WORKING PAPERS

N° TSE-428

November 2013

"Mergers along the Global Supply Chain: Information Technologies and Routineness"

Sergi Basco and Marti Mestieri

Toulouse School of Economics

Mergers along the Global Supply Chain:

Information Technologies and Routineness*

Sergi Basco — UC3M

Martí Mestieri — TSE

November 22, 2013

Abstract

This paper empirically analyzes how the adoption of Information Technologies (IT) has changed the organization of global supply chains. We focus on international mergers, which are a growing and important component of foreign direct investment. We use data on North-South vertical mergers and acquisitions for all manufacturing industries. We show that the effect of IT adoption on the number of vertical mergers and acquisitions is decreasing with the "routineness" of the industry. Our interpretation is that the IT revolution has enabled new monitoring mechanisms. This has allowed Northern headquarters to better monitor suppliers, specially those in less routine-intensive industries –which were harder to monitor prior to the IT revolution.

Keywords: Mergers and Acquisitions, Information Technologies, Routine Intensity.

JEL Classification: F23, F14, D23, L22

*A previous version of this paper was circulated under the title "Deconstructing International Mergers: Information Technologies and Routineness." We thank Daron Acemoglu, Pol Antràs, Paula Bustos, Nicholas Bloom, Alessandro Bonatti, Thomas Chaney, Rosario Crinò, Arnaud Costinot, Klaus Desmet, Gino Gancia, Francine Lafontaine, Mar Reguant, Steve Tadelis and seminar participants at MIT, TIGER Forum, Toulouse School of Economics and UC3M for useful comments and suggestions. Basco acknowledges financial supports from Spanish Ministry of Science and Innovation (ECO2011-27014). Mestieri acknowledges financial support from the Agence Nationale de la Recherche. e-mail addresses: sergi.basco@uc3m.es and marti.mestieri@tse-fr.eu. The remaining errors are our own.

1 Introduction

The Information Technologies (IT) revolution has changed the organization of the firm.[1] It has been argued that IT have allowed headquarters to better monitor suppliers, as the next quote from the New York Times (March 19, 2011) illustrates.

> "...supply lines are longer and far more complex than in the past. The ability to manage these complex networks, experts say, has become possible because of technology — Internet communications, RFID tags and sensors attached to valued parts, and sophisticated software for tracking and orchestrating the flow of goods worldwide."

This paper provides a first attempt to empirically study how the adoption of these Information Technologies has affected the international organization of the supply chain of Northern firms. We focus on Mergers and Acquisitions (M&As), which are an important and growing fraction of Foreign Direct Investment (FDI).[2]

The starting premise of our paper is that contractual frictions play an important role in the organization of global supply chains. This is a well documented fact in the international trade literature.[3] We focus on monitoring problems as the source of contractual frictions. In line with our emphasis on monitoring, the latest World Investment Report (UNCTAD, 2013) identifies communication and information flows, which allow better monitoring and coordination, as key elements for effective governance of global supply chains.

To investigate how the IT revolution has affected M&As, we develop a task-based model of organizational choice of upstream production with agency problems. Tasks differ on how closely they follow tight and standardized procedures. Standardized tasks are easier to monitor. We assume that the IT revolution reduces the monitoring costs in an industry by expanding the set of tasks that can be easily monitored. This is consistent with the findings of Baker and Hubbard (2003) for the trucking industry, and the growing international trade literature highlighting the importance of IT in facilitating a finer "slicing" of the global supply chain.[4]

The expansion in monitorable tasks generated by the IT revolution causes a relatively higher fall in monitoring costs of previously harder-to-monitor industries. This delivers the

[1] See, for example, Bloom et al. (2011) for an empirical analysis of the impact of ICT technologies on the organization of Northern firms. The fall in communication costs has also expanded the range of jobs that are being offshored. See, among others, Blinder (2006), Crinò (2010), Ebenstein et al. (2011) and Oldenski (2011).

[2] According to UNCTAD (2000), Table *I.1*, the ratio of the value of global cross-border M&As to the value of global FDI is about 80%. Moreover, the value of completed cross-border M&As rose from less than $100 billion in 1987 (which represented 72% of the total value of FDI inflows) to $720 billion in 1999 (which represented 83% of the total value of FDI inflows).

[3] See Antràs (forthcoming) for a survey of theoretical and empirical papers emphasizing the role of contractual frictions on the international organization of production.

[4] See, for example, Baldwin (2012), Basco and Mestieri (2013) and Antràs and Chor (forthcoming).

most salient prediction of our model: harder-to-monitor industries receive relatively more M&As with the IT revolution. The testable implication of this complementarity result is that countries abundant in IT infrastructure receive relatively more M&As in harder-to-monitor industries.

To give empirical content to the notion of hard-to-monitor industries we use the routine task index developed by Autor and Dorn (2009). An industry is defined as routine-intensive when the average task performed in that industry requires relatively tight and standardized procedures. Accordingly, we argue that it is more difficult to monitor production in industries with less standardized tasks.

We focus our empirical analysis on vertical North-South M&As. The reason is that agency problems are more prevalent when a supplier is located in the South, while they are much less important in the North.[5] We obtain data on mergers from SDC Thomson Platinum, which is the most comprehensive data set publicly available. A merger is classified as vertical if the 4-digit SIC codes of the target and acquirer firms are different and if these industries are linked through the 1997 direct requirements U.S. Input-Output table.[6] Our variable of interest is the number of vertical M&As by country and industry in the 1990s.[7] We study the 1990s because the pattern of North-South trade dramatically changed in those years. As argued in Baldwin (2006), Blinder (2006) and Basco and Mestieri (2013), among others, the IT revolution was one of the main drivers of this change. Lastly, our proxy for adoption of Information Technologies at the country level is Internet users from WDI (World Bank), which is the most extensive Internet adoption variable available for Southern countries.

Consistent with the complementarity implied by our model, we show that the effect of the adoption of Information Technologies on the number of M&As is decreasing with the routine intensity of the industry. Our interpretation is that, in Southern countries with low IT adoption, Northern headquarters only find optimal to acquire a firm in very routine industries, where monitoring problems are of little importance. However, in Southern countries with more IT adoption, Northern headquarters will also find optimal to merge in less routine industries, because the adoption of Information Technologies reduces monitoring costs.

Quantitatively, we find that if IT adoption in a Southern country raises from the 25th to the 75th percentile of the distribution, ceteris paribus, the increase in the number of mergers in a low routine-intensive industry (e.g., non-metallic products) would be 29% higher than in a high routine-intensive industry (e.g., computer and electronics).

[5] More severe agency problems in Southern countries has been emphasized, among others, in Antràs et al. (2009) and Antràs (2003). Following the reasoning of focusing on Southern countries, we could look as well at South-South M&As. However, we have a very low number of observations in our data for South-South M&As, which precludes their analysis. A country is defined as Southern if the GDP per capita (PPP adjusted) in 2000 is lower than the 50% of the United States. Romalis (2004) uses the same definition.

[6] This definition is similar to Alfaro and Charlton (2009), Atalay et al. (2013) and Ramondo et al. (2012).

[7] We do not use value measures because these data are missing in many instances.

Given that our main result is on the interaction between IT infrastructure and routineness of an industry, we include both country and industry fixed effects in our baseline regression. We also include country-industry varying controls for exports, intrafirm exports and capital inflows (FDI). In addition, the result holds when we control for Heckscher-Ohlin effects to account for determinants on the pattern of specialization. We include the standard human and physical capital interactions of a country's factor endowments and industry intensity requirements (Romalis, 2004). We also control for the interaction between domestic credit and standardization of the industry as an additional Heckscher-Ohlin force.

Our result is robust to using adoption of Enterprise Resource Planning (ERP) systems as an alternative measure of monitoring problems. ERP software allows headquarters to acquire relevant information of the production process in real time and, thus, better monitor production (see Bloom et al., 2011, for more details). We find that the effect of IT adoption on the number of M&As is larger in those industries with lower use of ERP (i.e., more monitoring problems). Since the adoption of ERP software is endogenous, we also use an instrumental variable approach. We obtain the same qualitative results when we instrument the adoption of ERP systems with the routineness of the industry.

As an additional check, we use Internet penetration rates as an alternative measure of IT adoption. Penetration rates measure the speed of diffusion of Internet after adjusting for country size and income. This ensures that they are comparable across countries and informative about the underlying diffusion process (see Comin and Mestieri, 2010, for more details). We show that our result holds when using this alternative measure of IT adoption instead of Internet users.

We also show that our measure of IT infrastructure is not a proxy of aggregate productivity or output by controlling for their interaction with routine intensity. Another concern could be that our measure of IT adoption may be a proxy of other institutions. We show that our coefficient of interest holds when we add the interaction between property rights institutions with routine intensity. The result is also robust to the inclusion of the interaction with contracting institutions.

Finally, our theoretical framework generates additional predictions that also hold in the data. First, it predicts that industries with less monitoring problems (more routine-intensive) should have relatively more mergers. We show that this is indeed the case. Second, it predicts that the routine intensity of the marginal industry receiving a merger decreases as IT technologies diffuse within a country. We show that there exists a negative correlation between the routineness of new industries receiving mergers and the diffusion of Internet adoption.

Related Literature This paper is related to different strands of the literature. A vast literature on organizational economics followed the seminal work of Williamson (1975) on the nature of the firm. The make-or-buy decision has also been studied in the context of multinational firms. For example, Antràs (2003) and Antràs and Helpman (2004 and 2008) use the incomplete contracts approach of Grossman and Hart (1986). In our model, we assume that the rents of the supplier come from a moral hazard problem in the production of tasks. In the empirical section, we use the routine index of Autor and Dorn (2009), which measures the tightness and standardization of the production process, as a proxy of how hard-to-monitor an industry is. The closest paper to our work is Costinot et al. (2011). They use the routineness of an industry as a proxy for contractibility and show that intrafirm trade tends to be higher in less routine intensive industries. One difference is that they use the importance of problem solving as a measure of routineness. In addition, we are interested in the effect on mergers.

