deal flows. Moreover, transaction intensity increases when countries have a shared border or closer geographic proximity, and also when countries share the same language or the same legal origin (but not when they have the same religion). Finally, we see more transactions between country pairs in which the acquirer country has a larger statutory corporate tax rate than the target country.

Arguably, differences in valuation across country-*industry* pairs can potentially influence acquisition activity.[18] Also, we naturally expect to see more transactions between industries that are populated by a larger number of firms. Both factors could be related to industry specialization. To assess whether the above results are driven by differences in industry valuation or size across countries we include proxies for each country-industry level of valuation and size.[19] We use the average market-to-book ratio in each country-industry to measure valuation, and the (log of the) sum of assets to measure size. Both measures are computed as averages over the sample period. Because some country-industry observations do not feature any publicly listed company in Worldscope, we are able to measure these variables for about half of all country-industry pairs. Panel A of Table 6 indicates that our variable of interest ΔSP remains positive and strongly significant in all four specifications.[20] Reflecting that part of the specialization effect is related to differences in valuation and size, the economic significance slightly decreases (by about 20%) but remains substantial.

[Insert Table 6 Here]

In Panel B of Table 6, we replace the Worldscope-based specialization measures with measures constructed from all private and public firms from UNIDO (as defined in Section III.A). Because UNIDO only covers the manufacturing sector for 43 countries, the size of the sample is considerably reduced. Remarkably, the estimated coefficients for ΔSP remains positive and significant in all specifications. Even though the economic magnitude of the specialization effect is reduced in these specification, it remains considerable with a 5% increase in number of deals and a

[18] See for instance Rhodes-Kropf, Robinson, and Viswanathan (2005) for the role of valuation in domestic acquisitions and Erel, Liao, and Weisbach (2012) for cross-border acquisitions.

[19] Recall that both the acquirer and target industries in horizontal cross-border acquisitions are more specialized on average. This indicates that the effect of specialization is unlikely to fully reflect difference is size, where target industries features very few firms.

[20] For brevity we only report the coefficients on ΔSP.

20% increase in value of deals with a one-standard deviation increase in ΔSP.

C Reverse Causality and Omitted Variables

Overall, the baseline results reported in Tables 5 and 6 are consistent with firms extending their comparative advantage abroad. All else equal, firms in more specialized industries expand abroad horizontally by acquiring firms in less specialized industries. The impact of the difference in specialization on the volume of cross-border acquisitions is large, and is distinct from country determinants identified by previous research.

Yet, there is a possibility that our interpretation suffers from a reverse causality or omitted variable bias. Indeed, one concern is that reverse-causation leads specialization differences to increase in response to cross-border acquisition activity. Another concern is that both industry specialization and the intensity of cross-border acquisition could be correlated with unobserved factors.

To examine the issue of reverse causality, we re-estimate our baseline equation (2) but we allow for a very long time lag between the measurement of specialization and cross-border acquisition activity. The results are shown in Table 7. In Panel A, we measure difference in specialization over the 1990-1999 period, whereas the dependent variables (deal activity) over the interval 2000-2010. In Panel B we further measure difference in specialization over the 1990-1995 period and use it to explain deal activity over the interval 2006-2010 period. Overall, the results remain unchanged. These lagged structures largely mitigate the concern that reverse causality is the driving force behind our results.

[Insert Table 7 Here]

To investigate the potential effect of omitted variables, we take advantage of the panel structure of the sample. Introducing the time dimension in the gravity equation (2) allows us to include country-industry-pair fixed effects, and hence capture any fixed difference across country-industry-pair. By doing so, the coefficient of interest (β) in equation (2) measures how the volume of acquisitions in a given country-industry-pair changes in when the difference in specialization ($\Delta SP_{c,c',i,t}$) changes.

However, estimated on the full panel sample, the gravity model expands to more than 4.2 million observations ($46 \times 45 \times 97 \times 21$). With only 38,826 horizontal acquisitions during the sample period, the number of zeros in the dependent variable inflate to more than 99% of the sample, pushing the unconditional deal incidence in a given country-industry-year pair close to zero. For this reason, we report in Table 9 the results obtained from the full panel of 21 years as well as with a aggregation of three sub-periods of seven years where we average the dependent and independent variables across each sub-period.

[Insert Table 8 Here]

The results reported in Table 8 reveal that our conclusions continue to hold when we control for unobserved differences between country-industry pairs (together with country-level controls). When we focus on the three-period aggregation (Panel A), the estimated coefficients on ΔSP are all positive and significant. Albeit smaller, the economic magnitude of the specialization effect remains substantial. When the difference in specialization in a given country-industry-pair increases by one standard-deviation, we observe an increase of about 1% (0.8% and 1.2%) in the number of deals in this pair and a 7.5% (6.4% and 9.7%) increase in acquisition value. Remarkably, we continue to detect the positive and significant effect of specialization in three out of four specifications when we consider the full panel (Panel B).[21]

D Product Market Competition

In Table 9 we consider the role of product market competition. Caves (1971) argues that imperfect competition, in particular the possession of differentiated products, is an important determinant in international acquisitions as it shields the acquirer from competitive pressure in the foreign market. Similarly, Neary (2007) predicts that firms are less likely to target assets overseas in more competitive industries. In his model, firms make acquisitions in order to limit competition in the industry in

[21] The smaller economic magnitude is somewhat expected as the source of variation in these panel specifications is within country-industry pairs as opposed to between country-industry pairs in our baseline (cross-sectional) estimation. The significance of ΔSP is further remarkable as industry specialization is highly persistent across countries and industries. The autocorrelation estimates are 0.92 for $SP(sales)$ and 0.87 for $SP(emp)$.

which they hold an advantage. The smaller the number of competitors, the larger will be the increase in market share for the remaining firms if one of the competitors is taken over. Thus, Neary (2007) specifically predicts that the less competition in a given industry, the more likely firms will be to enter overseas markets through acquisitions. Overall, as product market competition in a particular country-industry could be related to the degree of specialization, we evaluate the effect of competition on our conclusions.

We measure the intensity of product market competition in target industries using the Lerner Index, or price-cost margin, following Nickell (1996). The price-cost margin we use is operating profits divided by sales (from Worldscope). We measure competition in a given country-industry-year as one minus the average price-cost margin.[22] As explained by Aghion, Bloom, Blundell, Griffith, and Howitt (2005), one advantage of the Lerner Index is that it does not rely on any particular definition of geographic markets (unlike other indicators such as the Hirschman-Herfindahl index). This is particularly relevant in our setting as multinational firms operate in global markets.

[Insert Table 9 Here]

Table 9 reports the results. Panel A reveals that, all else equal, the intensity of international acquisitions is significantly lower in competitive target industries. Estimates on the measures of competition in target country-industry are negative and significant. This is true for both measures of acquisition flows (in number and value) and for both measures of specialization. While intense competition in the product market appears to dampen foreign acquisitions, the effect of specialization on acquisition flows remains positive and substantial.

To further understand to interplay between specialization and competition, we interact the difference in specialization between the aquirer and target industy (ΔSP) with the intensity of competition of the target industry. Results are presented in Panel B. The interactive effect is positive and significant across all specifications, indicating that the specialization effect we document above mitigates the competitive

[22] A value of one indicates perfect competition (price equal marginal cost) while values below one indicate some degree of market power.

effect. The flow of acquisition is markedly larger when the difference in specialization is large and the target industry is more competitive, consistent with the comparative advantage of specialized buyers allowing them to withstand the effects of competitive pressure in foreign markets.

VI Intangible Capital

According to our two hypotheses, cross-border acquisitions are driven by relative comparative advantage that originate in localized industry-specific assets, that we capture using differences in specialization across countries and industries. As these specialized assets should be (1) mobile, and (2) difficult to contract upon or replicate by outsiders, they are likely to be intangible. As such, we expect the impact of industry specialization on the intensity of acquisitions flowing from an acquirer country to a target country be stronger when the acquirer country benefits from a larger stock of intangible capital compared to that of target country.

In this section, we exploit the cross-country dimension of the sample to examine whether the industry specialization effect for cross-border acquisitions is related to differences in the stock of intangible capital across countries. We specifically focus on two types of intangible capital: human and technological capital.

A Human Capital

We first consider human capital. We rely on two measures of country-level education as proxies for the stock of human capital. First, following Barro and Lee (2013) we consider on the fraction of population that obtains a higher (tertiary) education. Second, we use the fraction of public spending on education (to total public spending). To assess the role of these two variables on the acquisition-specialization sensitivity, we partition the sample in two sub-samples based on the median of the country-pair differences. Accordingly, we assign to the "High" partition the pairs of country where the difference in education proxies (between the acquirer and the target country) are above the median, and to the "Low" partition the pairs that are

below the median.[23] We then estimate the gravity specification (2) separately for each partition and compare the estimated coefficients across partition.

