

**INDUSTRY ARCHITECTURES AND GLOBALIZATION:
INSTITUTIONAL MODULARITY, VALUE CHAIN SIMILARITY
AND EASE OF FOREIGN EXPANSION**

Abstract

Much research on international expansion has focused on the methods through which firms expand, the relative difficulty of expanding into one country as compared with another, or firm advantages or shortcomings in international expansion. We complement this focus by moving beyond the ‘company’ and ‘country’ perspectives to examine how sector structures, and in particular *industry architectures* influence the success of operation of firms expanding internationally. Based on a survey of CIS countries, we find that the modularity of value chains and similarity of industry architectures across countries are robust predictors of firm success in international operations.

The degree to which a firm succeeds in global expansion is usually thought of as the result of a trade-off between its specific advantage (Hymer, 1976) and the generic challenges of going abroad (Ghemawat, 2001). Firms leverage their unique strengths in new markets through trade, licensing, and various forms of foreign direct investment (FDI), but are constrained by physical distance, cultural contrasts and “liabilities of foreignness” – operational differences between countries and variance in “the way we do things around here”. Research in the international management literature has made substantial headway in our understanding of the nature of these international differences (in terms of institutions, norms or culture), or on the most appropriate *mode* of entry into a foreign market. Far less attention has been paid to the question of *when* and *whether* a firm’s advantage in one country is “exportable” into another. This paper tackles this question head-on: what is it that drives the “exportability” of advantage, over and above the country-level variables?

Our focus, building on recent advances in institutional and evolutionary economics (see Jacobides & Winter, 2005; Jacobides, Knudsen & Augier, 2006) is on the role of *value chain structure* or *industry architecture* in the host country – the set of rules and roles that dictates how labor is divided among firms. Following these recent works, we posit that each sector has a potentially country-specific way of being organized – i.e., it has its own “industry architecture” and its own endogenously derived way of breaking up the activities along the value chain. Based on this premise, we aim to demonstrate empirically that the “fit” between industry architectures (i.e. the similarity between the value chains in home and host countries) and institutional modularity (i.e. the separability between the stages in a value chain in a segment where firms are active) are the two important and understudied success factors in international expansion. This paper’s contribution is to take this recently developed work on industry architectures and comparative value chain structures, ground these concepts in the international management literature and, more importantly, provide the first empirical test of the resulting propositions. We do this by analysing the success of the subsidiaries of multinational firms who set up operations in four CIS countries and focusing on the importance of industry architectures in terms of their *similarity* and *institutional modularity*.

By finding that these factors are empirically significant, we help to advance a perspective that may also help us address some open questions, such as why we see extensive international activity in some sectors and very little in others (although we do not attempt answering this question). Our findings also suggest that in order to understand what drives success in expansion, we need to look beyond individual companies and countries and analyse sectors and industry architectures more deeply. By understanding how such industry architectures differ between countries (and whether they are becoming more similar and more modular) we can also understand why we observe such a drastic increase in international activity (in terms of trade, FDI, and strategic alliances) through the “integration of trade [through] the dis-integration of production” (Feenstra, 1998).

In terms of structure, this paper begins with an overview of current theory on the exportability of advantage. It then looks at how the analysis of industry architectures might help to cast a new light on the issue, leading to the hypotheses to be tested. We then introduce data and methods, provide results, and close with a discussion on the implications for research and practice.

THEORY

Analysis of global expansion in the literature

What determines success in global expansion? We know that a firm expanding in a foreign country faces a potentially hostile environment. Lack of access to local resources, imperfect knowledge of the local operating environment and potential difficulties in establishing a competitive position will put the expanding firm at a disadvantage vis-à-vis its local competitors (Buckley & Casson, 1976, Dunning, 1979, Caves, 1982, Rugman, 1981). As Hymer (1976) observed in his seminal contribution, there *has* to exist some firm-specific advantages that outweigh the “liability of foreignness” – the generic disadvantages of expanding abroad (Zaheer, 1995; Zaheer & Mosakowski, 1997). In Hymer’s words, “there are as many kinds of advantages as there are functions in making and selling a product”. These advantages form the basis of global expansion because they are superior in absolute or in relative terms (Yip, 2003).