A small but growing literature has studied the relationship between mergers and trade. On the empirical side, for example, Breinlich (2008) studies the effects of NAFTA on mergers and shows that there is no robust link between tariff reductions and the number of cross-border M&As. On the theoretical side, Neary (2007) shows that trade liberalizations can trigger international (horizontal) merger waves. More recently, Nocke and Yeaple (2007 and 2008) analyze the choice between mergers and greenfield investment. However, they do not study how this choice is affected by the IT revolution. Our contribution to this literature is to link the adoption of IT with the relative benefit of acquiring a firm.

Antràs et al. (2006a and 2006b) and Bloom et al. (2011) among others study, both theoretically and empirically, the effects of reductions in communication costs (IT revolution) on the internal organization of the firm. Fort (2012) shows that communication technologies usage is a predictor of production fragmentation and offshoring. To the best of our knowledge, our paper is the first study on how the IT revolution has changed the incentives to engage in M&As.

The next section develops a model to guide the empirical section. Section 3 discusses our data. Section 4 presents the main empirical results and Section 5 shows the robustness checks. The concluding remarks are in Section 6.

2 Theoretical Framework

The main goal of this section is to lay out a theoretical framework that guides our empirical exercise. We develop a stylized model of organizational choice of upstream production. The model provides a micro-foundation of monitoring costs and analyzes how the number of mergers is affected by industry characteristics and IT adoption.

We consider a North-South economy. There is one Northern country and $c = 1, \ldots, C$ Southern countries. There are $s = 1, \ldots, S$ industries. A final good producer (or headquarters) wants to produce abroad a measure $N_s \geq 0$ of differentiated input varieties within each industry s. The final good producer combines input varieties into a final good. Intermediate input production can be located in any country, while final good production is located only in the

North.[8]

We are interested in analyzing the organizational choice of a final good producer. The final good producer can choose between two organizational modes $X \in \{M, O\}$. It can either acquire an existing intermediate supplier (M&A) denoted by M-organization, or it can choose some other organizational form, denoted by O-organization. This alternative organizational mode subsumes the best alternative between greenfield investments and arm's length contracting. We choose this classification to emphasize that our focus and results are on mergers and acquisitions.

Production Function.– Labor is the only factor of production. In order to produce an input, a worker has to perform $\mathcal{T}$ complementary tasks in a given firm. Production is carried out by assembling tasks in a Leontief fashion. That is, all tasks need to be performed successfully by a worker in order to produce the input. Formally, a worker employed in firm j produces $a(j) \min_{t\in\mathcal{T}} q(t)$, where $a(j)$ denotes the labor productivity of firm j and $q(t)$ takes the value of 1 if task t is performed successfully and 0 otherwise.

Agency Problems.– When an agent performs a task $t \in \mathcal{T}$, he can choose whether to exert high (H) effort at a cost $e(c)$ or low (L) effort at no cost. We allow the effort cost $e(c)$ to differ across countries to capture differences in supply of human capital, institutional arrangements, etc. Effort is not observable by the headquarters, while the output produced in a given task is observable.

Headquarters have access to a monitoring technology. This technology allows headquarters to detect when an agent exerts low effort with probability $\pi(c, X)$. Upon detection of shirking, a penalty proportional to the effort cost $\alpha e(c)$ can be imposed, $0 \leq \alpha \leq 1$.

The role of routineness.– A central premise of the paper is that industries differ on how verifiable their production is. Both in this model and in our empirical exercise, we capture this idea by having heterogeneous tasks across industries. Tasks differ in how closely they follow tight and standardized procedures.[9] Tasks can either be "standardized," in the sense that they follow tight and standardized procedures, or discretional. The difference between standardized and discretional tasks is that it is easier to infer whether high effort was exerted in standardized tasks than in discretional tasks.

For simplicity, in the main text, we assume that effort can be perfectly inferred from observing task output in standardized tasks, while this is not the case for discretional tasks.[10] If an agent exerts high effort in a discretional task, the probability of output being usable

[8] We abstract from transportation costs. As it will become clear in what follows, our results hold if there exists an iceberg transportation cost τ for shipping to the North. To see that, re-scale the productivity measure a to a/τ, and all the stated results hold for the re-scaled productivity.

[9] As it will become apparent in Section 3, this modeling choice is motivated to draw a connection with the Routine Task Intensity index, which measures how closely a task follows tight and standardized procedures.

[10] In Appendix B we relax the stark separation between standardized and discretional tasks. We allow for tasks to differ in their probability of being caught shirking in a continuous manner, $\pi(t, c, X)$, rather than having only two levels. We show that our results hold in this generalized set-up.

for production is p_H. If the agent exerts low effort, the probability is $p_L(< p_H)$. We assume that agents and headquarters are risk neutral and normalize their outside option to zero. We assume that it is optimal for the headquarters to induce high effort in all tasks.[11] Appendix A shows that the payment offered to induce a worker to exert high effort in a given task is $e(c)(1-\alpha\pi(c,X))/(p_H-p_L)$. As workers are paid their outside option for standardized tasks (which is normalized to zero),[12] a worker in an industry with $\mathcal{D}$ discretional tasks is paid

$$\mathcal{D}e(c)\frac{1-\alpha\pi(c,X)}{p_H-p_L}. \tag{1}$$

Note that the payment to a worker (1) is increasing in the number of discretional tasks $\mathcal{D}$ and decreasing in the probability of detecting shirking, $\pi(c,X)$.

As we already discussed, a central premise of the paper is that industries differ on how verifiable production is. We capture this idea by denoting the number of discretional tasks performed in industry s be $\mathcal{D}=\mathcal{T}-s$. That is, we link the industry index s to the number of standardized tasks in the industry. Motivated by the fact that the Routine Task Index used in the empirical section measures how closely a task follows tight and standardized procedures, we label the industry index s as the *routineness* index of an industry. Thus, the result we derived in equation (1) that payments to workers are increasing in the number of discretional tasks can be re-stated as saying that payments are decreasing in the rountineness index s.

Defining the following notation,

$$w_c \doteq e(c), \tag{2}$$

$$R(s,c,X) \doteq \frac{\mathcal{T}-s}{p_H^{\mathcal{T}-s}}\cdot\frac{1-\alpha\pi(c,X)}{p_H-p_L}, \tag{3}$$

the expected cost of producing one unit of output in a firm with productivity $a(j)$ is

$$\frac{R(s,c,X)w_c}{a(j)}, \tag{4}$$

where we can interpret w_c as the marginal cost of effort and $R(s,c,X)$ as the mark-up paid by the headquarters to ensure high effort.[13] In other words, the final good producer has to pay rents to ensure the supply of inputs. In our context, this captures that monitoring production is imperfect and, thus, some rents have to be shared with suppliers. These rents are decreasing in the routineness index s.

Organizational Choices.– There is a technological difference between M- and O-organizations.

[11] Appendix A derives a sufficient condition for having high effort being always optimal. This boils down to the difference p_H-p_L being larger than a threshold and the expected penalty not being arbitrarily large.

[12] Appendix B departs from this zero-normalization and presents a model in which each task is paid a positive amount to derive the same results as in the main text.

[13] As long as $e(c)>p_H$, $R(s,c,X)>1$.

If the final good producer decides to acquire an input supplier, it inherits its productivity. For each industry and country, we assume that there is a mass one of potential suppliers with productivity $a \sim F(a)$, with a continuously decreasing probability density function and support $a \in [\underline{a}, \overline{a}]$, $\overline{a} \leq \infty$. This nests, amongst others, the Pareto and exponential distributions.[14] Finally, if the headquarters engage in an O-organization, they can either use their in-house productivity, $a(s, O)$, to produce an input in industry s or they can decide to inherit the productivity of the supplier. The former case can be interpreted as a greenfield investment in which headquarters use their in-house technology. The latter can be thought of an arm's length relationship in which the productivity is inherited from the supplier contracted.[15] Thus, we let the O-organization be the best competing alternative to M&As.

Organization and location choice.– The expected production cost per unit of output in industry s, country c and input j under organization X is

$$\kappa(s, c, X, j) \equiv \frac{R(s, c, X) w_c}{a_{scj}(X)}, \tag{5}$$

where w_c is the price of labor in country c and $a_{scj}(X)$ is the productivity of the supplier of the jth input.The final good producer wants to minimize the production costs for each intermediate input used in production. Note that the choice of the set of locations and organizational modes is independent of the amount demanded of each particular intermediate. Hence, the location-organization choice problem can be solved independently, without specifying the demand for each particular intermediate in each industry. The final good producer chooses the country of origin and the organizational form for each intermediate according to

$$\begin{aligned} & \min_{\{m(s,c,O), a(s,c,M)\}} \quad \int_0^1 ds \int_0^{N_s} dj \sum_{c,X} \kappa(s, c, X, j) \qquad \text{s.t.} \\ N_s &= \sum_{c=1}^{C} \{m(s, c, O) + 1 - F(a(s, c, M))\}, \qquad (6) \\ m(s, c, O) &\geq 0, \quad a(s, c, M) \geq 0 \qquad \forall s \in S, \ c \in C, \end{aligned}$$

where $\kappa(s, c, X, j)$ is defined in (5), j indexes intermediates used in production and $m(s, c, O)$ is the mass of intermediates in industry s and country c produced with an O-organization. Finally, $a(s, c, M)$ denotes the productivity threshold of firms with an M-organization in country c and industry s, so that $1 - F(a(s, c, M))$ is the mass of intermediates produced in country c and industry s under an M-organization.

Two comments on the location-organizational choice problem (6) are in order. First, to

[14] Pareto distributions provide a good description of productivity distributions (e.g., Eaton et al., 2011, for France).

[15] In the case that productivity is inherited from the contracted supplier, the pool of potential suppliers coincides with the pool of potential targets for a merger.

characterize the solution, it suffices to specify two objects for each country c and industry s: *(i)* the productivity threshold above which firms are acquired and *(ii)* the mass of intermediates produced under an O-organization. These two thresholds pin down the total number of intermediates in industry s produced in country c, $m(s,c,O) + 1 - F(a(s,c,M))$. Note also that thresholds enter directly the objective function because they determine the range of intermediates produced in country c and industry s.[16] The second remark is that the organizational choice problem (6) consists of s separate problems, one for each industry. So, the problem could be specified separately for each industry s (and the outer integral in s be dropped).