[Insert Table 10 Here]

Table 10 reports the results of the cross-country-pairs estimations. For brevity we only display the coefficients for ΔSP as well as the p-value of the test that assesses whether ΔSP is significantly larger in the "High" partition than in the "Low" partition. In support of our hypothesis, we observe that the link between specialization and cross-border horizontal acquisitions larger in the "High" partition than in the "Low" partition. This pattern emerge in all specifications. The differences across partitions are both statistically and economically signifcant. The effect of specialization on acquisition intensity is roughly two times larger when the acquirer country benefits from a large share of highly education people in its population relative to the target country. In the same vein, the effect of specialization is about 40% larger when there is a large difference in the spending on education between acquirer and target country.

B Technological Capital

Next, we investigate whether the effect of specialization on global acquisition flows also varies with countries' stock of technological capital. Our hypothesis implies that the benefit for firms to extend their comparative advantage overseas should be positively related to their country's technological advancement.

We use various measures of technology advancement at the country-level as proxies for the stock of intellectual capital. First, we measure the importance of technology and innovation by using the ratio of (public and private) R&D spending to GDP. Second, following Adams (1990) we measure the stock of technological knowledge with the number of number of patents per capita, the number of trademark per capita, and the number of scientific articles per capita. We again assign each country-pair into a "High" or a "Low" partition based on the median country-pair differences

[23] Note that because partitioning variables are differences at the country-pair level, the median are zero by construction. Hence, the "High" and "Low" partition capture positive and respectively negative differences in the partitioning variables.

of each variable. Table 11 presents the results of the cross-partition estimations.

[Insert Table 11 Here]

We observe notable differences between the "High" and "Low" partitions. Across all specifications, the acquisition-specialization sensitivity is markedly larger when the acquirer country enjoys a larger stock of technological capital (the "High" partitions). The contrasts are economically important as coefficient estimates are almost 50% larger in the "High" partitions. Moreover, the differences across partitions are statistically significant in 11 out of the 16 estimations.

Overall, our analysis indicates that the flow of horizontal cross-border acquisitions from more specialized to less specialized industries increases even more so when country pairs exhibit larger differences in human and technological capital. This is broadly consistent with the idea that the patterns of cross-border acquisitions are strongly related to the comparative advantage associated with the distribution of intangible assets across countries and industries.

VII Ex Post Performance and Robustness

In this section, we examine whether ex post acquisition outcomes depend on the specialization profile of both the acquirers and targets and discuss additional robustness checks.

A Ex Post Performance

An important obstacle to measuring ex post acquisition performance is that two separate firms exist before the transaction, and one or two firms might exist after the transaction, depending on the transaction type. As in Hoberg and Phillips (2012) we avoid this issue by considering only the ex post change in performance of acquirers, measured relative to the first set of of numbers available after the transaction effective date. We thus implicitly assume that performance accrues over time as it takes time for specialized acquirers to deploy their comparative advantage on newly purchased

foreign assets.[24]

We examine changes in operating income over assets from year $t+1$ to year $t+2$, or $t+4$ (one- and three-years horizons). As information on performance is available only for public companies, we focus on public firms acquiring public or private targets in horizontal cross-border transactions. To isolate the effect of specialization differences on post-acquisition performance, we restrict our attention to firms that only acquire assets in cross-border horizontal transactions over the horizons we consider. Moreover, because changes in performance can reflect underlying industry trends, we benchmark acquirers' performance by contrasting it to that of matched industry peers. For each acquirer, we select the closest peer (by size) that (1) operates in the same country and industry, and (2) that is not involved in any acquisition during a six-year window surrounding the transaction.[25]

[Insert Table 12 Here]

Table 12 reports the results of OLS regressions where the ex post changes in performance (at different horizons) are the dependent variables. The sample include 4,787 acquisitions made by 3,997 distinct firms from 46 countries and 94 industries. All specifications include control variables as well as country-pairs, industry, and year fixed effects. We observe that the estimated coefficients for ΔSP are positive across all performance horizons and with both measures of specialization. They are significant in three specifications out of four. Acquisitions where acquirers are more specialized than targets appear to be associated with increased ex post profitability. The results are economically substantial. For instance, a one standard deviation increase in $\Delta SP(sales)$ is associated with an increase in profitability of 0.70% over one year, and 0.80% over three years.

We recognize that looking at acquirers' ex post outcomes does not necessarily identify the (causal) effects of cross-border transactions on firm performance. Our analysis indicates, however, that differences in specialization between acquirers and

[24]Note that by examining post-changes only we bias our analysis towards not finding results due to a reduction in power, but we avoid complications of measuring performance in year $t-1$.

[25]To mitigate the effect of outliers, we winsorize the performance measures at the 1% level. Moreover, to reduce survivorship issues, we assign any missing values for a given horizon the value of the last known horizon (as in Hoberg and Phillips (2012)).

targets are associated with better operating performance. Consistent with our main hypothesis, this finding suggests that the benefit of extending comparative advantage abroad arise because of the enhanced ability of specialized buyers to operate the acquired assets more efficiently.

B Additional Robustness Tests

We perform additional analyses to verify the robustness of our findings, but do not report them her for brevity. These tests are build around our cross-sectional and panel gravity specifications of cross-border horizontal acquisition flows (equation (2)). With respect to our baseline cross-sectional results reported in Table 5, we first estimate the gravity equation using OLS, and the Poisson Pseudo-Maximum-Likelihood (PPML) method developed by Silva and Tenreyro (2006) to capture the count nature of the dependent variables (in the presence of many zeros).[26] Second, we include acquirer and target country fixed effects instead of country level control variables. We also replace these level variables by differences between the acquirer and target country. Third, we scale the flow (both in number and value) of cross-border horizontal acquisitions in a given industry between two countries by the intensity of domestic horizontal acquisition in the target industry. Fourth, we exclude observations from the U.S. and the U.K. as these two countries account for a non-trivial fraction of all transactions. Fifth, we include additional country-level variables capturing various institutional dimensions such as investor protection or the quality of accounting rules. Overall, our findings are robust to these alternative estimations and specifications.

VIII Conclusion

We examine whether industry comparative advantage is important in explaining the flow and direction of cross-border acquisitions and thus whether firms can extend their comparative advantage by acquiring assets in foreign markets. We find strong

[26]This estimation is performed using the `ppml` command available in Stata. Further details are available here: http://privatewww.essex.ac.uk/ jmcss/LGW.html

empirical support for this proposition, focusing on a large sample of horizontal transactions involving 46 countries and 97 industries.

We find large differences in the degrees of industry specialization between acquirers and targets. For a given industry, the larger the difference in specialization between two countries, the larger is the flow of bilateral acquisitions (both in numbers and dollar value). The direction of acquisitions goes from acquirers in industries in which their home country is more specialized buying targets in countries where that industry is less specialized. The magnitude of the specialization effect is large. For the average industry, the value of transactions between two countries is 24.98 % larger if this country-pair is at the 75th percentile of specialization distance (measured by sales) than if the pair is at the 25th percentile. Difference in specialization between acquirers and targets is also related to acquisitions outcomes as we observe better ex post operating performance when more specialized acquirers purchase assets in less specialized industries.

We further show that the effect of specialization on the intensity of cross-border acquisitions is related to measures of intangibles. For instance, we estimate that the specialization effect is stronger when the acquirer countries have higher educational attainment, spend more on R&D, and enjoy larger stocks of patents or trademarks. We also find that the volume of cross-border acquisition is larger when the target industry is more concentrated, consistent with firms wishing to minimize competition when they enter foreign markets. Importantly, the specialization effect we document is robust to the effect of competition and furthermore, firms from specialized industries are more likely to enter more competitive industries - consistent with specialization helping firms survive in a highly competitive environment.

We conclude that the distribution of specialization across countries and industries is an important element in explaining the geography of global acquisitions, consistent with firms extending their comparative advantage overseas via foreign acquisitions. In short, the existence and prevalence of specialized assets such as human capital or intangibles appear to be an important factor in understanding firms' multinational expansion.

Appendix 1: Definition of the Variables

- **#Acq.**: Number of cross-border horizontal acquisitions between two countries (Source: SDC)
- **$Acq.**: Dollar value of cross-border horizontal acquisitions between two countries (Source: SDC)
- **SP(sales)**: Degree of specialization of an industry in a given country, computed as the share of the industrys sales in its country total sales, divided by the average share of sales in the industry across all countries. The sales are aggregated across public firms in each country-industry (Source: Worldscope and own calculations).
- **SP(emp)**: Degree of specialization of an industry in a given country, computed as the share of the industrys employment in its country total employment, divided by the average share of employment in the industry across all countries. Employment is aggregated across public firms in each country-industry (Source: Worldscope and own calculations).
- **GDP**: Gross domestic product (Source: Worldbank)
- **GDP/capita**: Gross domestic product per capita (Source: Worldbank)
- **Openess**: Exports plus imports divided by GDP as a percentage of GDP. Exports and imports are in national currencies (Source: Worldbank)
- **%Tertiary Education**: Fraction of the labor force with a tertiary education (Source Barro-Lee Educational Attainment Dataset).
- **%Education Spending**: Fraction of public spending on education (Source Barro-Lee Educational Attainment Dataset).
- **#Patents/capita**: Number of deposited patents per capita (Source: Worldbank)
- **#Trademarks/capita**: Number of deposited trademarks per capita (Source: Worldbank)
- **#Articles/capita**: Number of scientific articles per capita (Source: Worldbank)
- **Exchange rate return**: Difference in the logarithm of the monthly real exchange rate (Source: Datastream)
- **Distance**: Geographic distance between capitals, calculated following the great circle formula, which uses latitudes and longitudes of the most important city (in terms of population) or its official capital (Source: CEPII).
- **Common Border**: Dummy that equals one if two countries share a common border (Source: CEPII).
- **Same Religion**: Dummy that equals one if two countries share the same religion, where the religion is defined as the dominant religion of a country (Source: CIA World Factbook 2008).
- **Same Language**: Dummy that equals one if two countries share the same language, where the language is defined as the primary spoken language of a country (Source: CIA World Factbook 2008).