Kindleberger (1969) and Dunning (1979) suggested that firms expanding abroad possess “monopolistic advantages” or “ownership-specific advantages” that account for their success, while Vernon (1975) suggested that firms expand their products as a function of their position in the product-development life cycle. Buckley & Casson (1976) and Rugman (1981) argued that ownership advantage (e.g. technology) and transaction costs of conducting business across national borders determine whether a firm employs arm’s-length or internal transactions to service foreign markets.

From the 1980s onwards, the development of the field of strategy established the concept of competitive, firm-specific advantages (Nelson, 1994), which has recently been more fully integrated in international economics as well (cf. Markusen, 2002; Henisz, 2003). From this perspective, the aim of global expansion is to “export” competitive advantage through some market-based arrangement (licensing or franchising, for example) or through FDI, whether via a “greenfield” operation or through M&A activity. In this conceptual framework, expansion requires an advantage that a firm can leverage internationally in terms of its products, perhaps based on its superior knowledge (Teece, 1977, 1981; Buckley & Casson, 1976; Kogut & Zander, 1993).

Clearly, however, the firm’s own capability is only part of the story. Success also depends on the differences between the home nation and the host nation, which have the potential to help or hinder expansion. Potentially helpful differences include lower labor and resource costs (Dunning, 1979, Rugman, 1981), while problems might stem from cultural, administrative, geographical and economic differences between home and host (Zaheer, 1995, Zaheer & Mosakowski, 1997, Ghemawat, 2001). Some good progress has been made in understanding the “problems of going abroad”. As Guillen & Suarez (2004) note in their survey article, countries differ in terms of culture (Hofstede, 1980, 1991), authority/business systems (Hamilton & Biggart, 1988; Whitley, 1992; Guillen, 1994; Djelic, 1998), political economy/-friendliness to multinationals (Gereffi, 1989), legal tradition (La Porta, Lopez-de-Silanes, Shleifer & Vishny 1998) and political risk (Henisz & Williamson 1999; Henisz 2000).

However, all this literature looks at how particular *countries* differ, and as a result, how difficult it is for a firm to export its advantages into a different national context. The received wisdom cannot

account for the substantial differences between different industries in patterns of globalization, and especially the lack of global expansion in some service sectors. Pavitt (1991) and Patel (1995), for instance, identify specific sectors where strengths in one national market did not lead to a successful expansion abroad.

A body of the literature on global vs. multidomestic industries (Bartlett & Ghoshal, 1989; Prahalad & Doz, 1987) analyses suitability of various globalisation modes (i.e. global, international, multidomestic or transnational) with respect to some industry-specific characteristics. Although this analysis is conducted at the industry level, the sector's value chain structure is not one of the characteristics examined by the authors. In fact, these studies adopt a completely different perspective from the one presented in this paper. While they do look into the extent of globalization (or globalization potential) of various industries, the authors are primarily concerned with the question "how to expand internationally?", not "why is international expansion easier in some sectors than others?"

Additionally, the extent of globalization has been considered in terms of "drivers of globalization" (Yip & Coundouriotis, 1991), such as globalization of customers, markets, and support of regulators. However, the question remains: what drives these drivers? In other words, what leads to some industries having more global competitors? In a rare effort to address this issue, Hu (1995), expanding Hymer's approach, observed that not all sources of competitive advantage are transferable on the global level. Some advantages are only relevant in specific countries and economies, and some advantages are hardly transferable at all. Furthermore, recent work by Rugman & Verbeke (2004) points out that upstream capabilities (i.e. production) can be transferred on a global level much more easily than downstream ones (i.e. distribution), and that this partially accounts for the observed regionalisation pattern (Rugman 2005). While certainly helpful, these observations still beg the question: *why* do these differences exist?