The solution to this problem is given by a threshold cost $\bar{\kappa}(s)$ for each industry, such that all intermediates in industry s are produced at a lower or equal cost. For example, suppose that in industry s there are O-organizations in country 1, and mergers in countries 1 and 2, then

$$\bar{\kappa}(s) = \frac{R(s,1,O)w_1}{a(s,O)} = \frac{R(s,1,M)w_1}{a(s,1,M)} = \frac{R(s,2,M)w_2}{a(s,2,M)}. \tag{7}$$

Before turning to the study of the IT revolution and its testable implications, note that with the structure we have imposed on the role of routineness, we have already one testable prediction stemming from the hypothesis that industries differ in monitoring costs. (The proofs of all results are in Appendix A).

Result 1 *Ceteris paribus, the number of M&As is increasing in the routineness, s, of the industry in each Southern country.*

This result is intuitive. It states that industries with higher routine indexes (low monitoring costs) should have more mergers than industries with low routine indexes. This result is a direct consequence from the assumption that more routine industries have to incur lower monitoring costs because they have a lower share of discretional tasks. Thus, ceteris paribus, it cannot be that in a given Southern country there are more mergers in a low routine industry than in a high routine industry.

[16] The exact expressions are

$$\begin{aligned}
\int_0^{N_s} \kappa(s,c,O,j)\mathbb{1}_{j\in\{s,c,O\}}dj &= \hat{m}(s,c,O)\frac{R(s,c,O)w_c}{a_s(O)} + \int_{a(s,c,O)}^{\infty} \frac{R(s,c,O)w_c}{a} f(a)da, \\
\int_0^{N_s} \kappa(s,c,M,j)\mathbb{1}_{j\in\{s,c,M\}}dj &= \int_{a(s,c,M)}^{\infty} \frac{R(s,c,M)w_c}{a} f(a)da,
\end{aligned}$$

where the indicator function $\mathbb{1}_{j\in\{s,c,X\}}$ denotes whether the jth intermediate is produced under {s,c,X}, $\hat{m}(\cdot)$ denotes the mass of firms set-up with in-house technology, $a_s(O)$ and $a(s,c,O)$ denotes the productivity level of the least productive firm that has received an arm's length contract.

2.1 The IT Revolution and Testable Implications

We frame the IT revolution as an improvement in the capabilities of the final good producer to monitor the production process of the supplier. For example, headquarters may acquire more easily relevant information on the production process in real time –as with the adoption of ERP software. Thus, our assumption is that the IT revolution reduces monitoring costs.

Assumption 1 *Let i denote the level of IT adoption. The probability of detecting shirking in country c and organizational choice X, $\pi(c, X; i)$, is increasing in i. That is, the monitoring technology becomes more efficient as IT diffuses.*

Improvements in the monitoring technology translate in reductions in the rents paid to suppliers. Formally, from equation (3) we see that rents paid under any organizational form $R(s, c, X; i)$ weakly decrease with i. Note that in our exercise we take the level of IT as a country characteristic, capturing the IT infrastructure of the country and, thus, exogenous to firms' choice. This assumption has the following testable implication.

Result 2 *Ceteris paribus, the routineness of industries receiving mergers for the first time is decreasing in i in each Southern country. In other words, industries starting to receive mergers as the IT revolution diffuses are harder-to-monitor (less routine intensive).*

This result relates to the extensive margin of the organizational choice. It states that as a country increases its level of IT adoption, if new industries start having mergers, these industries have higher monitoring costs (and lower routineness indexes) than the old industries which already experienced mergers. Thus, the routineness of the marginal industry receiving mergers is lower than the routineness of industries that already received mergers.

Finally, our micro-foundation for the rents paid $R(s, c, X; i)$ delivers an additional result. There is a negative complementarity between the routineness index s and the IT adoption index i. That is, industries that are harder-to-monitor (i.e., with a lower routineness index) experiment relatively larger gains from IT adoption. The intuition is that, in harder-to-monitor industries, there are more tasks that need to be monitored. Hence, an improvement in the monitoring technology is more beneficial in these industries. Formally, this is captured in the negative "cross partial" between s and i in (3).

While our theoretical framework presents, in our view, a compelling reason for this complementarity to exist, this is ultimately an empirical question. The following result presents a testable prediction of our theoretical prediction (in conjunction with Assumption 1).

Result 3 *Ceteris paribus, Southern countries with better IT infrastructure (higher i) receive relatively more M&As in harder-to-monitor (less routine-intensive) industries.*

This result is the most salient empirical prediction of our theoretical framework. It embeds the complementarity between the routineness of an industry and the IT revolution generated by our task-based approach. Result 3 informs us on how the relative number of mergers changes across industries and countries with the IT revolution. The result states that the increase in the number of mergers will be relatively higher in industries with more monitoring problems (i.e., those with a lower routineness index). The intuition for the result comes from the complementarity between monitoring tasks and the IT revolution: industries with more monitoring problems benefit relatively more from the IT revolution. Finally, note that this result is independent of any other organizational form, as it compares the *number of M&As* across industries in a given country.

3 Data Description

In order to test the empirical predictions of the model we need data on *(i)* North-South vertical mergers and acquisitions, *(ii)* routineness measures at the industry level and *(iii)* IT adoption.

We obtain data on mergers and acquisitions from SDC Thomson Platinum. This the most comprehensive data set on mergers and acquisitions publicly available. For each merger we know the country and 4-digit SIC codes of both the acquirer and the target, the share owned after the acquisition and a description of the primary business of each firm.[17] In our sample we have 3929 North-South M&As between 1990 and 2000.

We define a merger as vertical if *(i)* the 4-digit SIC codes of the acquirer and the target firm are different and *(ii)* the SIC codes of these industries are linked through the 1997 direct requirements U.S. Input-Output table.[18] By using this definition we find that a third of all North-South mergers and acquisitions are vertical. Figure 1 represents the main Southern recipients of Northern M&As. Brazil and India are the two countries which received the highest number of vertical mergers from the North. Figure 2 shows the distribution of the number of M&As by country and industry, which has an average of 5.5.

We build a measure of routineness at industry level using the routine task intensity index (RTI) constructed by Autor and Dorn (2009). The RTI index is constructed from the Dictionary of Occupational Titles. Each occupation is mapped to a task and each task is assigned a score along three different dimensions of its characteristics (routine, manual and abstract). The RTI index proposed by Autor and Dorn (2009) is the ratio of the routine score relative to the manual score. Their interpretation is that workers in RTI-intensive occupations are

[17] We only consider mergers in which the share owned after M&As is larger than 50 per cent. This restriction eliminates very few mergers. Our empirical results do not hinge on excluding these observations. Other data are available. For example, the value of transaction, target stock price and book value. We disregard these data because it is only available for a tiny fraction of our observations.

[18] The definition of vertical merger is similar to the procedure used in Alfaro and Charlton (2009), Atalay et al. (2013) and Ramondo et al. (2012).

required to follow tighter and more standardized procedures. Table 1 reports the most and least routine-intensive occupations from the raw data of Autor and Dorn (2009). Occupations related with transportation are the least routine-intensive and secretaries, banks tellers and pharmacists are the most routine-intensive occupations. We then aggregate these jobs at industry-level (3-digit NAICS) using U.S. Census data. Table 2 ranks the 21 manufacturing industries by routine intensity. The industries with less routine tasks are apparel and wood products and the industries with more routine tasks are machinery and fabricated metal products. Table 3 reports the industries that received the highest number of mergers in 1990 and 2000. From this table we can see that the top industries in the two years are similar. However, the average routineness of the top industries was higher in 2000.

We are not the first to use a routine index. Autor et al. (2003) used the notion of routineness to study the effect of computerization on labor demand. In the international trade literature, Blinder (2006), Grossman and Rossi-Hansberg (2006) and Basco and Mestieri (2013), among others, argue that routineness is a common characteristic of jobs that have become offshorable after the reduction in communication costs. Oldenski (2011) uses firm-level data and she finds that the most routine jobs are the most likely to be offshored. Costinot et al. (2009) use routineness as an indirect proxy for contractibility.[19] They argue that the more routine a task is, the more predictable it is and, thus, the less non-contractible problems arise. We use our routine index as a proxy for monitoring problems. The assumption is that the more routine a task is, the more standardized the production process is and, thus, the less monitoring is needed.

We also use adoption of Enterprise Resource Planning (ERP) systems as an alternative measure of monitoring problems. The adoption of ERP systems has allowed managers to better monitor their supply chain by having access to relevant information of the production process, including production, inventory and finance. Accordingly, our assumption is that industries with higher adoption of ERP systems will have less monitoring problems. We construct our measure of ERP adoption at industry level from the firm level data of Bloom et al. (2011).[20] Bloom et al. (2011) give a score between 0 and 1 to each firm as a function of their level of ERP adoption. The industries with the highest ERP adoption are petroleum and coal products (.56) and chemicals (.54). The industries with the lowest ERP adoption are apparel (.23) and textile product miles (.25). The mean ERP adoption for all manufacturing industries is .43 and the standard deviation is .09. The correlation between our measure of ERP adoption and routineness is .57. This suggests that ERP adoption has happened in

[19] Costinot et al. (2009) create an alternative index of routineness from the Occupation Information Network. The measure they propose for routineness is "problem solving" and, hence, different from Autor and Dorn (2009). For our purposes, we think that the measure proposed by Autor and Dorn (2009) is a better proxy of monitoring problems.

[20] To do the crosswalk from SIC to NAICS we use employment weights according to the U.S. Census Bureau when the matching is not one-to-one.

routine intensive industries, where tasks tend to be more codifiable and, presumably, easier to monitor by computer software.

Our baseline IT adoption measure is Internet users per hundred people from the WDI (World Bank). This measure has the advantage that it is one of the most extensive Internet adoption variables available for Southern countries. We think of this measure as being a proxy for the IT infrastructure in place. In order to maximize the number of observations, our preferred measure is Internet users in 2000.[21] For the Southern countries experiencing a Northern merger in our sample, the mean number of Internet users (per 100 people) is 3.92 and the standard deviation is 6.73. The values of this variable for the top-5 host countries are Brazil (2.87), India (.54), China (1.78), Mexico (5.16) and Poland (7.28). As a reference, in the United States this number is 43.1.