- **Same Legal System**: Dummy that equals one if two countries share the same legal system, classified into four groups: Common, Civil, German, or Scandinavian (Source: Djankov et al. 2006).
- **Corporate Tax Rate**: Country corporate tax rate (in percentage) (Source: Economic Freedom Index).
- **Double-Tax Treaty**: Dummy that equals one if two countries have signed a double-taxation treaty (Source: UNCTAD).
- **Bilateral Investment Treaty**: Dummy that equals one if two countries have signed bilateral investment treaty (Source: UNCTAD).
- **Total Assets**: Total Assets (Source: Worldscope)
- **Market-to-book**: Book value of assets minus book value of equity plus market value of equity, divided by the book value of assets (Source: Worldscope).
- **1-Lerner**: Measure of product market competition computed as one minus the average price-cost margin ratio in an industry, where the price-cost margin is computed as operating profits before depreciation and amortization over sales (Source: Worldscope)
- **OI/A**: Operating income divided by total assets (Source: Worldscope)

Appendix 2: Mapping between ISIC and SIC

Our various data sources are based on different industry classifications, notably the US Standard Industrial Classification (SIC 1987) classification and the International Standard Industrial Classification of All Economic Activities (ISIC Rev. 3) classification. To make the industry classification systems compatible, we define industries as the finest possible partition of industries in the 3-digit ISIC Rev. 3 system such that the 3-digit SIC 1987 classification is a refinement of this partition; that is, none of the 3-digit industries in the SIC 1987 has an intersection with two or more industries in the partition of industries we define. This yields a partition of 101 industries.[27]

[27]Existing concordances between ISIC and SIC classifications do not exclude overlap, i.e. individual 3-digit SIC industries corresponding to more than one 3-digit ISIC industries, and vice versa.

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Table 1: Measures of Specialization – Descriptive Statistics

This table presents descriptive statistics for our two main measures of industry specialization as presented in Section III.A. *SP(sales)* is specialization based on total sales, and *SP(emp)* is specialization based on total employment. Data on sales and employment are from Worldscope. The sample covers 46 countries, 97 distinct industries and the period 1990-2010. Industries are defined based on three-digit ISIC classification (see the Appendix for more details). Panel A displays aggregate summary statistics (average, median as well as 10th and 90th percentiles) for each country. Panel B displays the two most specialized industries (highest *SP(sales)*) for each country (highest SP(sales)) aggregated over the whole sample period.

Panel A	*SP(sales)*				*SP(Emp)*			
Country	Average	10th	Median	90th	Average	10th	Median	90th
Argentina	0.66	0.00	0.00	1.31	0.35	0.00	0.00	0.00
Australia	1.71	0.00	0.32	4.60	1.56	0.00	0.14	3.88
Austria	0.69	0.00	0.00	1.92	0.75	0.00	0.00	2.42
Belgium	0.79	0.00	0.00	2.20	0.91	0.00	0.00	2.27
Brazil	0.63	0.00	0.06	1.68	0.80	0.00	0.00	2.48
Canada	1.30	0.00	0.38	3.25	1.07	0.00	0.19	3.10
Chile	0.84	0.00	0.00	2.28	0.85	0.00	0.00	2.49
China	1.05	0.00	0.33	2.53	1.11	0.00	0.27	2.63
Colombia	0.52	0.00	0.00	1.62	0.53	0.00	0.00	1.08
Czech Republic	0.49	0.00	0.00	0.23	0.52	0.00	0.00	0.19
Denmark	0.81	0.00	0.00	2.38	0.84	0.00	0.00	2.56
Finland	0.93	0.00	0.00	2.29	1.00	0.00	0.00	2.33
France	1.24	0.00	0.49	3.43	1.37	0.00	0.47	3.46
Germany	1.38	0.00	0.28	3.11	1.35	0.00	0.26	3.16
Greece	0.73	0.00	0.06	2.27	0.76	0.00	0.00	2.32
Hong Kong	1.33	0.00	0.37	3.08	1.23	0.00	0.17	3.53
Hungary	0.47	0.00	0.00	0.58	0.51	0.00	0.00	0.66
India	0.91	0.00	0.21	2.66	0.70	0.00	0.00	1.94
Indonesia	1.12	0.00	0.14	2.91	1.13	0.00	0.00	2.62
Ireland	0.84	0.00	0.00	2.16	0.74	0.00	0.00	1.96
Israel	0.83	0.00	0.00	1.89	0.66	0.00	0.00	1.55
Italy	0.82	0.00	0.07	2.16	0.97	0.00	0.08	2.46
Japan	1.81	0.00	0.71	5.74	1.78	0.00	0.57	5.02
Korea	1.28	0.00	0.33	3.49	1.34	0.00	0.37	3.09
Luxemburg	0.55	0.00	0.00	0.32	0.48	0.00	0.00	0.13
Malaysia	1.27	0.00	0.51	3.81	1.16	0.00	0.00	3.39
Mexico	0.88	0.00	0.00	2.88	0.72	0.00	0.00	2.12
Netherlands	0.92	0.00	0.06	2.13	1.14	0.00	0.06	2.68
New Zealand	1.48	0.00	0.00	3.68	1.04	0.00	0.00	1.32
Norway	1.07	0.00	0.00	1.98	1.39	0.00	0.00	2.60
Peru	0.87	0.00	0.00	2.06	0.82	0.00	0.00	1.57
Philippines	0.70	0.00	0.00	1.97	0.68	0.00	0.00	1.63
Poland	0.69	0.00	0.00	2.02	0.68	0.00	0.00	1.77
Portugal	0.49	0.00	0.00	1.34	0.49	0.00	0.00	1.47
Russia	0.56	0.00	0.00	0.81	0.61	0.00	0.00	1.14
Singapore	1.53	0.00	0.40	4.04	1.26	0.00	0.00	3.63
South Africa	1.45	0.00	0.29	3.92	1.52	0.00	0.18	4.22
Spain	0.76	0.00	0.00	1.87	0.87	0.00	0.00	1.93
Sweden	1.05	0.00	0.12	3.00	0.98	0.00	0.09	2.77
Switzerland	1.64	0.00	0.08	3.71	1.77	0.00	0.05	3.07
Taiwan	1.32	0.00	0.07	3.76	1.22	0.00	0.00	2.62
Thailand	1.11	0.00	0.26	2.63	1.20	0.00	0.00	3.23
Turkey	0.78	0.00	0.00	1.86	0.74	0.00	0.00	1.90
UK	1.39	0.01	0.61	3.00	1.90	0.01	0.62	3.99
USA	2.05	0.10	1.07	4.67	2.17	0.09	0.89	5.59
Venezuela	0.28	0.00	0.00	0.22	0.33	0.00	0.00	0.00
World	1.00	0.00	0.02	2.60	1.00	0.00	0.00	2.49