The role of comparative value chain structure in Industry Architectures

This paper provides an alternative approach to analyse the question. This approach does not offer a comprehensive answer; instead, it aims to advance our understanding by offering new lenses through

which to view the issue. Specifically, we argue that “institutional modularity” at the level of the *sector* plays a significant role, as does the extent of similarity in value-chain structure between different countries. By “institutional modularity” we mean the degree of separability between parts of the value chain (in the spirit of Baldwin & Clark, 2000), which allows a firm to transplant easily if it focuses on only one part of the sector, without needing to re-create tight links to the existing (and potentially different) structure of the sector in the host country. We must add that the focus here is on industry architectures rather than differences in the value chains *within* individual firms, which are only partially influenced by industry architecture. By “similarity of industry architectures” we mean international compatibility in terms of the nature, structure and operation of the value chain (i.e. the vertical division of labor and the “rules and roles” that connect different industry participants as described by Jacobides et al. 2006). When value chain structures are similar, and particularly when specific parts of a production structure are modular, then global expansion is significantly easier.

However, before we look more closely at these two “comparative attributes” of the value chain, we need to elaborate on our starting point – the idea that, in general, substantial and understudied differences in industry organization and division of labour do exist. These differences exist because industry structures are not determined solely by technology: they are the result of path-dependent processes. This point has been made by the “varieties of capitalism” and “national business systems” literature (Whitley, 1992, 1999; Whitley & Kristensen, 1996; Hall & Soskice, 2001; Morgal et al, 2004), albeit at the level of the country as a whole. This has also been noted in the sociological analyses of value chains (Gereffi, 1994; Gereffi et al, 2005), albeit with a preoccupation with global power structures.

What is worth stressing is that path-dependent processes lead to value chains breaking down into “vertical units” – different ecologies of vertically co-specialized participants. Prevailing norms of interaction also play a part (cf. Nishiguchi, 1994 and Lane, 1996). In Kristensen’s words, “national types of firms and their institutional context change, but because the process of change happens through and by nationally patterned relations and interactions, nothing ensures convergence.” (Kristensen, 1996). This means that each industry, in each country, has a distinct evolutionary

trajectory in which capabilities, scope and institutional context combine to create fairly distinct “vertical groups” (Shanley & Peteraf, 2004). It is exactly these international differences in value chain structure, in otherwise identical industries, that hamper the exportability of competitive advantage – and which are the starting point for this paper’s contribution.

The role of “industry architectures”: similarity, separability and success in global expansion

On the basis of this recent theory, we can now develop the analysis that links the dynamics of industry architectures and the potential for success in global expansion. Specifically, we can consider two different, related key aspects.

First, some sectors’ production processes are more institutionally and socially embedded than others, making it more difficult to expand from one part of a value chain in one country to a corresponding part of the value chain in another. Correspondingly, if a value chain consists of relatively discrete units that can be easily separated and substituted by similar industry participants, then replication of interdependencies in this particular value chain in a new economic and social environment (i.e. another country) should be less problematic than in a value chain characterised by dense linkages among its participants. Thus “institutional modularity” (i.e. the separability of the parts of an industry’s architecture, which is the ease with which the steps of the value chain can be separated) can facilitate international expansion.¹

¹ Note that the level of analysis here is the value chain structure at the level of the *sector* – in keeping with the emerging literature on industry architectures. That is, we focus on the way labour is divided along the value chain; ie, with the nature and type of firms that constitute a sector’s vertical segments, and the rules & roles that pertain to the division of labour. Firms can, of course, pick from the existing variety within their sector, and they might even be able to develop a new type of solution, changing not only their own boundaries, but creating structures new to the sector. In this paper we abstract from these fascinating issues, and we also differ from the traditional Porterian (1985) of the value chain *within* a firm, focusing on sector-level structures and dynamics instead.

Second, any *similarity* in sectoral value chain structures and industry architectures should also be beneficial. If value-chain structures in home and host countries differ significantly, then the internationalizing firm will face serious difficulties in finding suitable business partners, since the way business is done in the host country is considerably different from the way it is done at home. Hence, it will not simply be able to replicate its home *modus operandi*, but will have to spend considerable time and resource to adjust its business model to the way the industry's value chain is organized in the host country. Furthermore, the success of this adjustment will depend on the firm's ability to understand and overcome these differences in the value chain, which may be trickier than one might expect at the outset. With this background, then, we are ready to articulate the role of these industry architectures in terms of global expansion, as it relates to the dual issues of similarity and modularity.