Finally, as an alternative measure of IT adoption, we use Internet penetration rates from Comin and Mestieri (2010). The penetration rate is a measure of the slope of the diffusion curve of Internet relative to the U.S., hence, it can be interpreted as a speed of diffusion. This measure is constructed so that speeds of diffusion are comparable across countries. In particular, the effects of country income and size are filtered, so that this measure is only informative about the underlying diffusion process. If a country has the same speed of diffusion as the U.S., this measure would be one, while if it is less than the U.S., it would be between zero and one. In our sample, we have that the slowest adopter is Guinea, with 3% of the speed of the U.S., and the U.S. is the fastest adopter. The average penetration rate in Southern countries is 29% and the standard deviation is 11%. The drawback of this measure is that we only have data for around 40% of the countries in our data.

4 Estimation Results

In this section we test the three predictions derived from our theoretical framework. We begin by testing Results 1 and 2. Then, we test our main result, Result 3, which embeds the complementarity result between the IT revolution and routineness of an industry derived in Section 2.

4.1 Testing Result 1

We first study the prediction that vertical North-South mergers should be increasing in the routineness of the industry. In order to do that, we consider the following count regression

$$\mathbb{E}(M\&A_{sc}) = \exp(\alpha \cdot RTI_s + \gamma \cdot X_s + \theta \cdot X_{sc} + \delta_c), \quad (8)$$

[21] We check that our results do not hinge on selecting year 2000 in particular. We obtain the same qualitative results using earlier dates (even though the number of countries for which we have data decreases substantially).

where $M\&A_{sc}$ is the number of vertical M&As from the North to Southern country c in industry s between 1990 and 2000, RTI_s is routine intensity of industry s, X_s are industry characteristic variables, X_{sc} are exports of country c in industry s and δ_c are country fixed effects.

Table 4 reports the coefficients of running equation (8) using a negative binomial regression.[22] The first column only includes routineness as control variable. The coefficient is positive and statistically significant. In the second column we add country fixed effects. The coefficient remains positive and significant. In the third column we add exports as control variable. The routineness of the industry remains significant. Moreover, the coefficient on exports is positive. It means that countries are more likely to receive a merger in those industries with more exports. Finally, columns (4) and (5) add other industry variables to the regressions reported in columns (2) and (3). These industry variables are: dependence on external funding, asset tangibility, human capital intensity and physical capital intensity. The coefficient on routineness is positive and significant in these specifications too.

To summarize, the results reported in Table 4 show that the routineness index of Southern industries is positively correlated with the number of M&As from Northern firms in that industry. This is consistent with the first prediction of our theoretical framework.

4.2 Testing Result 2

In this subsection we test the second result of our theoretical framework. Result 2 states that the routineness of new industries experiencing mergers declines with the diffusion of the IT revolution.

Let $[\underline{s}_{ct}, \bar{s}_{ct}]$ denote the set of industries in which country c has some mergers at time t. Recall that s is an industry index that is increasing in the routineness of the industry. Result 2 implies that the lower bound $\underline{s}_{ct}$ is declining as IT diffuses over time. We take the minimum RTI among all industries receiving M&As in a given country and year as a measure of the lower bound $\underline{s}_{ct}$.

To test Result 2, we run the following regression

$$\min RTI_{ct} = \alpha + \beta \cdot Internet_{ct} + \delta_c + \delta_t + \varepsilon_{ct}, \tag{9}$$

[22] We prefer a Negative Binomial regression to a Poisson regression as our baseline specification in all of our count regressions. The reason is that a Negative Binomial regression does not impose that the mean and the variance of the process coincide -which we would be imposing by fitting a Poisson. Indeed, the Poisson regression is subsumed as a particular case of the Negative Binomial regression. We note that if we estimate Poisson regressions as our baseline specification, we obtain similar and significant coefficients as well. The Poisson regression has the advantage that it avoids the "incidental parameters problem" when using fixed effects and yields consistent estimators. This is not guaranteed with the negative binomial regression. However, we follow the procedure described in Allison and Waterman (2002) of estimating an unconditional negative binomial regression with dummy variables, which they find to not generate the "incidental parameters problem" in their simulations. Finally, we have also verified that our results hold when running linear regressions with fixed effects instead of count regressions.

where $\min RTI_{ct}$ is the minimum RTI by country and year, $Internet_{ct}$ is yearly predicted Internet Adoption at the country level and δ_c and δ_t denote country and year fixed effects. We use predicted Internet Adoption from an estimated time trend to circumvent the lack of country time series data for the period 1990-2000.[23] The prediction of Result 2 is that $\beta < 0$. Column (1) in Table 5 reports the coefficient β of running (9). We find β to be negative and statistically significant, consistent with Result 2.[24]

As a complementary exercise, we analyze the country-specific trend on $\min RTI_{ct}$ for the top-five host countries in the following regression

$$\min RTI_{ct} = \beta_c \cdot Internet_{ct} + \delta_c + \varepsilon_{ct}. \tag{10}$$

Columns (2) to (6) in Table 5 report the country-specific trend coefficients of IT adoption, β_c. In accordance with Result 2, we find the coefficients of IT adoption to be negative for all five countries. The coefficient is significant for Brazil, India, China (top-3 countries), significant at 10 percent for Poland and not significant for Mexico.[25]

4.3 Testing Result 3

We test our main empirical result in this subsection. Result 3 states that the effect of the IT revolution on the number of M&As is higher in industries with high monitoring costs (i.e., with low routine intensity). In Section 5, we perform additional robustness checks.

We formally test this result by investigating the sign of the interaction between Internet adoption and industry routineness in the following regression

$$\mathbb{E}(M\&A_{sc}) = \exp(\beta \cdot IT_c \cdot RTI_s + \theta \cdot X_{sc} + \gamma \cdot X_s \cdot X_c + \delta_s + \delta_c), \tag{11}$$

[23] For example, we have more than 5 years of observations for only a third of the countries in our sample. Predicted Internet Adoption is obtained from a linear regression of Internet and a year trend with country fixed effects,

$$Internet_{ct} = \gamma \cdot year_t + \delta_c + \varepsilon_{ct}.$$

Each observation is weighted by the number of observations by country. We note that the unweighted regression delivers similar results.

[24] We also find a negative and significant β if, instead of using year fixed-effects, we use a time trend and run the regression $\min RTI_{ct} = \alpha + \beta \cdot Internet_{ct} + \gamma \cdot year_t + \delta_c + \varepsilon_{ct}$.

[25] We choose not to pursue the analysis of regression (10) for more than the top-five host countries. The reason is that the sparseness in the data can be problematic to make inference on the ranking of the industries receiving M&As. For our approach to be informative, we require a large number of mergers in each country and each year, so that each country-year observation is representative. In this case, a merger in a new industry is informative of whether or not the range of industries experimenting M&As is expanding. Unfortunately, for most of our country-year pairs we have a low number of observations at the country-year level and data sparseness is a concern. For this reason we focus on the top-five receivers of mergers, for which we have a sizable amount of data. If we extend our analysis and run individual regressions from the top-six to the top-ten receivers (the Czech Republic, Hungary, Argentina, Malaysia and South Africa), we find a negative but not significant relationship.

where $M\&A_{sc}$ is the number of vertical M&As from the North to Southern country c in industry s between 1990 and 2000, IT_c is IT adoption in country c, RTI_s is routine intensity of industry s, X_s, X_c, X_{sc} are industry, country and industry-country varying control variables and δ_s and δ_c are industry and country fixed effects.[26] We have data for the 21 3-digit NAICS industries and 60 Southern countries.[27] Result 3 implies that $\beta < 0$. It means that the effect of IT adoption on mergers is decreasing with the routine intensity of the industry.

Table 6 reports the coefficients of running equation (11) using a negative binomial regression. Column (1) reports our baseline regression. The coefficient is negative and statistically significant.[28] It means that the effect of IT adoption on the number of mergers a country receives is decreasing with the routine intensity of the industry. That is, a country with better Information Technologies will receive relatively more mergers in low routine-intensive industries.

The coefficient is also quantitatively important. If Internet users in a country raise from the 25th to the 75th percentile of the Internet distribution, the increase in the number of mergers in the industry belonging to the 25th percentile of the RTI distribution (non-metallic products) would be 29% higher than the industry in the 75th percentile (computer and electronics).[29]

Standard trade theory predicts that countries should export goods that intensively use the factor in which the country is relatively abundant. Therefore, to the extent that part of this trade is done through affiliates that have been acquired, we should control for these Heckscher-Ohlin effects. Column (6) includes the capital and human capital interactions of Romalis (2004). These are interactions between country's factor endowments and industry factor requirements. We also include a domestic credit interaction. This is the interaction between financial development and R&D-intensity of the industry. We include this interaction because the trade literature has also emphasized the importance of financial development as a source of comparative advantage.[30] The first thing to notice is that our coefficient of interest

[26] We pool the data by country and industry and do not exploit the time variation because we lack enough observations to do a regression analysis at the country-industry-year level. We prefer the negative binomial specification as our baseline specification as discussed in Section 4.1, Testing Result 1.

[27] The list of Southern countries receiving, at least, one vertical merger and acquisition from the North in our dataset is: Algeria, Argentina, Brazil, Bulgaria,Cambodia, Chile, China, Colombia, Congo, Costa Rica, Croatia, Czech Republic, Dominican Republic, Ecuador, Egypt, Estonia, Gabon, Ghana, Greece, Haiti, Hungary, India, Indonesia, Jamaica, Jordan, Kazakhstan, Latvia, Lithuania, Malaysia, Mexico, Morocco, Mozambique, Netherlands Antilles, Niger, Nigeria, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Poland, Puerto Rico, Romania, Russia, Saudi Arabia, Slovakia, South Africa, Sri Lanka, Taiwan, Tanzania, Thailand, Tunisia, Turkey, Ukraine, Uruguay, Uzbekistan, Venezuela, Vietnam, Zambia and Zimbabwe.

[28] The standard errors are clustered by industry. Our results remain if we cluster by country.