Panel B	**Top#1**	**Top#2**
Argentina	Manufacture of footwear	Farming of cattle, sheep, goats, horses, asses
Australia	Mining of iron ores	Repair of personal and household goods
Austria	Architectural, engineering and others	Other wholesale
Belgium	Insurance and pension funding	Retail sale of food, beverages and tobacco
Brazil	Mining of iron ores	Education
Canada	Repair of personal and household goods	Chemical and Fertilizer Minerals
Chile	Education	Forestry, logging and related service activities
China	Non-scheduled air transport	Education
Colombia	Spinning, weaving and finishing of textiles	Beverages
Czech Republic	Mining and agglomeration	Tobacco products
Denmark	Sea and coastal water transport of freight	Sea and coastal water transport of passengers
Finland	Television and radio transmitters	Paper and paper products
France	Electric lamps and lighting equipment	Tanning and dressing of leather
Germany	Retail trade not in stores	Sale, maintenance and repair of motor vehicles
Greece	Human health activities	Precious and non-ferrous metals
Hong Kong	Sea and coastal water transport of passengers	Farming of cattle, sheep, goats, horses, asses
Hungary	Plastics products	Refined petroleum products
India	Electric lamps and lighting equipment	Education
Indonesia	Tobacco products	Sale, maintenance and repair of motor vehicles
Ireland	Farming of cattle, sheep, goats, horses, asses	Growing of fruit, nuts, beverage and spice crops
Israel	Chemical and Fertilizer Minerals	Insurance and pension funding
Italy	Quarrying of stone, sand and clay	Aircraft and spacecraft
Japan	Accumulators, primary cells, primary batteries	Electrical equipment
Korea	Television and radio receivers	Other wholesale
Luxemburg	Structural metal products, tanks, reservoirs	Basic iron and steel
Malaysia	Growing of fruit, nuts, beverage and spice crops	Sale, maintenance and repair of motor vehicles
Mexico	Glass and glass products	Restaurants, bars and canteens
Netherlands	Renting of construction or demolition equipment	Meat, fish, fruit, vegetables, oils and fats
New Zealand	Forestry, logging and related service activities	Fishing, operation of fish hatcheries and fish farms
Norway	Oil and gas extraction	Non-scheduled air transport
Peru	Agricultural and animal husbandry service	Mining of non-ferrous metal ores
Philippines	Education	Beverages
Poland	Renting of construction or demolition equipment	Wearing apparel, except fur apparel
Portugal	Products of wood, cork, and straw	Retail sale of food, beverages and tobacco
Russia	Transport via pipelines	Chemical and Fertilizer Minerals
Singapore	Building and repairing of ships and boats	Electronic valves and tubes
South Africa	Railway and tramway locomotives	Chemical and Fertilizer Minerals
Spain	Railway and tramway locomotives	Repair of personal and household goods
Sweden	Domestic appliances	Wearing apparel, except fur apparel
Switzerland	Watches and clocks	Electricity distribution, wire and cable
Taiwan	Office, accounting and computing machines	Casting of metals
Thailand	Farming of cattle, sheep, goats, horses, asses	Miscellaneous Manufactures
Turkey	Domestic appliances	Glass and glass products
UK	Legal, accounting, and auditing activities	Advertising
USA	Renting of transport equipment	Education
Venezuela	Extraction of crude petroleum and natural gas	Structural metal products, tanks, and reservoirs

Table 2: Mergers and Acquisitions - Descriptive Statistics

This table describes the sample of mergers and acquisitions. Data are from SDC Platinium M&A Database. We include mergers and acquisitions where more than 50% of the target shares are owned by the acquirer after the transaction. We exclude LBOs, spinoffs, recapitalizations, self-tender offers, exchange offers, repurchases, acquisitions of remaining interests, privatizations as well as deals involving government agencies. The sample is 1990-2010. Panel A displays the breakdown of transactions across domestic, cross-border, horizontal and non-horizontal for the whole sample. Panel B displays the number of transactions (N), the dollar value of transactions (V in $bn), the fraction of cross-border transactions (C), the fraction of horizontal transactions (H) and the fraction of cross-border horizontal transactions (C&H) separately for each acquirer and target country. Industries are defined based on three-digit ISIC classification (see the Appendix for more details).

Panel A	Total	Domestic	Cross-Border
Deal Number	388,699	301,565	87,134
	(100%)	(77.60%)	(22.40%)
Deal Value	23,749	17,170	6,578
	(100%)	(72.30%)	(27.70%)
Horizontal Deals	173,625	134,799	38,826
	(44.60%)	(44.70%)	(44.50%)
Non-Horizontal Deals	215,074	166,766	48,304
	(55.40%)	(55.30%)	(55.50%)

Panel B	Acquirer Country					Target Country				
	N	V (Bn)	C	H	C&H	N	V (Bn)	C	H	C&H
Argentina	859	63	15%	49%	8%	1,682	105	57%	53%	33%
Australia	14,733	558	16%	46%	7%	15,903	557	22%	46%	9%
Austria	2,139	41	51%	47%	25%	2,020	48	48%	45%	22%
Belgium	2,959	162	51%	46%	24%	2,983	116	51%	46%	25%
Brazil	2,516	213	10%	53%	5%	3,798	285	40%	52%	20%
Canada	20,043	922	29%	52%	16%	19,162	951	26%	49%	11%
Chile	533	18	23%	50%	14%	876	38	53%	51%	28%
China	6,654	186	11%	35%	5%	9,020	279	35%	36%	13%
Colombia	211	11	28%	65%	20%	441	32	66%	61%	39%
Czech Republic	790	6	9%	42%	4%	1,537	32	53%	46%	26%
Denmark	3,371	83	37%	47%	18%	3,439	82	39%	47%	19%
Finland	4,766	113	26%	43%	11%	4,742	98	26%	43%	11%
France	17,037	1,116	29%	45%	15%	17,279	883	30%	43%	13%
Germany	19,771	851	29%	44%	14%	21,058	959	34%	43%	14%
Greece	992	27	19%	46%	9%	995	32	19%	47%	10%
Hong Kong	6,090	334	40%	35%	13%	5,471	258	33%	37%	12%
Hungary	797	4	9%	37%	5%	1,420	23	49%	43%	25%
India	4,505	96	20%	38%	11%	5,215	128	31%	36%	13%
Indonesia	798	40	13%	41%	4%	1,357	56	49%	46%	24%
Ireland	2,137	78	58%	43%	26%	1,816	54	50%	44%	24%
Israel	1,137	61	44%	40%	22%	1,178	53	46%	40%	22%
Italy	6,711	470	25%	43%	13%	7,635	495	34%	41%	14%
Japan	18,230	721	15%	38%	5%	16,692	650	7%	38%	3%
Korea	3,258	231	14%	28%	5%	3,472	248	19%	30%	8%
Luxemburg	737	82	92%	38%	34%	332	78	83%	46%	37%
Malaysia	7,641	108	14%	33%	5%	7,349	98	11%	34%	4%
Mexico	898	154	32%	49%	18%	1,723	165	64%	54%	38%
Netherlands	7,882	525	49%	43%	22%	6,639	439	39%	43%	17%
New Zealand	2,200	38	21%	43%	9%	2,720	58	36%	42%	14%
Norway	3,333	155	36%	47%	17%	3,402	160	37%	47%	17%
Peru	238	8	11%	47%	6%	527	22	60%	58%	39%
Philippines	653	21	13%	40%	5%	957	35	41%	43%	18%
Poland	1,381	17	8%	42%	4%	2,391	44	47%	44%	23%
Portugal	1,232	52	23%	43%	11%	1,491	53	36%	46%	20%
Russia	4,722	211	6%	35%	2%	5,340	206	17%	38%	9%
Singapore	4,472	171	48%	32%	16%	3,537	101	34%	31%	12%
South Africa	2,766	122	17%	42%	8%	3,054	129	25%	42%	12%
Spain	7,095	391	19%	47%	10%	8,250	340	30%	46%	14%
Sweden	7,601	276	39%	45%	19%	7,026	351	34%	43%	15%
Switzerland	5,034	520	51%	44%	22%	4,282	362	43%	45%	19%
Taiwan	904	56	37%	41%	15%	975	63	42%	41%	18%
Thailand	1,506	27	10%	35%	5%	1,987	36	32%	36%	14%
Turkey	536	25	11%	40%	6%	902	51	47%	44%	23%
UK	42,731	2,671	26%	42%	11%	40,643	2,343	22%	43%	10%
USA	143,964	11,705	15%	48%	7%	135,687	12,135	10%	48%	5%
Venezuela	136	9	23%	46%	9%	294	14	64%	56%	39%
World	388,699	23,748	27%	43%	12%	388,699	23,748	38%	44%	19%

Table 3: Specialization Profile of Acquirers and Targets

This table presents the univariate differences in the degree of specialization between the acquirer's industry (A) and the target's industry (T) at the transaction level. We consider two measures of specialization, where *SP(sales)* is specialization based on total sales, and *SP(emp)* is specialization based on total employment. Data on sales and employment are from Worldscope. The sample covers 46 countries, 97 distinct industries and the period 1990-2010. Industries are defined based on three-digit ISIC classification (see the Appendix for more details). We report the average and median (in parenthesis) degree of specialization. We separate transactions between domestic and cross-border. Panel A includes all transactions (N=388,699). Panel B includes all horizontal transactions (N=173,625). Panel C further indicates the fraction of all horizontal cross-border transactions and the fraction of the dollar value in these transactions for which the degree of specialization of the acquirer is larger than that of the target (A.SP(x)>T.SP(x)).