Starting with the analysis of modularity, it is important to note that often, the capabilities that firms have in one part of the value chain are critically dependent on capabilities developed by other vertically co-specialized firms in the same country and sector. This point has been well covered, albeit in the particular context of Japanese firms (mostly automotive assemblers) expanding to the US. As Pil & MacDuffie (1999: 60) note, "suffice it to say that the capabilities of a plant reside to some degree in the strengths of its relationships with the suppliers and in the abilities of those suppliers." Kenney & Florida (1993), who carefully documented the expansion of Japanese firms to the US, noted that successful expansion abroad combines the transfer of work and production organization within the plant with the simultaneous transfer of broader *interorganizational relationships* between plants and their parts suppliers. This is having a powerful effect in the broader environment and is creating a whole new and supportive environment for the Japanese system of production.

Toyota, hailed as the most successful Japanese example of global expansion, invested in training its new US suppliers to deal with it just as its home suppliers had. This suggests that even when the division of labor is similar in home and host countries (as with automobiles), some competitive advantage consists in the way a firm interfaces with other sector participants – and also, possibly, those participants' exact nature and capabilities. Therefore, a firm expanding overseas must either occupy an *institutionally modular* position in the value chain of a specific sector (i.e. it must be neatly separated

from other industry participants in easy-to-replicate relations), or it must be able to reproduce the same (or substitute) structures in the host country's value chain, insofar as these structures drive its advantage.

Thus, to the extent to which an industry is “institutionally modular” (linkages between different parts of the value chain are “loose”); it will be easier to expand globally. Certainly, institutional modularity of a sector itself is not a sufficient condition for a successful international expansion.² However, everything else being equal, if an internationalising firm operates in a sector which is characterised by close, non-substitutable links among industry participants (or in an institutionally non-modular sector), then it will find it more difficult to set up its foreign operations in a new country, as it should be able to export or reproduce all the links with value chain participants the firm has established in its home country. Otherwise its competitive advantage will be curtailed. International expansion in such conditions is certainly a highly demanding task, as it involves a much higher degree of complexity and requires more substantial resource commitment from the parent firm. Conversely, if the value chain of a sector in which the firm operates can be easily broken down and some of its parts replaced with similar parts without a loss in the firm's competitive advantage, then the firm will be able to set up foreign operations much more easily. More formally, we can argue that:

Hypothesis 1: The more institutionally modular a sector is, where a firm expands internationally, the more successful the firm's foreign operations will be.

² By “international expansion”, the empirics of this study denote the establishment of a greenfield subsidiary in the host country. We would expect that most of our propositions would hold with the other modes of foreign expansion, but leave the question of how mode of foreign expansion interacts with industry architecture to determine success for future study. Furthermore, note that our theory development will focus, more concretely, on success in foreign operations. While we do acknowledge that success in international expansion might also include indirect benefits (through learning, information sharing, use of the global network, economies of scale, joint marketing etc), we consider success in foreign operations to be a major issue both theoretically and for practicing managers.

Relatedly, the extent of linkages that the firm has with other companies in its home environment might also curtail its ability to expand globally. Dense linkages among value chain participants create a set of locally contingent dependencies and habits that may not travel well. The firm finds itself dependent on its value chain partners and recognizes (or fails to recognize) the challenge it poses to successful transfer of its competitive advantage.

Also, a high degree of home embeddedness suggests that the production process depends on the links to other firms. This is likely to damage the firm's ability to expand internationally, as, when seeking to replicate an "embedded" modus operandi abroad, it is likely to find it problematic: The "rules and roles" in its home country are likely to differ from those in the host to a smaller or greater extent. This is likely to create more problems for companies with dense linkages to their value chain partners in their home countries, than to those with looser links at home. Moreover, if a firm is deeply embedded in its *home* environment, then it is more likely that its source of advantage will, at least partly, rely on the connections it has with other participants in the value chain. That suggests that the degree of embeddedness at home should be *negatively* associated with the success in terms of global expansion, and surely with satisfaction with such an expansion. More formally,

Hypothesis 2: The greater the embeddedness of a firm in its home environment, the less successful its foreign operations will be.