[29] Note that the prediction of our model is on the number of M&As and not directly on intrafirm trade. Recently, Ramondo et al. (2012) have documented that less than 30 percent of affiliate sales are shipped within the firm for U.S. multinationals. Our theoretical framework focuses on the organizational form and abstracts from the volume of intrafirm trade. Thus, our theoretical framework is silent on this dimension (as is our empirical setup, because we do not have the necessary data to explore this question).

[30] See, for example, Antràs and Caballero (2007), Basco (2012), Carluccio and Fally (2012), Kletzer and Bardhan (1987) and Manova (2007). Basco (2012) considers the same interaction.

remains negative and significant. For the other control variables, only the domestic credit term is positive and significant. It means that countries with more developed financial institutions receive relatively more mergers in R&D-intensive industries.

A first concern is that we do not control for openness to trade of the country or the intrafirm trade in that industry. That is, if a country does not export in a given industry (maybe because there is no production or trade costs in that industry are very high) is not very likely that a Northern country would consider to acquire a Southern company. Similarly, the existence of intrafirm trade in an industry may affect the choice of Northern headquarters. Columns (2) and (7) include exports of each Southern country to the North at industry level to the baseline regression, with and without Heckscher-Ohlin effects, respectively. These data come from the Feenstra database. Note that the coefficient of interest remains negative and significant. Moreover, as anticipated, the coefficient on exports is positive and significant. Therefore, industries that export to the North are more likely to be acquired in a vertical merger.

Columns (3) and (8) repeat the same regressions with related-party exports to the United States instead of total exports. We would like to have related-party exports to the world disaggregated at the industry level, but we do not have access to these data. The assumption is that the ranking of industries with more intrafirm trade in each Southern country would be the same as in the U.S.. We obtain these data from the U.S. Census. Note that the coefficient of interest remains negative in both columns. The coefficient on both related-party exports and the share of the intrafirm trade is positive and significant. Finally, columns (4) and (9) includes the share of related-party exports to the United States (over total exports to the United States) by industry as control variable. The coefficient of interest remains negative and significant. The coefficient of the share of related-party exports is positive in both columns. It implies that countries are more likely to receive vertical mergers in industries with more intrafirm trade.

A related concern is that we should also consider capital inflows, in addition to exports, to these Southern countries. Unfortunately, the available disaggregated data are scarce. Columns (5) and (10) include capital outflows from United States to each Southern country and industry. Notice that the number of observations falls considerably. Thus, these results should be taken with a grain of salt. Nonetheless, the coefficient of interest remains negative and significant. The coefficient of exports also remains positive and significant. The coefficient on capital inflows is negative and significant at 10% in column (5) and not significant when we also add Heckscher-Ohlin terms (column 10).

5 Robustness Checks on Result 3

This section performs several alternative robustness checks and two placebo tests on our main result.

Alternative Measure of Monitoring Problems Our interpretation of the baseline results is that IT adoption has allowed headquarters to better monitor suppliers. We use routineness as a proxy of monitoring problems because it is, arguably, an exogenous characteristic of the tasks required in an industry. However, one could argue that routineness may proxy for other industry characteristics. In order to address this concern, we use the adoption of Enterprise Resource Planning (ERP) systems from Bloom et al. (2011) as an alternative measure of monitoring problems. As discussed in Section 3, the adoption of these systems allows headquarters to obtain information of production, deliveries, stocks, financial figures and failures of machines. Our assumption is that, ceteris paribus, monitoring is relatively more efficient in industries where the usage of ERP systems is higher. Columns (1) to (10) in Table 7 repeat all our baseline regressions using adoption of ERP systems instead of routineness as a proxy for monitoring problems. In all ten specifications the interaction between adoption of ERP and Internet adoption is negative and significant (in columns 6 to 9, it is significant at 10%).

Finally, we also repeat the analysis for Results 1 and 2 using ERP adoption as a measure of monitoring costs. Tables 8 and 9 show that our baseline results also hold in this case.

Instrumenting the Monitoring Channel The adoption of ERP systems is an endogenous choice. In order to address this concern, we instrument ERP adoption with the routineness of the industy. The logic behind this argument is that industries that are more routine intensive are more likely to benefit from computerized monitoring. Column (11) in Table 7 shows that the interaction of ERP with IT adoption remains negative and significant after being instrumented by the interaction of RTI and IT adoption. Columns (12) and (13) show that this remains the case after controlling for exports and Heckscher-Ohlin effects. Overall, we conclude that, consistent with our theory, the effect of IT adoption on the number of M&As is higher in industries with more monitoring problems (less usage of ERP system).

Alternative Measure of IT Adoption Next, we conduct robustness analysis on our measure of IT adoption. A possible concern is that Internet users is not a good proxy for IT adoption. To address this concern, we take the penetration rates estimated in Comin and Mestieri (2010) as an alternative proxy for IT adoption (see description in Section 3). Table 10 reports all baseline regressions discussed in Section 4 using the penetration rate as a measure of IT adoption instead of Internet users. The interaction term between IT adoption and routineness remains negative and significant in all specifications.[31]

Output One concern is that richer Southern countries tend to have mergers in industries with some other characteristics that are correlated with our measures of monitoring costs. In order to address this concern, column (1) of Table 11 adds the interaction of production (from Hall and Jones, 1999) and routineness to our baseline regression. Note that the interaction between IT adoption and routineness remains negative and significant. However, the interaction with production is not significant.

Productivity Similarly, it could be argued that more technologically advanced countries tend to receive mergers in industries with some other characteristics that are correlated with our measures of monitoring costs. We use total factor productivity (TFP) as an indirect measure of the technological level of a country. We obtain TFP data at country level from Hall and Jones (1999). Column (2) of Table 11 includes the interaction between technology and routineness. Our interaction on the variable of interest remains negative and significant. Note also that the interaction with total factor productivity is not significant.

Institutions Following the theoretical work of Antràs (2003), a growing empirical literature, which includes Bernard et al. (2010) and Nunn (2007), has attempted to test the role of contracting institutions in intrafirm trade. Moreover, La Porta et al. (1998) and Rossi and Volpin (2005) among others emphasize the importance of property rights institutions on mergers activity and concentration of ownership. Therefore, it could be argued that our measure of IT adoption is a proxy for other institutions. In order to address these concerns, column (3) adds the interaction between rule of law and RTI to the baseline specification. Analogously, column (4) includes the interaction between constraints on the executive and RTI. Following the terminology used in Acemoglu and Johnson (2005), column (3) controls for contracting institutions and column (4) controls for property rights institutions. Note that in both columns the coefficient of interest remains negative and significant. Moreover, the interactions with contracting and property rights institutions are not statistically different from zero.

Placebo Tests Finally, we perform two placebo tests. The prediction of our model is that the adoption of IT in the South has enabled Northern headquarters to better monitor Southern suppliers. This is the reason why we focused on vertical North-South mergers. However, one could ask whether we would obtain the same result if we had considered horizontal mergers. If that were the case, it would weaken our interpretation of the results, because it is not clear that our monitoring theory of the production chain applies for horizontal mergers. Similarly,

[31] We also conduct an additional robustness check. We use data on Internet users at the beginning of the sample period and in 1995 rather than in year 2000. Our results also hold in this case.

we have studied North-South mergers because we emphasized, consistent with the related literature, that agency problems are more pervasive when dealing with Southern suppliers. Therefore, we would expect that the mechanism emphasized in this paper is less relevant to explain cross-border North-North mergers.

Table 12 reports the coefficients of our baseline regressions when we consider three different dependent variables. The dependent variable in columns (3) and (4) is the number of North-South horizontal mergers. In columns (5) and (6) the dependent variable is the number of North-North cross border vertical mergers. Columns (1) and (2) consider again, for comparability purposes, the number of North-South vertical mergers. The odd columns only control for the interaction of IT adoption with RTI and fixed effects. The even columns also include exports. We find the following two results. First, the coefficient is only significant for North-South vertical mergers (columns 1 and 2). Second, the sign is negative in all columns, it is the largest when considering North-South vertical mergers and the smallest for North-North vertical mergers. We interpret these results as suggesting that the effect of IT adoption is exacerbated when there are both important agency costs (North-South relationships) and when there is an input-output relationship (vertical relationship).

To sum up, the evidence presented in this section paints a picture consistent with the view that Information Technologies have enabled Northern headquarters to better monitor suppliers where monitoring problems are more severe (Southern countries).

6 Concluding Remarks

This paper provided a first attempt to empirically study how the IT revolution has changed the organization of global supply chains. We focused on international mergers and acquisitions, which is a growing and important fraction of FDI.

The premise of our analysis was that adoption of Information Technologies has reduced the costs of monitoring production. We presented a simple model that showed that this implies that the effect of IT adoption on the number of mergers is relatively larger in hard-to-monitor industries

We tested this prediction using North-South vertical mergers and acquisitions. We used the routine-intensity of the industry as a proxy for monitoring problems. Consistent with the prediction of the model, we showed that the effect of IT adoption on the number of M&As is decreasing with the routineness of the industry. This finding is robust to alternative specifications and alternative measures of monitoring problems and IT adoption.

Our theoretical framework also implied that the number of mergers should be larger in more routine intensive industries, which we find to be true. It also predicted that the routineness of the marginal industry receiving a merger decreases as the IT revolution diffuses. We provided evidence consistent with this prediction as well.

To conclude, our results hint to the importance of technology adoption for the organization of the firm and international trade. We plan on further pursuing the study of the interdependence between technology adoption and trade.

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A Detailed Analysis of the Model in Section 2 and Proofs

We start this section by studying the problem of the headquarters of choosing whether to induce high or low effort. Consider an input in industry s, country c and organizational mode X.

In case the headquarters decide to induce high effort in the production of a given task, the incentive compatibility constraint,

$$p_H w_H - e \geq p_L w_H - \alpha e \pi(c, X), \tag{12}$$

and the participation constraint,

$$p_H w_H \geq e, \tag{13}$$

need to be satisfied (following the main text we are normalizing the outside option of an agent to zero). Thus, in this case the wage offered has to satisfy simultaneously (12) and (13). That is,

$$w_H = \max\{e\frac{1-\alpha\pi(c,X)}{p_H - p_L}, \frac{e}{p_H}\}. \tag{14}$$

Note that, if the incentive compatibility constraint is binding when inducing high effort, it has to be the case that

$$\frac{1-\alpha\pi}{p_H - p_L} > \frac{1}{p_H}. \tag{15}$$

This is ensured if the monitoring technology π is sufficiently imperfect, or if the penalty imposed α in case of shirking is not arbitrarily large. In what follows we assume that $\alpha\pi < p_L/p_H$, which ensures that the incentive compatibility constraint is always binding when inducing high effort.