Panel A: All Transactions	Domestic	Cross-Border	All
A. SP(sales)	1.858 (0.993)	1.901 (1.094)	1.868 (1.022)
T. SP(sales)	1.978 (1.144)	1.55 (0.826)	1.882 (1.074)
A. SP(emp)	1.911 (0.864)	1.922 (0.927)	1.913 (0.870)
T. SP(emp)	2.021 (0.963)	1.531 (0.722)	1.911 (0.915)

Panel B: Horizontal Transactions	Domestic	Cross-Border	All
A.SP(sales)	2.146 (1.216)	1.979 (1.252)	2.109 (1.225)
T. SP(sales)	2.146 (1.216)	1.515 (0.860)	2.005 (1.123)
A. SP(emp)	2.218 (1.030)	2.023 (1.092)	2.174 (1.043)
T. SP(emp)	2.218 (1.030)	1.495 (0.758)	2.056 (0.960)

Panel C: Horizontal Cross-Border Transactions	%(# of deals)	$ value	%($ value)
A.SP(sales)>T.SP(sales)	60.47%	$2.26 Bn.	63.96%
A.SP(sales)>T.SP(sales)	60.39%	$2.22 Bn.	62.98%

Table 4: Summary Statistics of Variables used in Gravity Models

This table presents summary statistics (means, standard deviations, percentiles, and the number of observations) for each variable used in the gravity models we estimate. Observations are at the country-industry-pair level in Panel A, the country-level in Panel B, the country-pair level in Panel C, and the country-industry level in Panel D. All variables are defined in the Appendix. The sample covers 46 countries, 97 distinct industries and the period 1990-2010. Industries are defined based on three-digit ISIC classification (see the Appendix for more details). Δ indicates the difference between acquirer and target country. The unit of observation is at the country-industry pair.

Statistics:	Mean	Std.Dev	25th	50th	75th	N
Panel A: Country-Industry-Pair Variables						
ln(#Acq.)	0.07	0.30	0.00	0.00	0.00	200,790
ln($Acq.)	0.13	0.79	0.00	0.00	0.00	200,790
$\Delta SP(sales)_{WS}$	0.00	3.44	-0.49	0.00	0.49	200,790
$\Delta SP(emp)_{WS}$	0.00	3.65	-0.45	0.00	0.45	200,790
$\Delta SP(sales)_{UNIDO}$	0.00	1.92	-0.61	0.00	0.61	77,658
$\Delta SP(emp)_{UNIDO}$	0.00	1.92	-0.61	0.00	0.61	77,658
Panel B: Country-Level Variables						
ln(GDP)	25.33	1.27	24.22	25.15	26.13	200,790
ln(GDP/capita)	8.76	1.16	7.90	9.15	9.71	200,790
ln(Openess)	4.20	0.62	3.86	4.13	4.44	200,790
%Tertiary Education	34.20	17.17	23.44	28.82	44.00	183,330
%Education Spending	14.21	3.94	11.52	13.22	15.93	192,060
#Patent/Pop.	491.07	645.01	83.86	221.91	615.01	196,425
#Trademark/Pop.	1,287.57	946.12	510.48	1,142.51	1,664.03	187,695
#Articles/Pop.	358.26	333.97	57.82	275.22	698.74	196,425
Panel C: Country-Pair Variables						
Exchange Rate Return	0.00	0.09	-0.03	0.00	0.03	200,790
ln(Distance)	8.62	1.00	7.92	9.05	9.29	200,790
Common Border	0.05	0.21	0.00	0.00	0.00	200,790
Same Religion	0.30	0.46	0.00	0.00	1.00	200,790
Same Legal System	0.25	0.43	0.00	0.00	1.00	200,790
Same Language	0.11	0.32	0.00	0.00	0.00	200,790
ln(ΔCorporate Tax Rate)	0.07	0.05	0.03	0.06	0.10	200,790
Double-Tax Treaty	0.36	0.48	0.00	0.00	1.00	200,790
Bil. Investment Treaty	0.16	0.36	0.00	0.00	0.00	200,790
Panel D: Country-Industry-Level Variables						
Market-to-Book	1.54	0.71	1.12	1.36	1.73	133,261
Total Assets	1,483.74	4,327.46	94.11	271.14	927.96	135,964
1-Lerner	0.90	0.08	0.88	0.92	0.95	135,727

Table 5: Specialization and Cross-Border Acquisitions: Baseline Estimation

This table presents cross-sectional Tobit estimations of the baseline gravity model (equation (2)). The dependent variable is the total flow of acquisitions, in number (ln(#Acq.)) or dollar value (ln($Acq.)), in a given country-industry-pair over the 1990-2010 period. The variable of interest, ΔSP, is the average difference in specialization (in a given industry) between the acquirer and the target country over the sample period. We consider two measures of specialization, one based on sales (SP(sales)) and one based on employment (SP(emp)). The control variables include average acquirer and target country characteristics, as well as country-pair characteristics. All variables are defined in the Appendix. All specifications include industry fixed effects. Industries are defined based on three-digit ISIC classification (see the Appendix for more details). To facilitate economic interpretation, all dependent variables are standardized to have a unit variance. Standard errors are clustered at the acquirer-target country pair level. We report t-statistics in parenthesis. Symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Dep. Variable:	ln(#Acq.)		ln($Acq.)	
SP(x)	SP(sales)	SP(emp)	SP(sales)	SP(emp)
ΔSP	0.147***	0.137***	0.529***	0.484***
	(11.409)	(11.244)	(7.763)	(7.399)
log(Acq. GDP)	0.767***	0.766***	2.802***	2.798***
	(23.362)	(23.333)	(19.243)	(19.219)
log(Tar. GDP)	0.574***	0.576***	2.289***	2.293***
	(16.656)	(16.684)	(14.524)	(14.545)
log(Acq. GDP/capita)	0.391***	0.389***	1.264***	1.256***
	(11.795)	(11.759)	(9.053)	(9.017)
log(Tar. GDP/capita)	0.055*	0.056*	0.115	0.117
	(1.689)	(1.698)	(0.771)	(0.782)
log(Acq. Openess)	0.208***	0.207***	0.863***	0.860***
	(4.826)	(4.790)	(4.361)	(4.332)
log(Tar. Openess)	0.092**	0.094**	0.474**	0.480**
	(2.225)	(2.269)	(2.477)	(2.514)
Exchange Rate Return	0.119***	0.122***	0.496***	0.505***
	(3.861)	(3.951)	(3.594)	(3.665)
log(Geographic Distance)	-0.410***	-0.410***	-1.296***	-1.295***
	(-14.852)	(-14.854)	(-9.773)	(-9.777)
Shared Border	0.028	0.028	-0.031	-0.031
	(1.047)	(1.040)	(-0.237)	(-0.238)
Same Religion	-0.008	-0.008	-0.189	-0.189
	(-0.328)	(-0.324)	(-1.633)	(-1.632)
Same Language	0.266***	0.266***	1.183***	1.184***
	(9.264)	(9.264)	(9.759)	(9.754)
Same Legal Origin	0.205***	0.205***	0.731***	0.730***
	(6.814)	(6.799)	(5.428)	(5.416)
log(ΔCorporate Tax Rate)	-0.050**	-0.050**	-0.289***	-0.289***
	(-2.193)	(-2.190)	(-2.738)	(-2.734)
Double-Tax Treaty	-0.037	-0.037	-0.084	-0.085
	(-1.524)	(-1.538)	(-0.753)	(-0.759)
Bilateral Investment Treaty	-0.050**	-0.050**	-0.272**	-0.273**
	(-2.149)	(-2.155)	(-2.559)	(-2.563)
#Obs.	200,790	200,790	200,790	200,790
Pseudo_R^2	0.30	0.30	0.22	0.22

Table 6: Specialization and Cross-Border Acquisitions: Size, Valuation, and UNIDO

This table presents cross-sectional Tobit estimations of the baseline gravity model (equation (2)). The dependent variable is the total flow of cross-border horizontal acquisitions, in number (ln(#Acq.)) or dollar value (ln($Acq.)), in a given country-industry-pair over the 1990-2010 period. The variable of interest, ΔSP, is the average difference in specialization (in a given industry) between the acquirer and the target country over the sample period. We consider two measures of specialization, one based on sales (SP(sales)) and one based on employment (SP(emp)). In Panel A, we include two proxies for acquirer and target country-industry size and valuation. We measure size as the average (logarithm) total assets in each country-industry over the sample period. We measure valuation as the average market-to-book ratio in each country-industry. In Panel B, we replace the measures of specialization based on Worldscope by two measures based on UNIDO (see Section III.A for details). The sample is thus restricted to manufacturing industries. Baseline control variables (average acquirer and target country characteristics, as well as country-pair characteristics) are included but not reported for brevity. All specifications include industry fixed effects. Industries are defined based on three-digit ISIC classification (see the Appendix for more details). To facilitate economic interpretation, all dependent variables are standardized to have a unit variance. Standard errors are clustered at the acquirer-target country pair level. We report t-statistics in parenthesis. Symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Dep. Variable:	ln(#Acq.)		ln($Acq.)	
SP(x)	SP(sales)	SP(emp)	SP(sales)	SP(emp)
	Panel A: Industry Size and Valuation			
ΔSP	0.104***	0.096***	0.351***	0.328***
	(7.052)	(7.065)	(5.002)	(4.945)
Acq. Size	0.059***	0.062***	0.371***	0.380***
	(5.077)	(5.587)	(6.716)	(7.093)
Tar. Size	-0.032**	-0.036***	-0.107	-0.118*
	(-2.413)	(-2.747)	(-1.536)	(-1.715)
Acq. MB	0.060***	0.060***	0.314***	0.315***
	(4.810)	(4.834)	(5.819)	(5.844)
Tar. MB	0.032***	0.032***	0.204***	0.204***
	(2.636)	(2.642)	(3.697)	(3.695)
Baseline Controls	Yes	Yes	Yes	Yes
#Obs	98,174	98,174	98,174	98,174
Pseudo R^2	0.27	0.27	0.18	0.18
	Panel B: UNIDO-based Specialization			
ΔSP	0.054***	0.050**	0.197*	0.227**
	(2.788)	(2.512)	(1.743)	(2.032)
Baseline Controls	Yes	Yes	Yes	Yes
#Obs	77,658	77,658	77,658	77,658
Pseudo R^2	0.31	0.31	0.21	0.21