Also, the extent of linkages that the firm has with other companies in its host environment negatively affects its performance. Dense linkages among value chain participants that are likely to operate with different rules and norms will create a liability. Dissimilarity of the environment is likely to create more problems for companies with *dense linkages* to their value chain partners in their host countries, than to those with looser links, as the differences would carry substantial weight. Thus, *local (i.e. host)* dependencies are likely to create a problem for global expansion, as it is unlikely that the new, local partners will be able to replicate the benefits that matter for success. As such, we posit that:

Hypothesis 3: The greater the dependencies of a firm are in the value chain of its host environment, the less successful the firm's foreign operations will be.

In addition to the modularity and linkages between/embeddedness in a country's value chain, the second set of attributes that we think drives success in international expansion, is the extent to which the two industries are structured on a similar basis. If the structures of the value chains in home and host are similar, then it is more likely that the capabilities and competencies developed in one setting will be able to "fit" the host's value chain. Such similarity should also make it easier to adapt to the host country and transfer competitive advantage into it. The similarity of the overall business environment has been shown to be beneficial for international expansion, as it helps to overcome the liability of foreignness (Zaheer, 1995). Also, the similarity of the economic, social and cultural environments in the region is the basis of the regionalization thesis as put forward by Rugman (2005) and Rugman & Verbeke (2004). In this analysis we go a step further and stress the importance of similarity of the *value chain structure/industry architecture* (in the spirit of Jacobides et al., 2006) instead of business environment in general, focusing at the *sectoral* level of analysis.

If the value chain structure is similar between the home and host countries, then the internationalizing firm will be able to set up its operations in the new country more smoothly, since the capabilities it developed in managing the value chain at home are directly transferable abroad. Hence, the firm will spend less time adapting to the new environment and adjusting its business processes than otherwise, as we argued at length earlier. All in all, the firm will experience an easier, faster and smoother expansion into an industry with similar value chain structure. Thus, we posit that:

Hypothesis 4: The greater the similarity in value chain structure between host and home country, the more successful the firm's foreign operations will be.

Finally, modularity and similarity along the value chain combine in interesting ways. If a sector is institutionally modular, then it becomes *comparatively easier* to overcome the differences between two value-chain structures. The more modular a value chain – that is, the more separable the parts that constitute a sector – the smaller the impact of problems caused by the dissimilarity of the home and host sector, because a firm can focus on one part of the value chain without caring quite as much about the way in which connections with the other industry participants are made.

In order for us to put this down as a proposition, we need to shift our attention to *the ease of overcoming value-chain differences*, and see to what extent the modularity (separability) may make it easier to overcome these differences. In our last hypothesis, thus, we change our dependent variable to focus on what factors explain whether it is easy or not to adapt to new value chain structures/ industry architectures, and consider how the institutional modularity (i.e. the separability of different parts of the value chain) makes it more straightforward to adapt. Specifically, we stipulate that

Hypothesis 5: The greater the institutional modularity of a sector, the easier it is for a company to overcome differences in value-chain structure between host and home countries.

These five hypotheses, seen jointly, provide a first set of testable propositions on how important the role of “industry architectures” is on international expansion. Of course, these hypotheses need to be seen in *conjunction* to existing views that explain how difficult it might be for a firm to expand internationally. For this reason, we consider both a set of traditional control variables, and a number of variables that explain the CAGE attributes, keeping with existing literature, as we will explain in the following section.

DATA AND METHODS

To help us test these hypotheses, we conducted a survey in four CIS countries (Ukraine, Moldova, Georgia and Kyrgyzstan) between the summer of 2007 and the winter of 2008. We chose these countries because we wanted to study firms in similar settings, with relatively similar industry structures and business environments, so that other environmental factors would not differ as much and we could avoid including additional controls.³ So this multi-country setting had a good balance between heterogeneity and comparability: the former Soviet Union countries seemed to offer a good

³ Note that, in principle, we could conduct the study on the basis of data coming only from one country, as the international dimension comes from the comparison of the operations of firms within their host country to the operations they had in their home countries. Adding more countries where the hosts are considered is thus an additional safety check that our results are not driven by idiosyncrasies in one national environment.

setting as they have relatively similar industry structures (inherited from the common past), yet they have been developing independently for more than 15 years, resulting in a sufficient degree of heterogeneity. This particular survey was a part of a bigger survey that was conducted under the auspices of the European Union's Sixth Framework Program (FP6); hence we were able draw on the resources available for that purpose.