Assumption 2 *The monitoring technology, π, is sufficiently imperfect and the penalty imposed, α, is not arbitrarily large so that*

$$\alpha\pi < p_L/p_H.$$

If the headquarters decide to induce low effort, they just pay agents their outside option to satisfy the participation constraint, which we have normalized to zero.

We can analyze now whether it is more profitable to induce high or low effort for the headquarters. This boils down to comparing the expected output of a task for a worker that exerts high or low effort in a given task. Headquarters will choose to induce high effort if and only if the expected output minus the payment to a worker is higher. That is, if

$$p_H a(j) 1 - e(c)\frac{1-\alpha\pi(c,X)}{p_H - p_L} \geq p_L a(j) 1, \tag{16}$$

where the 1 stands for the unit of labor provided by a worker. Let $\underline{a}$ denote the lowest productivity in the support of possible productivities of a firm. Then, a sufficient condition for headquarters to always want to implement high effort is

$$(p_H - p_L)^2 \underline{a} \geq \max_{c \in C} e(c). \tag{17}$$

We assume that the difference in probabilities is large enough so that condition (17) holds. Thus, inducing high effort is always optimal.

Assumption 3 *The difference in probabilities between high and low effort satisfies*

$$p_H - p_L \geq \sqrt{\frac{\max_{c \in C} e(c)}{\underline{a}}}. \tag{18}$$

Thus, the payment offered for a discretional task t under organizational choice X in country c is

$$w(t, c, X) = \frac{1 - \alpha \pi(c, X)}{p_H - p_L} e(c). \tag{19}$$

The payment to a standardized task is the outside option because of the perfect observability assumption. The total payment to a worker in a industry in which there are s standardized tasks is the sum of the payments for all discretional tasks,

$$(\mathcal{T} - s) \frac{1 - \alpha \pi(c, X)}{p_H - p_L} e(c). \tag{20}$$

Proof of Result 1 Consider two industries s and s' such that $s < s'$ for which we observe some mergers in country c. The ceteris paribus assumption implies that the cost of the marginal input being offshored is the same $\kappa(s) = \kappa(s')$ and that the measure of offshored inputs is the same, $N_s = N_{s'}$. We show the result by contradiction. Suppose that the number of mergers in industry s, M_s, is greater than in industry s', $M_{s'}$. That is $M_s > M_{s'}$. Note that the marginal merger in industry s is in country c (amongst possibly other countries). This means that

$$\kappa(s) = \frac{R(s, c, M) w_c}{a(s, c, M)}. \tag{21}$$

Note that we have that $R(s', c, M) < R(s, c, M)$ and that, by assumption, $\kappa(s) = \kappa(s')$. This implies that $a(s', c, M) < a(s, c, M)$, which implies that $1 - F(a(s', c, M)) > 1 - F(a(s, c, M))$, i.e., $M_s < M_{s'}$. A contradiction. ∎

Proof of Result 2 Let us denote by $i = 0$ the level of Internet adoption before the IT revolution. Consider a level of IT adoption $i > 0$ in country c. Consider two industries s, s' with $s' > s$. Thus, $R(s, c, X; i) > R(s', c, X; i)$. Suppose that at $i = 0$ neither industry experienced mergers. We show by contradiction that it is not possible that there are mergers at i in industry s but not in s'. The ceteris paribus assumption implies that the maximal cost of production and that the total number of inputs to be offshored are equal, $\kappa(s) = \kappa(s')$ and $N_s = N_{s'}$. Suppose that there are mergers in industry s and not in s'. Let $\tilde{a}(s, c, M)$ denote the least productive acquired firm in industry s. This implies that the marginal cost of production is

$$\frac{R(s, c, M; i)}{\tilde{a}(s, c, M)} = \kappa(s). \tag{22}$$

Note that in this model, if mergers are preferred in one sector in one country, then mergers are preferred to arm's length contracting in all sectors in this country.

This implies that

$$\frac{R(s', c, M; i)}{\tilde{a}(s, c, M)} < \kappa(s'), \tag{23}$$

a contradiction, because it would be possible to produce at lower cost than what is being done in equilibrium. ∎

Proof of Result 3 Consider first the case in which no O-organization is ever operating in country c. Suppose further that only country c receives mergers. In this case, the number of mergers remains constant, as the total number of inputs is fixed to N_s. Suppose now that there are only mergers in c but that another country c' is also supplying inputs. Suppose we want to compare two sectors s and s'. The ceteris paribus assumption implies that the maximal cost of production and that the total number of inputs to be offshored are equal, $\kappa(s) = \kappa(s')$ and $N_s = N_{s'}$ In fact, the maximal cost of production $\bar{\kappa}(s)$ remains constant because it is pinned downed by c'. The ceteris paribus assumption ensures that $\bar{\kappa}(s)$ is constant around s. We have that the number of firms operating is $1 - F(a(s, c, M; i)) = 1 - F(\bar{\kappa}(s) w_c R(s, c, M; i))$. Taking the "derivative" of this expression with respect to s and i yields[32]

$$-f'(\bar{\kappa}(s) w_c R(s, c, M; i))\, \bar{\kappa}(s)^2 R_i R_s - f(\bar{\kappa}(s) w_c R(s, c, M; i))\, R_{si} < 0, \tag{24}$$

where $f'(\cdot)$ denotes the first derivative of the density function and R_x denotes the partial derivative of R with respect to x. As $f' < 0$, $R_s < 0$, $R_i < 0$ and $R_{si} > 0$ (see equation 3), the result follows.

Consider now the case in which there are both O- and M-organizations for some s and s'. In this case, we have that the ratio $R(s, c, M; i)/R(s, c, O; i)$ is independent of s. Hence the "cross partial" is zero.

Finally, note that the intermediate case of starting with no O-organization before the Internet revolution and incorporating O-activity during the Internet revolution is a combination

[32] To be more precise, the derivative expression with respect to s has to be understood as a first difference, as $s \in \mathbb{N}$.

of the two previous cases. Hence, by dividing the problem in two sub-periods, one where there is no O-activity and another where there is at least one O-organization, the result follows. ∎

B Extension of the Theoretical Framework

In this section we extend the baseline framework to allow for more than two different types of tasks. The baseline model considered "standardized" tasks which had probability one of detection when shirking and discretional tasks which had a probability $\pi(c, X) < 1$. Here, we generalize the exercise by allowing the probability of detection to be task specific, $\pi(t, c, X)$. Without loss of generality, we order tasks so that they are ranked in an increasing probability of detection. That is, if $t < t'$, then $\pi(t, c, X) \leq \pi(t', c, X)$ for all $c \in C$ and $X \in \{M, O\}$.

The difference across industries is on the distribution over tasks that are required to carry out production, $g(t, s)$, where $g(t, s)$ is a density over $\mathcal{T}$, $\sum_{t=1}^{\mathcal{T}} g(t, s) = 1$. We assume that tasks can be ordered in terms of First Order Stochastic Dominance.

Assumption 4 *The probability densities $g(t, s)$ can be ranked in terms of First Order Stochastic Dominance along the industry index s. In particular, we assume that if $s < s'$*

$$\sum_{t=1}^{T} g(t, s) \geq \sum_{t=1}^{T} g(t, s') \qquad \forall T \in \mathcal{T}. \tag{25}$$

This assumption provides a natural ranking across industries on how intensively they rely on hard- versus easy-to-monitor tasks.

The total payment to a worker in industry s is

$$\sum_{t=1}^{\mathcal{T}} g(t, s)\mathcal{T}e(c)\frac{1 - \alpha\pi(t, c, X)}{p_H - p_L}. \tag{26}$$

Using the first order stochastic dominance property, it is immediate to verify that

$$\sum_{t=1}^{\mathcal{T}} g(t, s)\pi(t, c, X) \tag{27}$$

is increasing in s. Thus, total payments to a worker, (26) are decreasing in s.

Defining

$$w_c \doteq e(c), \tag{28}$$

$$R(s, c, X) \doteq \sum_{t=1}^{\mathcal{T}} g(t, s)\mathcal{T}e(c)\frac{1 - \alpha\pi(t, c, X)}{(p_H - p_L)p_H^{\mathcal{T}}}, \tag{29}$$

we recover the same properties for $R(s, c, X)$ as discussed in the main text.

Next we show that the complementarity result between IT and s holds in this generalized set-up too. Let $s < s'$, then

$$\sum_{t=1}^{\mathcal{T}} (g(t, s') - g(t, s))\pi(t, c, X; i) > 0. \tag{30}$$

Now, let $i < i'$. This implies that $\pi(t, c, X; i) < \pi(t, c, X; i')$. We have that

$$\sum_{t=1}^{\mathcal{T}} (g(t, s') - g(t, s))(\pi(t, c, X; i') - \pi(t, c, X; i) > 0, \tag{31}$$

which shows increasing differences. In turn, this implies that $R(s, c, X; i)$ has decreasing differences.

From the properties of $R(s, c, X; i)$ it follows that the proofs of Results 1 and 2 hold in this generalized set-up. The proof for the case in Result 3 in which there are only mergers in country c also holds because it relies on the decreasing differences property we just showed. For the case in which there are both M- and O-organizations that co-exist in country c, we have that, in general,

$$\frac{R(s, c, M; i)}{R(s, c, O; i)} \tag{32}$$

is not independent of s. To make further progress, we need to compare the benefits from IT across different organizational forms. To motivate our next hypothesis, it is useful to unpack the O-organization into its two components: greenfield and arm's length. In an acquired firm, part of the organizational aspects, employee performance, tacit and non-codifiable knowledge can remain harder to evaluate and monitor than in a greenfield investment. While, comparing M&As to an arm's length relationship, there is less scope for monitoring when the supply chain is outside of the firm. Thus, we make the hypothesis that mergers, where informational problems are more severe, gain relatively more from a better monitoring technology than other organizational forms. Our second hypothesis captures this idea.