Table 7: Specialization and Cross-Border Acquisitions: Reverse Causality

This table presents cross-sectional Tobit estimations of the baseline gravity model (equation (2)). The dependent variable is the total flow of cross-border horizontal acquisitions, in number (ln(#Acq.)) or dollar value (ln($Acq.)), in a given country-industry-pair over the 1990-2010 period. The variable of interest, ΔSP, is the average difference in specialization (in a given industry) between the acquirer and the target country over the sample period. We consider two measures of specialization, one based on sales (SP(sales)) and one based on employment (SP(emp)). In Panel A, the dependent variable is the total flow of acquisitions (in # or $ value) in a given country-industry-pair over the 2000-2010 period. The variable of interest, ΔS, is the average difference in specialization (in a given industry) between the acquirer and the target country computed over the period 1990-1999.)). In Panel B, the dependent variable is the total flow of acquisitions (in # or $ value) in a given country-industry-pair over the 2006-2010 period. The variable of interest, ΔS, is the average difference in specialization (in a given industry) between the acquirer and the target country computed over the period 1990-1995. Baseline control variables (average acquirer and target country characteristics, as well as country-pair characteristics) are included but not reported for brevity. All specifications include industry fixed effects. Industries are defined based on three-digit ISIC classification (see the Appendix for more details). To facilitate economic interpretation, all dependent variables are standardized to have a unit variance. Standard errors are clustered at the acquirer-target country pair level. We report t-statistics in parenthesis. Symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Dep. Variable:	ln(#Acq.)		ln($Acq.)	
SP(x)	SP(sales)	SP(emp)	SP(sales)	SP(emp)
	Panel A: SP(1990-1999) - Acquisitions(2000-2010)			
ΔSP	0.117***	0.098***	0.405***	0.329***
	(8.503)	(7.702)	(5.013)	(4.331)
Controls	Yes	Yes	Yes	Yes
#Obs.	196,650	194,580	196,650	194,580
Pseudo R^2	0.29	0.29	0.21	0.21
	Panel B: SP(1990-1995) - Acquisitions(2006-2010)			
ΔSP	0.099***	0.083***	0.350***	0.305***
	(6.563)	(6.122)	(3.810)	(3.546)
Controls	Yes	Yes	Yes	Yes
#Obs.	190,440	190,440	190,440	190,440
Pseudo R^2	0.28	0.28	0.20	0.20

Table 8: Specialization and Cross-Border Acquisitions: Panel Data

This table presents panel Tobit estimations of the baseline gravity model (equation (2)). The dependent variable is the total flow of cross-border acquisitions, in number (ln(#Acq.)) or dollar value (ln($Acq.)), in a given country-industry-pair over the 1990-2010 period. The variable of interest, ΔSP, is the difference in specialization (in a given industry) between the acquirer and the target country. We consider two measures of specialization, one based on sales (SP(sales)) and one based on employment (SP(emp)). The control variables include acquirer and target country characteristics, as well as country-pair characteristics. All variables are defined in the Appendix. In Panel A, we split the sample period (1990-2010) into three sub-periods of seven years, and average all variables over these three sub-periods. In Panel B, we consider the full panel of 21 years. All specifications include industry and time fixed effects, as well as country-pair fixed effects. Industries are defined based on three-digit ISIC classification (see the Appendix for more details). To facilitate economic interpretation, all dependent variables are standardized to have a unit variance. Standard errors are clustered at the acquirer-target country pair level. We report t-statistics in parenthesis. Symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Dep. Variable:	ln(#Acq.)		ln($Acq.)	
SP(x)	SP(sales)	SP(emp)	SP(sales)	SP(emp)
Panel A: three seven-year sub-periods				
ΔSP	0.008**	0.012***	0.064***	0.097***
	(2.098)	(2.979)	(2.885)	(3.941)
Baseline Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Country-industry-pair FE	Yes	Yes	Yes	Yes
#Obs.	602,370	602,370	602,370	602,370
Pseudo R^2	0.01	0.01	0.01	0.01
Panel B: Full Panel of 21 years				
ΔSP	0.005	0.010**	0.054*	0.100***
	(1.320)	(2.437)	(1.897)	(3.269)
Baseline Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Country-industry-pair FE	Yes	Yes	Yes	Yes
#Obs.	4,216,590	4,216,590	4,216,590	4,216,590
Pseudo R^2	0.01	0.01	0.01	0.01

Table 9: Specialization and Cross-Border Acquisitions: Product Market Competition

This table presents cross-sectional Tobit estimations of the baseline gravity model (equation (2)). The dependent variable is the total flow of cross-border horizontal acquisitions, in number (ln(#Acq.)) or dollar value (ln($Acq.)), in a given country-industry-pair over the 1990-2010 period. The variable of interest, ΔSP, is the average difference in specialization (in a given industry) between the acquirer and the target country over the sample period. We consider two measures of specialization, one based on sales (SP(sales)) and one based on employment (SP(emp)). In Panel A, we include a proxy for the degree of product market competition in the target country-industry. We measure competition using one minus the Lerner Index. In Panel B, we further interact the difference in specialization with the measure of competition. We present the marginal effect of the difference in specialization when competition is evaluated at the mean of the median (at the bottom of the Table). The baseline control variables (average acquirer and target country characteristics, as well as country-pair characteristics) are included but not reported for brevity. All specifications include industry fixed effects. Industries are defined based on three-digit ISIC classification (see the Appendix for more details). To facilitate economic interpretation, all dependent variables are standardized to have a unit variance. Standard errors are clustered at the acquirer-target country pair level. We report t-statistics in parenthesis. Symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Dep. Variable:	ln(#Acq.)		ln($Acq.)	
SP(x)	SP(sales)	SP(emp)	SP(sales)	SP(emp)
	Panel A: Level Effect			
ΔSP	0.150***	0.138***	0.594***	0.544***
	(10.880)	(10.429)	(8.495)	(7.955)
Tar. (1-Lerner)	-0.047***	-0.047***	-0.198***	-0.199***
	(-4.296)	(-4.309)	(-3.800)	(-3.799)
Baseline Controls	Yes	Yes	Yes	Yes
#Obs	135,720	135,720	135,720	135,720
Pseudo R^2	0.28	0.28	0.20	0.20
	Panel B: Interaction Effect			
ΔSP	-0.516***	-0.470***	-2.253***	-1.846***
	(-3.177)	(-3.055)	(-2.824)	(-2.488)
Tar. (1-Lerner)	-0.058***	-0.057***	-0.245***	-0.239***
	(-5.183)	(-5.158)	(-4.572)	(-4.496)
[ΔSP] x [Tar. (1-Lerner)]	0.059***	0.054***	0.254***	0.213***
	(4.174)	(4.026)	(3.649)	(3.305)
Baseline Controls	Yes	Yes	Yes	Yes
#Obs	135,720	135,720	135,720	135,720
Pseudo R^2	0.28	0.28	0.20	0.20
E[ΔSP | Mean]	0.148***	0.138***	0.607***	0.552***
E[ΔSP | Median]	0.163***	0.152***	0.671***	0.606***

Table 10: Specialization and Cross-Border Acquisitions: Human Capital

This table presents cross-country-pairs Tobit estimations of the baseline gravity model (equation (2)) split by country differences in the stock of human capital. The dependent variable is the total flow of cross-border horizontal acquisitions, in number (ln(# of Acq.)) or dollar value (ln($ of Acq.)), in a given country-industry-pair over the 1990-2010 period. The variable of interest, ΔSP, is the average difference in specialization (in a given industry) between the acquirer and the target country over the sample period. We consider two measures of specialization, one based on sales (SP(sales)) and one based on employment (SP(emp)). We measure the stock of human capital using two variables: The fraction of the population that obtains a higher education (Panel A), and the fraction of public spending on education (Panel B). We compute the difference (Δ) in these measures between the acquirer and target country. We partition the sample in two groups, High and Low, based on the median values of these differences (which are zero by construction). The baseline control variables (average acquirer and target country characteristics, as well as country-pair characteristics) are included but not reported for brevity. Industries are defined based on three-digit ISIC classification (see the Appendix for more details). All specifications include industry fixed effects. To facilitate economic interpretation, all dependent variables are standardized to have a unit variance. Standard errors are clustered at the acquirer-target country pair level. We report t-statistics in parenthesis. We further report the p-value corresponding to a unilateral (F-)test of whether the estimate of ΔSP in the High partition is larger than in the Low partition (H>L). Symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