Setting and data

First of all we developed a preliminary questionnaire that was tested on four companies. The questionnaire was adjusted following this pilot study and mailed out to our target sample at a later stage. The target sample was constructed as follows. Each country's chamber of commerce (or similar body) was approached in order to obtain a mailing list. Since there are few foreign investors in Moldova and Kyrgyzstan, the sample covered the majority of significant international companies operating there (about 100); whereas in Ukraine and Georgia the questionnaire was mailed out to the largest 100 foreign companies.

The mailing package consisted of a cover letter and a questionnaire. The cover letter was directed to the Managing Director and explained the aims of the study. The mailing was followed up a week later with a phone call to boost participation. We received 117 replies in total, representing a response rate of 31%, with participation rates roughly equal across countries (please see Table 1 for details). The non-response bias examination showed no significant difference between the companies which chose to participate in the survey and those which did not.

The sectoral composition of the companies surveyed reflects the sectoral FDI distribution in each country (see Table 1). To guard against sectoral composition driving our results, we included sector dummy variables, which proved both to be insignificant, and, more to the point did not affect the significance or magnitude of the variables of interest.

Insert Table 1 about here

Dependent variables

Our key dependent variable is a manager's perception of the subsidiary's performance (*subsidiary performance*). This, as with all perceptual variables in our survey, was measured on a five-point Likert scale. More specifically, the question was, "Please evaluate the performance of your [country] subsidiary".

This, of course, is not a true measure of performance as such, but a satisfaction effect, which is also subject to individual biases. However, we expect this measure to perform adequately, since our hypotheses are referring to the "success of foreign operations", in which case the satisfaction measure effectively reflects the perception of the success or lack thereof. It is also worth noting that any "objective" measure of success of foreign operations would require controlling for all the inputs required; after all, the theory developed predicts how, *ceteris paribus*, the structure of the value chain makes foreign operations more successful. Given the difficulty of constructing such a measure, and the reluctance of companies to divulge such financial or operational information, a second-best approach is needed. In that spirit, we do think that the measure of satisfaction with foreign operations should provide an appropriate test of our hypotheses.

Our second dependent variable (used to test H5) is *difficulty of overcoming differences*. In addition to understanding the value chain/industry architecture's impact on international success, we also want to understand how easy it is to overcome such difficulties. In particular, it would be interesting to assess to what extent modularity and the extent of similarity of value chains independently and jointly explain the *difficulty* of overcoming these differences. As such, we used as a dependent variable the response to the question "How difficult was it for you to overcome the differences in the industry structure?"

Independent variables

Our first independent variable, also measured on the same Likert scale, is *sector modularity* (the extent to which it is easy to separate the different parts of the sector). This variable (*sector modularity*) is the answer to the question "how easy is it to break up the activities of your sector in separate components/modules?" This, as we verified in the pre-testing period, reflects fairly adequately the

manager's perception of the ease of breaking up the activities of the sector in separate components/modules (i.e. the sector's institutional modularity). *Sector modularity* thus provides a direct test for H1.

Our second independent variable employed to test H2 is directly related to the firm's embeddedness in the *home* country (i.e. close linkages between the focal firm and other organizations in the country of origin). This variable (*home embeddedness*) is the response to the question "Does your company have close relationships with buyers/suppliers in your home country?" It allows us to consider the impact of home embeddedness on the success of international expansion directly. For our argument to be supported, we would expect the links *within* the home country (*home embeddedness*) to be significant.

H3 tests the role of dependencies on the local ecosystem in terms of dependencies and linkages and the potential problems this may cause. In this context, we consider to what extent there are close links with, and a dependency on, local partners. Our *local dependency* variable is the answer to the question "To what extent does the success of your operations in [host country] depend on the performance of, and relationships to, other *local* industry participants (e.g. other supply chain partners, providers, etc)?"