Assumption 5 *Mergers benefit relatively more than other organizational forms from the IT revolution. That is,* $\log\left(\frac{R(s,c,M;i)}{R(s,c,O;i)}\right)$ *has increasing differences in s and i. Abusing notation, we symbolize this as*

$$\frac{\partial^2 \log\left(\frac{R(s,c,M;i)}{R(s,c,O;i)}\right)}{\partial s \partial i} \geq 0. \tag{33}$$

We also assume a particular functional form for the productivity distribution of potential targets.

Assumption 6 *The productivity distribution of firms in sector s in country c is distributed* *exponential with parameter* $a(s,O)^{-1}$.

With these two assumptions at hand, we can finalize the Proof of Result 3. Using the threshold property of the least efficient firm in both organizational modes in country c,[33] we have that the number of mergers is

$$1 - F(a(s,c,M;i)) = 1 - F\left(a(s,O)\frac{R(s,c,M;i)}{R(s,c,O;i)}\right). \tag{34}$$

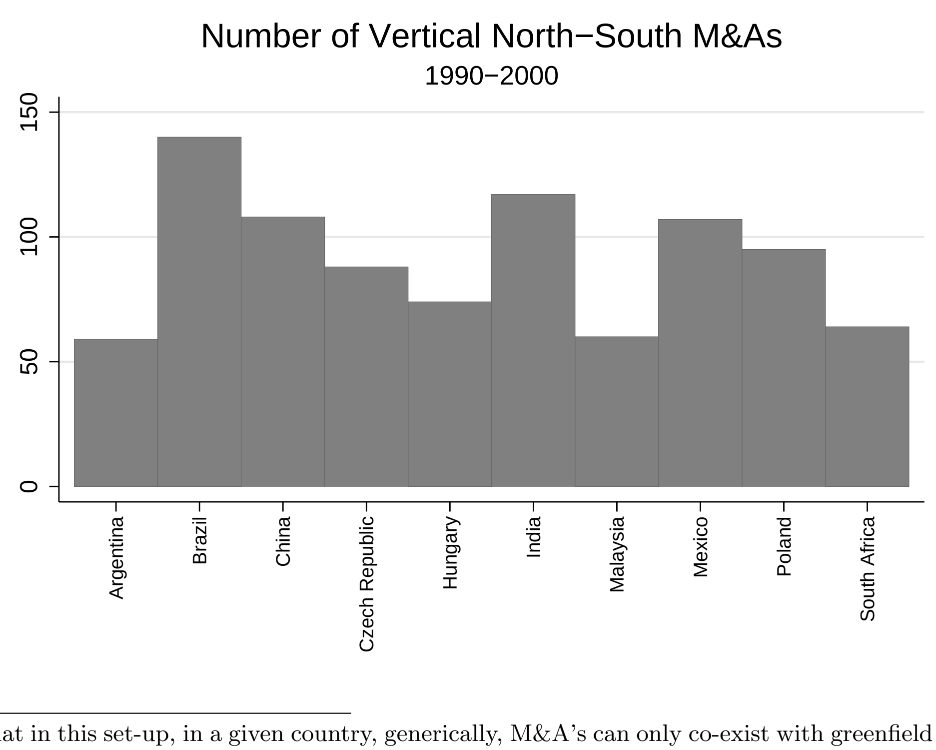
Differentiating the right hand side of expression (34) with respect to i and s, we have that

$$-\exp\left(-\frac{R(s,c,M;i)}{R(s,c,O;i)}\right)\frac{\partial^2 \log\left(\frac{R(s,c,M;i)}{R(s,c,O;i)}\right)}{\partial s \partial i} \leq 0. \tag{35}$$

As a final remark, the negative complementarity between s and i that we find empirically also informs us about the fact that, through the lens of this model, mergers benefit relatively more than other organizational forms from the IT revolution.

C Figures and Tables

Figure 1: Top-ten Southern Recipients of Mergers and Acquisitions



[33]Note that in this set-up, in a given country, generically, M&A's can only co-exist with greenfield investment, as $R(s,c,M) \lesseqgtr R(s,c,O)$.

Figure 2: Distribution of North-South Vertical M&As at the Country-Industry Level

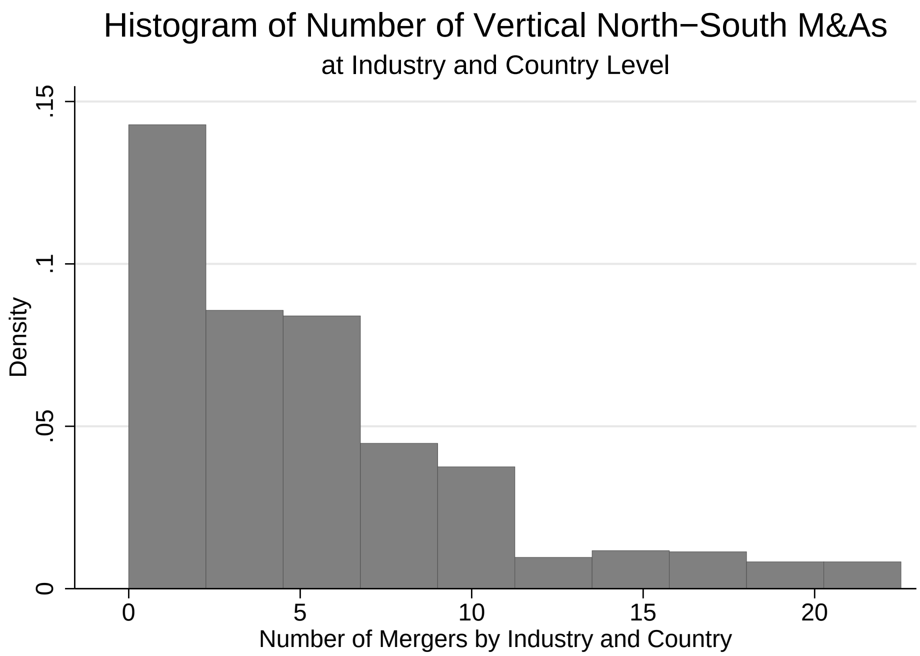


Table 1: Highest and Lowest Routine Intensive Occupations

Lowest RTI			**Highest RTI**		
RTI	Number	Description	RTI	Number	Description
-1.39	813	Parking Lot Attendants	6.34	313	Secretaries and Stenographers
-1.38	417	Firefighting, Prevention and Inspection	6.32	383	Bank Tellers
-1.35	808	Bus Drivers	6.28	96	Pharmacists
-1.25	809	Taxi Cab Drivers and Chauffeurs	6.27	338	Payroll and Timekeeping Clerks
-1.20	463	Public Transportation Attendants	6.22	773	Motion Pictures Projectionists

Sample occupations that are aggregated to construct the industry routine index. Source: Autor and Dorn (2008).

Table 2: Data on Routine Intensity by Industry

RTI	NAICS	Description
1.51	315	Apparel
1.52	321	Wood Products
1.64	314	Textile Product Mills
1.74	312	Beverage and Tobacco Products
1.78	313	Textile Mills
1.80	316	Leather and Allied Products
1.84	322	Paper
1.85	327	Non-Metallic Mineral Products
1.86	337	Furniture and Related Products
1.90	331	Primary Metals
1.93	324	Petroleum and Coal Products
2.04	326	Plastics and Rubber Products
2.13	336	Transportation Equipment
2.17	335	Electrical Equipment
2.22	311	Food
2.23	334	Computer and Electronic Products
2.24	339	Miscellaneous
2.25	325	Chemicals
2.32	323	Printing and Related Support Activities
2.33	332	Fabricated Metal Products
2.40	333	Machinery

Source: Routine index at industry-level calculated from the Autor and Dorn (2008)'s RTI values at occupation level.

Table 3: Top-5 North-South Vertical M&As

Year:	**1990**		**Year:**	**2000**	
RTI	NAICS	Defintion	RTI	NAICS	Definition
1.85	327	Non-Metallic Minerals	2.25	325	Chemicals
1.52	321	Wood Products	1.90	331	Primary Metals
2.23	334	Computer and Electronics	2.23	334	Computer and Electronics
1.93	324	Petroleum and Coal	2.22	311	Food
2.22	311	Food	2.04	326	Plastics and Rubber

Table 4: Test of Result 1

	(1)	(2)	(3)	(4)	(5)
	Dependent Variable is: Number of M&As				
RTI_s	1.11	.94	.89	.89	1.13
	(.22)	(.22)	(.23)	(.29)	(.27)
Exports_{sc}			1.78		2.10
			(.40)		(.46)
Ext. Fin. Dep._s				.91	.56
				(.21)	(.26)
Asset Tang._s				-2.08	-1.89
				(.84)	(.88)
H-Intensity_s				.99	-1.01
				(1.56)	(.88)
K-Intensity_s				.81	.73
				(.12)	(.13)
Country Fixed Effects	N	Y	Y	Y	Y
Observations	381	381	334	307	272

Notes: The dependent variable is the number of vertical M&As between 1990-2000 from the North by southern country and industry. Data on mergers and acquisitions are obtained from SDC Thomson Platinum. RTI_s is routine intensity index constructed from Autor and Dorn (2008), Exports_{sc} are exports of country c in industry s from the Feenstra database. Ext. Fin. Dep._s is dependence on external funding. Asset Tang._s is asset tangibility, both measures are obtained from Braun (2003). H(K)-Intensity_s is human (physical) capital intensity. Both measures are obtained from the NBER-CES Manufacturing database. Each specification is a negative binomial regression with industry and country fixed effects. Standard errors are clustered by country.

Table 5: Test of Result 2, Baseline Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
	Pooled	Brazil	India	China	Mexico	Poland
			Dependent Variable is: Minimum RTI			
Internet_{ct}	-.031	-.061	-.131	-.090	-.013	-.064
	(.003)	(.016)	(.027)	(.022)	(.029)	(.033)
Observations	253	10	9	9	11	11

Notes: The dependent variable is the dependent variable is the minimum RTI of the mergers received in each country and year from 1990-2000. Internet is predicted Internet Adoption from a linear regression of Internet and a year trend with country fixed effects, weighted by the number of observations by country. Each specification is an OLS regression. Column (1) includes country and year fixed effects and standard errors clusters at country level. Robust standard errors in parenthesis in columns (2) to (6).