SP(x):	SP(sales)						SP(emp)					
Dep. Var.:	ln(#Acq.)			ln($Acq.)			ln(#Acq.)			ln($Acq.)		
Group:	High	Low	(H>L)	High	Low	(H>L)	High	Low	(H>L)	High	Low	(H>L)
					Panel A: Δ(% Tertiary Education)							
ΔSP	0.195***	0.093***	(0.000)	0.648***	0.375***	(0.001)	0.175***	0.095***	(0.000)	0.581***	0.363***	(0.005)
	(10.82)	(5.178)		(7.163)	(61.166)		(10.192)	(5.521)		(6.584)	(54.158)	
#Obs.	91,665	91,859		91,665	91,859		91,665	91,859		91,665	91,859	
					Panel B: Δ(%Education Spending)							
ΔSP	0.173***	0.136***	(0.098)	0.617***	0.491***	(0.125)	0.164***	0.121***	(0.051)	0.610***	0.399***	**(0.019)**
	(8.549)	(6.444)		(65.17)	(4.713)		(9.351)	(5.690)		(65.852)	(3.816)	
#Obs.	83,420	83,614		83,420	83,614		83,420	83,614		83,420	83,614	

Table 11: Specialization and Cross-Border Acquisitions: Technological Capital

This table presents cross-country-pairs Tobit estimations of the baseline gravity model (equation (2)) split by country differences in the stock of technological capital. The dependent variable is the total flow of cross-border horizontal acquisitions, in number (ln(# of Acq.)) or dollar value (ln($ of Acq.)), in a given country-industry-pair over the 1990-2010 period. The variable of interest, ΔSP, is the average difference in specialization (in a given industry) between the acquirer and the target country over the sample period. We consider two measures of specialization, one based on sales (SP(sales)) and one based on employment (SP(emp)). We measure the stock of technological capital using four variables: The ratio of (public and private) R&D spending to GDP (Panel A), the number of patents per capita (Panel B), the number of trademarks per capita (Panel C), and the number of scientific articles per capita (Panel D). We compute the difference (Δ) in these measures between the acquirer and target country. We partition the sample in two groups, High and Low, based on the median values of these differences (which are zero by construction). The baseline control variables (average acquirer and target country characteristics, as well as country-pair characteristics) are included but not reported for brevity. All specifications include industry fixed effects. Industries are defined based on three-digit ISIC classification (see the Appendix for more details). To facilitate economic interpretation, all dependent variables are standardized to have a unit variance. Standard errors are clustered at the acquirer-target country pair level. We report t-statistics in parenthesis. We further report the p-value corresponding to a unilateral (F-)test of whether the estimate of ΔSP in the High partition is larger than in the Low partition (H>L). Symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

SP(x):	SP(sales)						SP(emp)					
Dep. Var.:	ln(#Acq.)			ln($Acq.)			ln(#Acq.)			ln($Acq.)		
Group:	High	Low	(H>L)	High	Low	(H>L)	High	Low	(H>L)	High	Low	(H>L)
						Panel A: Δ(R&D/GDP)						
ΔSP	0.177***	0.108***	(0.007)	0.602***	0.496***	(0.219)	0.164***	0.103***	(0.009)	0.545***	0.463***	(0.250)
	(11.525)	(4.907)		(42.785)	(4.108)		(11.313)	(4.835)		(42.752)	(3.852)	
#Obs.	91,762	91,762		91,762	91,762		91,762	91,762		91,762	91,762	
						Panel B: Δ(Patent/Pop.)						
ΔSP	0.172***	0.117***	(0.019)	0.605***	0.442***	(0.143)	0.159***	0.109***	(0.020)	0.558***	0.382***	(0.096)
	(10.817)	(5.642)		(7.263)	(3.857)		(10.657)	(5.490)		(7.072)	(3.431)	
#Obs.	96,030	96,030		96,030	96,030		96,030	96,030		96,030	96,030	
						Panel C: Δ(Trademark/Pop.)						
ΔSP	0.176***	0.115***	(0.014)	0.642***	0.335***	(0.000)	0.156***	0.113***	(0.044)	0.557***	0.327***	(0.002)
	(9.712)	(5.519)		(7.333)	(32.447)		(9.141)	(5.531)		(6.665)	(31.364)	
#Obs.	87,591	87,591		87,591	87,591		87,591	87,591		87,591	87,591	
						Panel D: Δ(Articles/Pop.)						
ΔSP	0.172***	0.107***	(0.009)	0.586***	0.481***	(0.253)	0.160***	0.098***	(0.005)	0.541***	0.421***	(0.196)
	(11.274)	(4.938)		(7.376)	(3.875)		(11.544)	(4.621)		(7.259)	(3.453)	
#Obs.	96,030	96,030		96,030	96,030		96,030	96,030		96,030	96,030	

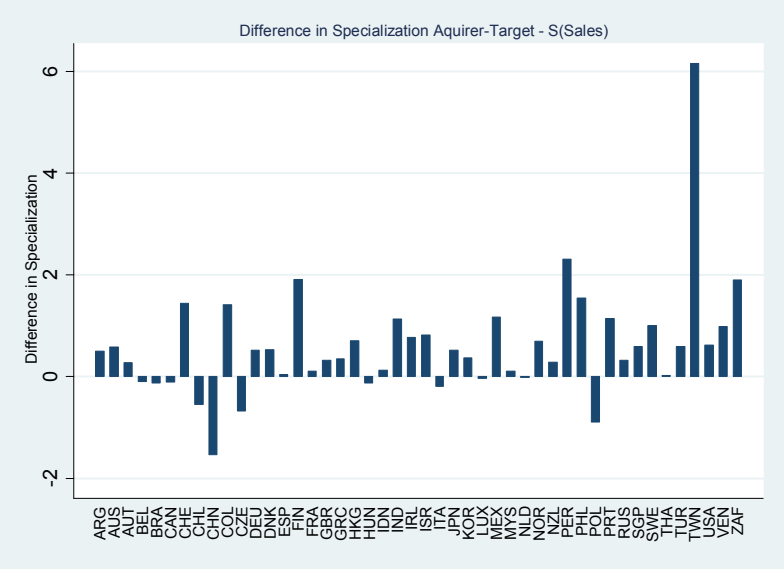
Table 12: Specialization and Cross-Border Acquisitions (Ex Post) Performance

This table presents OLS regressions on acquirers' change in performance following cross-border horizontal acquisitions. We define performance as operating income over assets, and examine changes from year t+1 to year t+1 (one-year horizon), or t+4 (three-year horizon), where t=0 is the year of the acquisition. We restrict our attention to firms that only acquire assets in cross-border horizontal transactions over the three-year horizon. We adjust the performance of each acquirer by subtracting the performance of a matched peer, where peers are the closest firms in terms of size that active in the country-industry of the acquirer and do not participate in any acquisition during a six-year window surrounding the transaction. The variable of interest, ΔSP, is the difference in specialization between the country-industry of the acquirer and that of the target, measured in year t=0. We consider two measures of specialization, one based on sales (SP(sales)) and one based on employment (SP(emp)). All specifications include the following control variables: logarithm of acquirer assets, the relative size of the acquirer compared to the target, and a dummy variable indicating whether the transaction is a merger. Moreover, all specifications include industry, time, and country-pair fixed effects. Industries are defined based on three-digit ISIC classification (see the Appendix for more details). To facilitate economic interpretation, all dependent variables are standardized to have a unit variance. Standard errors are clustered at the acquirer-target country pair level. We report t-statistics in parenthesis. Symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Perf. Measure	Operating Income (Over assets)			
SP(x):	SP(sale)		SP(emp)	
Horizon:	one-year	three-year	one-year	three-year
ΔSP	0.007**	0.008***	0.004*	0.005**
	(2.503)	(2.801)	(1.857)	(2.105)
log(Assets)	0.003	0.000	0.003	0.001
	(0.703	(0.096)	(0.761)	(0.158)
Acq. Relative Size	0.009***	0.009***	0.009***	0.009***
	(3.025)	(3.023)	(3.018)	(3.11)
Merger Dummy	-0.001	-0.001	-0.001	-0.001
	(-0.090)	(-0.462)	(-0.056)	(-0.424)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Country-Pair FE	Yes	Yes	Yes	Yes
#Obs.	4,787	4,787	4,787	4,787
Adj. R^2	0.17	0.20	0.17	0.20

Figure 1: Difference in Specialization by Acquirer Country

This figure presents the average difference in specialization between acquirers and target in horizontal cross-border acquisitions by acquirer country based on the two main measures of industry specialization presented in Section III.A. SP(sales) is specialization based on total sales (reported in the top Panel), and SP(emp) is specialization based on total employment (reported in the bottom Panel). Data on sales and employment are from Worldscope. The sample covers 46 countries, 97 distinct industries and the period 1990-2010.