In addition to this perceptual measure, we also added another, objective measure. One of the questionnaire items asked (for the parts of the value chain not handled in-house) what percentage of the components of the value chain is procured locally; vs. procured from the home country or other subsidiaries. We thus constructed the variable *percentage of global value chain partners*, which was the percentage of the value chain components that were procured from the home country or other subsidiaries as a percentage of the total. We expect that the lower this percentage, the greater the difficulties with global expansion. This variable provides another test for H3, as it provides a measure of the orientation towards global (as opposed to local) partners, itself a potential indication of the issues with the difference between the home and host industry architectures. Our expectation is that the percentage of the value chain components procured from non-local firms will *ceteris paribus* be positively associated with satisfaction, since firms will find these suppliers more familiar and easier to deal with, and will not face the challenges of adapting to a potentially different industry architecture.

The second set of hypotheses we develop looks at similarities. The *sector similarity* variable provides a direct test, as it corresponds to the manager's perception of the similarity between the value chain structures in host and home countries. Specifically, it is the answer to the question "how similar is the structure of your industry in your home country to the structure of the industry in [subsidiary location]?" *Sector similarity* provides a direct test for H4.

Control variables

Our study also employs a number of both theoretically driven control measures, and other standard control variables that could have an impact on success of expansion. Some of these consist of "objective measures", either gathered through the survey, or taken from external sources (explained below); others draw on perceptual measures measured in the same Likert scale, so as to ensure that our results are not driven by common method bias.⁴ More specifically, we employed the following measures at the country, industry, and firm level of analysis:

Country level.

The first set of control variables draws on existing theory, and considers whether the standard theoretical predictions hold sway in our sample; and how such predictions work in conjunction to our variables of interest. We employed the CAGE framework (Ghemawat 2001) as a standard theory which explains the success of foreign expansion. Ghemawat reintroduced an idea that contextual factors (distance along various dimensions) affect performance of a firm's international operations. He suggests that the distance between home and host countries in terms of cultural, administrative, geographic and economic dimensions has a significant impact on the success of multinational enterprise's (MNE) operations abroad. All else being equal, companies operating in relatively close markets (along the four dimensions) should find their operations more successful than their peers

⁴ The intuition is that having a number of controls rated on the same Likert scale can help alleviate the concern that our results are spurious, *inasmuch as* a number of the controls are *not* significant, even if they are rated by the same raters on the same scale. That is, if at least some of the controls that were rated on that Likert scale were to be significant, then we would have to discount the findings on the main part of our analysis.

operating in more distant markets. Consistent with the prior literature we consider a number of variables which have traditionally been used to measure the distance of the parent company to the host country in terms of culture, administration, geography and economy (Chan, Isobe & Makino, 2008, Ricart, Enright, Ghemawat & Khanna, 2004, Nachum & Zaheer, 2008). Table 2 details both variables and their sources.

 Insert Table 2 about here

Industry and firm level.

We have also included several industry and firm level variables. At the level of sector we include the *number of suppliers* and the *number of customers*. While these measures do relate to industry architectures, they also relate to more traditional issues of power and dependency (Pfeffer & Salancik, 1978) or the potential risk for *post hoc* renegotiation (Williamson, 1985). Including these variables should enable us to provide a more robust view of the ease or difficulty of expansion, *having taken into account* the power structures in the sector.

Additionally, the variable *global dependency* is employed to measure the dependence of a firm on its global value chain partners. It is the answer to the question “To what extent does the success of your operations in [host country] depend on the performance of, and relationships to, other international industry participants (e.g. other supply chain partners, providers, etc)?”⁵

The inclusion of *global dependency* helps us address an important research design reason, as it can help us deal with the risk of spurious correlation. The problem is that if H3 is supported, we cannot safely claim that it is the *local* dependencies that matter; it might be that *any* tight connections make it more problematic to expand globally, as resource dependency theory (Pfeffer & Salancik, 1978) would

⁵ We explained that this included the home country.

predict. To make sure it is the *local* conditions and value chain dependencies that matter, we need to confirm that *other* types of dependency are at least not correlated and at best positively correlated with success in global expansion. Thus, including *global dependency* as a regressor is crucial for our interpretation of the results on *local dependency*.