Table 6: Test of Result 3, Baseline Regressions

	Baseline					Heckscher-Ohlin Effects				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
					Dependent Variable is: Number of M&As					
IT_c*RTI_s	-.078	-.087	-.085	-.081	-.240	-.108	-.114	-.113	-.109	-.250
	(.022)	(.023)	(.023)	(.025)	(.063)	(.027)	(.028)	(.029)	(.029)	(.075)
Exports_{sc}		1.22			1.44		1.07			1.13
		(.144)			(.307)		(.244)			(.475)
Related-Party Exports_{sc}			2.11					2.33		
			(.534)					(.772)		
Share $\text{Related-Party}_{sc}$				.499					.492	
				(.136)					(.223)	
FDI_{sc}					-.030					-.023
					(.016)					(.030)
K-Abund.$_c$*K-Int.$_s$						-.071	-.125	-.079	-.062	-.125
						(.045)	(.046)	(.040)	(.044)	(.079)
H-Abund.$_c$*H-Int.$_s$						-3.23	-4.65	-2.66	-2.31	-4.92
						(6.52)	(6.29)	(6.85)	(6.94)	(6.70)
Fin. Dev.$_c$*R&D-Int.$_s$						.058	.033	.060	.058	.037
						(.019)	(.014)	(.017)	(.019)	(.063)
Observations	381	334	345	345	100	241	230	231	231	94

Notes: The dependent variable is the number of vertical M&As between 1990-2000 from the North by southern country and industry. Data on mergers and acquisitions are obtained from SDC Thomson Platinum. Exports_{sc} are imports from country c to the North in industry s in 2000, from the Feenstra database. Related-Party Exports_{sc} and Share $\text{Related-Party}_{sc}$ are related party exports and share of related party exports from country c to the U.S. in industry s in 2002 (the oldest year available) and obtained from US Census. FDI is capital outflows from US to country c in industry s in year 2000 from BEA. Human Capital Abundance and Capital Abundance data is obtained from Hall and Jones (1999). Fin. Dev_c is domestic credit to private sector (% GDP) from WDI (World Bank). $\text{R\&D-intensity}_s$ is from NSF. Each specification is a negative binomial regression with industry and country fixed effects. Standard errors are clustered by industry.

Table 7: Test of Result 3, Alternative measure of Monitoring (ERP)

	Baseline					Heckscher-Ohlin Effects					IV		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Dependent Variable is: Number of M&As												
IT_c*ERP_s	-.190	-.233	-.229	-.221	-.752	-.300	-.285	-.310	-.295	-.730	-.071	-.106	-.114
	(.079)	(.086)	(.088)	(.092)	(.108)	(.159)	(.156)	(.163)	(.168)	(.124)	(.023)	(.039)	(.049)
$Exports_{sc}$		1.24			1.54		1.05			1.16		.57	.14
		(.148)			(.273)		(.236)			(.411)		(.18)	(.05)
Related-Party $Exports_{sc}$			2.11					2.30					
			(.526)					(7.46)					
Share Related-$Party_{sc}$				.506					.483				
				(.132)					(.226)				
FDI_{sc}					-.038					-.019			
					(.014)					(.020)			
K-Abund.$_c$*K-Int.$_s$						-.048	-.098	-.054	-.039	-.062			-.009
						(.045)	(.045)	(.041)	(.045)	(.064)			(.011)
H-Abund.$_c$*H-Int.$_s$						-3.75	-5.28	-3.29	-2.85	-3.84			-.913
						(6.33)	(6.16)	(6.64)	(6.67)	(6.09)			(.895)
Fin. Dev.$_c$*R&D-Int.$_s$						.057	.030	.059	.057	.046			.009
						(.022)	(.018)	(.020)	(.004)	(.070)			(.007)
Observations	381	334	345	345	100	241	230	231	231	94	381	334	230

Notes: The dependent variable is the number of vertical M&A's between 1990-2000 from the North by southern country and industry. Data on mergers and acquisitions are obtained from SDC Thomson Platinum. ERP_s is a measure of adoption of Enterprise Resource Planning systems in industry s constructed from Bloom et al. (2011). Each specification is a negative binomial regression with industry and country fixed effects. In the IV columns $IT_c * ERP_s$ is instrumented with $IT_c * RTI_s$. Only the second stage is reported. Standard errors are clustered by industry for all columns except for column (11) which reports robust standard errors, as the modified OIM "sandwich" used to compute standard errors was close to singular in this case.

Table 8: Test of Result 1, Alternative Measure of Monitoring (ERP)

	(1)	(2)	(3)	(4)	(5)
	Dependent Variable is: Number of M&As				
ERP_s	4.61	4.06	4.21	1.37	2.33
	(.725)	(.736)	(.758)	(.897)	(.763)
$Exports_{sc}$			1.74		2.05
			(.367)		(.417)
Ext. Fin. $Dep._s$				.846	.345
				(.272)	(.282)
Asset $Tang._s$				-2.54	-2.49
				(.853)	(.899)
$H\text{-}Intensity_s$				1.52	-.134
				(1.62)	(1.50)
$K\text{-}Intensity_s$				.776	.663
				(.116)	(.125)
Country Fixed Effects	N	Y	Y	Y	Y
No. Observations	381	381	334	307	272

Notes: The dependent variable is the number of vertical M&A's between 1990-2000 from the North by southern country and industry. ERP_s is a measure of adoption of Enterprise Resource Planning systems in industry s from Bloom et al (2011). Data on mergers and acquisitions are obtained from SDC Thomson Platinum. Each specification is a negative binomial regression with industry and country fixed effects. Standard errors are clustered by country.

Table 9: Test of Result 2, Alternative Measure of Monitoring (ERP)

	(1)	(2)	(3)	(4)	(5)	(6)
	Pooled	Brazil	India	China	Mexico	Poland
			Dependent Variable is: Minimum ERP			
Internet_{ct}	-.008	-.022	-.036	-.012	-.006	-.020
	(.001)	(.005)	(.012)	(.004)	(.011)	(.008)
Observations	253	10	9	9	11	11

Notes: The dependent variable is the minimum level of Enterprise Resource Planning (ERP) systems of the mergers received in each country and year from 1990-2000. Internet is predicted Internet Adoption from a linear regression of Internet and a year trend with country fixed effects, weighted by the number of observations by country. Each specification is an OLS regression. Column (1) includes country and year fixed effects and standard errors are clustered at country level. Robust standard errors in parenthesis in columns (2) to (6).

Table 10: Test of Result 3, Alternative measure of IT adoption (penetration rate)

	Baseline					Heckscher-Ohlin Effects				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Dependent Variable is: Number of M&As									
IT_c*RTI_s	-.709	-.649	-.697	-.693	-.994	-.639	-.627	-.636	-.629	-.995
	(.129)	(.131	(.130)	(.141)	(.524)	(.130)	(.194)	(.130)	(.143)	(.492)
$Exports_{sc}$		8.38					1.02			
		(.154)					(.220)			
Related-Party $Exports_{sc}$			1.97					2.26		
			(.054)					(.771)		
Share $Related\text{-}Party_{sc}$				.434					.470	
				(.164)					(.246)	
FDI_{sc}					-.045					.020
					(.392)					(.615)
K-Abund.$_c$*K-Int.$_s$						-.093	-.138	-.089	-.074	-.003
						(.052)	(.043)	(.046)	(.048)	(.146)
H-Abund.$_c$*H-Int.$_s$						-2.08	-3.32	-.985	-.853	-5.38
						(6.79)	(6.24)	(6.97)	(7.13)	(10.68)
Fin. Dev.$_c$*R&D-Int.$_s$						.041	.019	.042	.041	.005
						(.025)	(.018)	(.022)	(.025)	(.084)
Observations	293	281	292	292	75	204	204	203	203	75

Notes: The dependent variable is the number of vertical M&As between 1990-2000 from the North by southern country and industry. IT is the penetration rate measure taken from Comin and Mestieri (2010). Each specification is a negative binomial regression with industry and country fixed effects. Standard errors are clustered by industry.

Table 11: Output,Technology and Institutions

	Output	Technology	Institutions	
	(1)	(2)	(3)	(4)
	Dependent Variable is: Number of M&As			
IT_c*RTI_s	-.059	-.070	-.082	-.078
	(.026)	(.025)	(.027)	(.021)
GDP_c*RTI_s	-4.34			
	(3.65)			
TFP_c*RTI_s		.571		
		(.493)		
Rule of Law_c*RTI_s			.094	
			(.301)	
Constraint $Executive_c$*RTI_s				-.078
				(.108)
Observations	298	298	350	350

Notes: The dependent variable is the number of vertical M&As between 1990-2000 from the North by southern country and industry. Data on mergers and acquisitions are obtained from SDC Thomson Platinum. TFP and GDP data are obtained from Hall and Jones (1999). Constraint Executive is Constraint on the Executive from the Polity IV Project (2006). Rule of Law is rule of law from Kaufmann et al. (2008). Each specification is a negative binomial regression with industry and country fixed effects. Standard errors are clustered by industry.

Table 12: Placebo Tests

	North-South Vertical		North-South Horizontals		North-North Verticals	
	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable is: Number of M&As					
IT_c*RTI_s	-.078	-.087	-.033	-.045	-.001	-.010
	(.036)	(.033)	(.035)	(.036)	(.011)	(.014)
$Exports_{sc}$		1.22		1.48		.703
		(.367)		(.626)		(.168)
Observations	381	334	628	536	420	279

Notes: The dependent variable is the number of vertical M&As between 1990-2000. Data on mergers and acquisitions are obtained from SDC Thomson Platinum. The sample in columns (1) and (2) is North-South vertical M&As. The sample in columns (3) and (4) is North-South horizontal M&As. The sample in columns (5) and (6) is cross-border North-North vertical M&As. Each specification is a negative binomial regression with industry and country fixed effects. Standard errors are clustered by country.