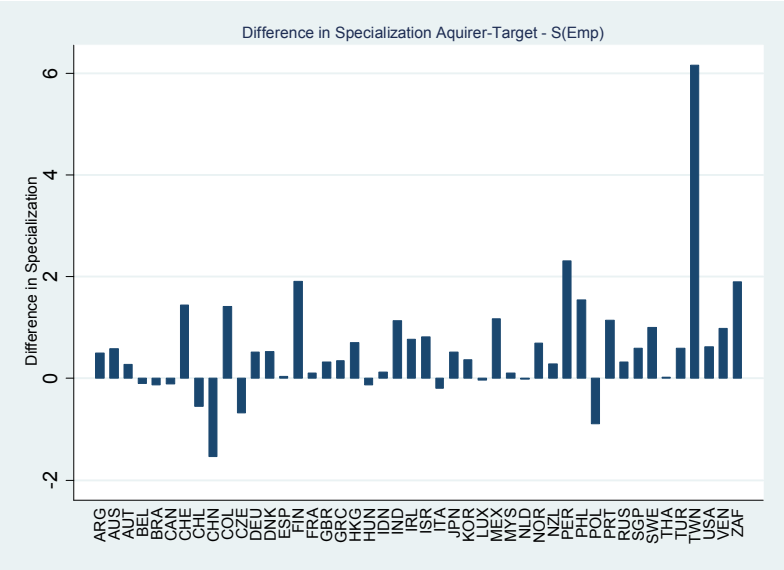
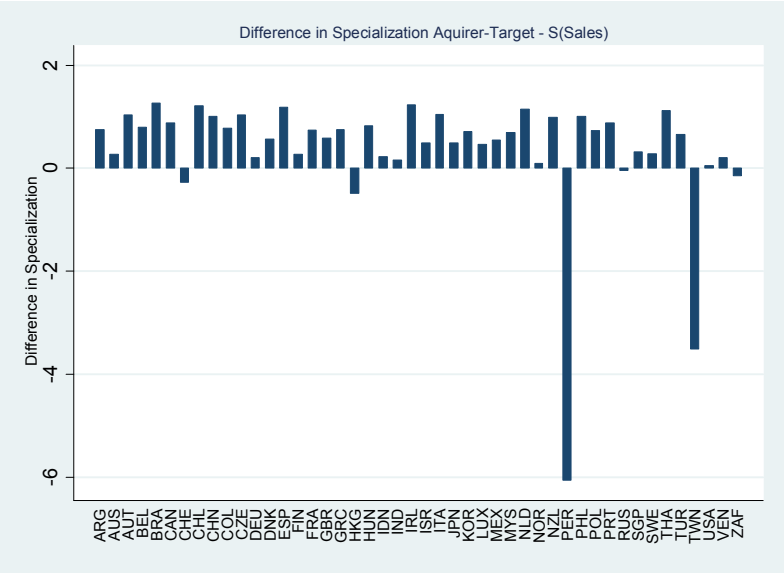


Figure 2: Difference in Specialization by Target Country

This figure presents the average difference in specialization between acquirers and target in horizontal cross-border acquisitions by target country based on the two main measures of industry specialization presented in Section III.A. SP(sales) is specialization based on total sales (reported in the top Panel), and SP(emp) is specialization based on total employment (reported in the bottom Panel). Data on sales and employment are from Worldscope. The sample covers 46 countries, 97 distinct industries and the period 1990-2010.



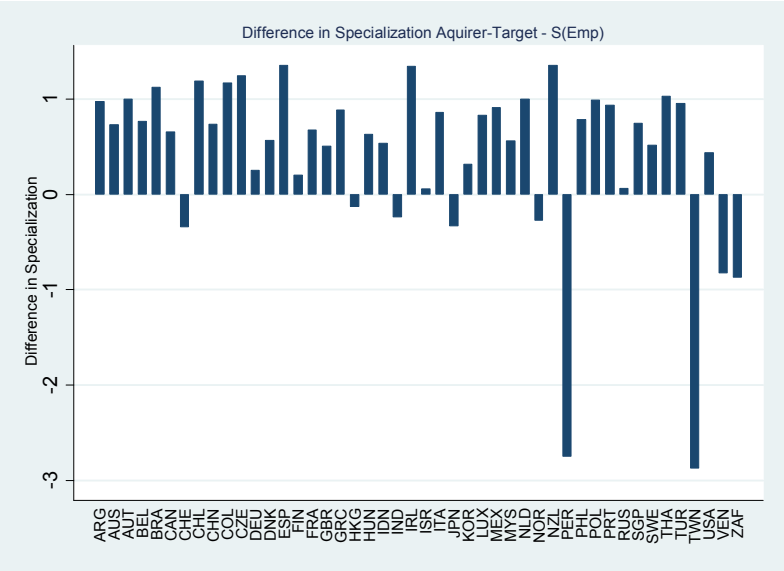
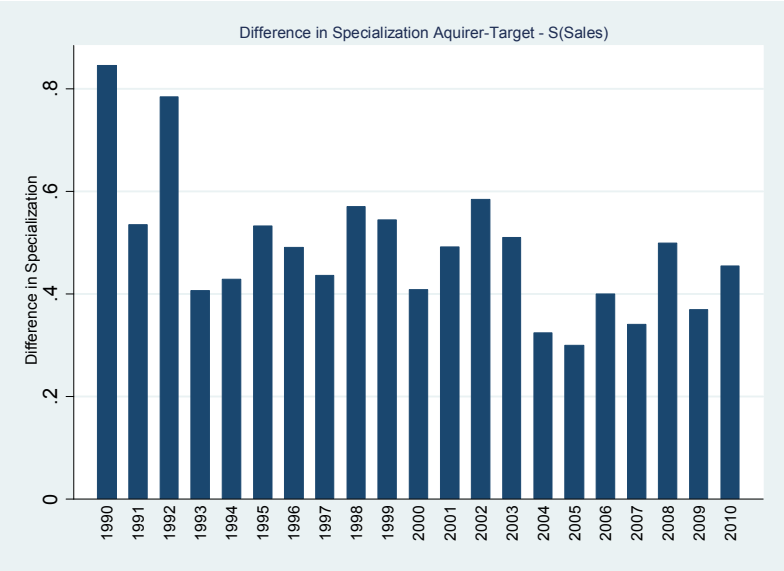


Figure 3: Difference in Specialization by Year

This figure presents the average difference in specialization between acquirers and target in horizontal cross-border acquisitions by year based on the two main measures of industry specialization presented in Section III.A. SP(sales) is specialization based on total sales (reported in the top Panel), and SP(emp) is specialization based on total employment (reported in the bottom Panel). Data on sales and employment are from Worldscope. The sample covers 46 countries, 97 distinct industries and the period 1990-2010.



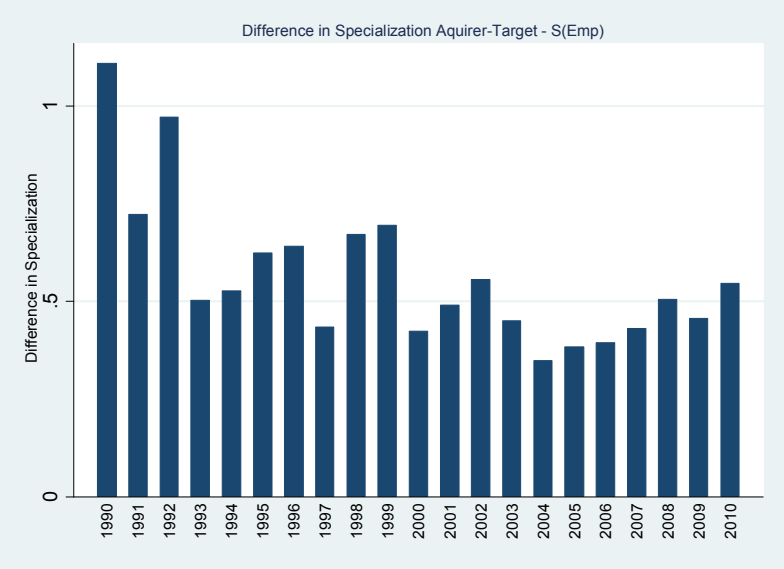


Figure 4: Difference in Specialization by industry

This figure presents the average difference in specialization between acquirers and target in horizontal cross-border acquisitions by industry country based on the two main measures of industry specialization presented in Section III.A. SP(sales) is specialization based on total sales (reported in the top Panel), and SP(emp) is specialization based on total employment (reported in the bottom Panel). Data on sales and employment are from Worldscope. The sample covers 46 countries, 97 distinct industries and the period 1990-2010. Industries are defined based on three-digit ISIC classification (see the Appendix for more details).