At the level of a firm, we included a number of objective and perceptual controls in the questionnaire. In terms of “objective” measures that can be reasonably expected to affect satisfaction with global expansion (or the ease of overcoming problems), we first control for the number of years a subsidiary was in operation (*years of operation*). Second, we control for the subsidiary size by including: 1) annual turnover variable (*turnover*), and 2) *number of employees*. Third, we control for the level of the initial investment in the subsidiary (*initial investment*). Fourth, we account for the market share a subsidiary has in the country (*market share*), as this can affect performance significantly. Next, we account for export orientation of the subsidiary by controlling for the percentage of goods exported: 1) intermediate products (*percentage of intermediate products exported*), and 2) final products (*percentage of final products exported*).

In addition to these objective questions, we added more perceptual Likert-scale type questions, both to see if other factors drive satisfaction with expansion, and also to consider if our results could be driven by common rater bias (if either of the two motivations were true, then the controls should be significant). Specifically, we control for investment orientation of the subsidiary, i.e. whether a company’s global venture was initiated with the intention to get access to: 1) low-cost resources (*cost of resources*), 2) internal market (*market access*), or 3) develop new products using local expertise (*develop new products*). Chan et al. (2008) showed that investment orientation of the subsidiary is related to its performance. Furthermore, we control for the parent company’s prior experience in the region (CIS countries) by including a variable (*other CIS investments*) that takes the value of 1 if the company had made investment in other countries in the region. In addition to these variables, we also considered *every* questionnaire response (the questionnaire is available upon request), specifically to ward off against spurious results from common rater bias. These questions considered the links of the subsidiary with the parent company, the nature of inputs that the subsidiary has to the parent company

and the types of problems encountered in the host business environment. As none was significant, we do not report them here. Table 3 provides the descriptive statistics and correlation table for all variables.

Insert Tables 3 here

Methods

When the dependent variable is measured on an ordinal scale (as indeed is the case with our data), the standard OLS technique is not applicable as a number of its assumptions are violated, including measurement, homoskedasticity and normality of the error term. In the case of the categorical dependent variable, logistic models (based on a maximum likelihood estimation) are shown to produce more efficient and, more importantly, consistent estimates (Agresti, 2002). However, when the categories are ordered, multinomial logit or probit models are not appropriate because they fail to account for the ordinal nature of the outcomes (Greene 2002). In this case the ordered (or cumulative) logit model is the most appropriate, as it does not rely on subjectively chosen scores assigned to the categories and takes the ceiling and floor effects into account (Agresti, 2002). Furthermore, hypothesis testing is more powerful, and results are easier to interpret and present in ordered logit model as compared to multinomial logit (Allison, 1999).

As our study is based on a questionnaire completed by a single executive, it is potentially prone to common method biases (Podsakoff, MacKenzie, Lee & Podsakoff, 2003, Podsakoff & Organ, 1986, Bagozzi & Yi (1990)). Traditionally, the problem is caused either by the same person rating both predictor and resultant variables, or the manner and/or context in which items are presented to respondents. For example, participants could have biased our results by basing their responses to the satisfaction measures on certain implicit beliefs about the degree of sector modularity and similarity. The key biases resulting from the common rater can be caused by 1) consistency motive, i.e. respondents attempt to be consistent in their responses throughout the questionnaire, 2) implicit

theories that raters are trying to stick to, 3) social desirability, i.e. a desire to be seen in a positive light, 4) leniency biases, a propensity to rate people that respondents like higher than they should, 5) item complexity and ambiguity, 6) scale format and anchors, 7) negatively worded items, and 8) item embeddedness.

Let us consider each of them in turn, notably when and how such concerns apply in our context and how we dealt with them empirically. First, the biases caused by the consistency motive and implicit theories seem not to be present as our questions do not imply some definite causalities. Second, we can say the same about the social desirability and leniency triggered biases, as our questions are very neutral in terms of social desirability and do not require any rating of other people. Furthermore, the inclusion of controls that are arguably more evaluative should provide a further test; if such evaluative questions are not significant, then our results are unlikely to be driven by common rater bias. Third, the biases caused by question complexities could come into play (for example, on questions related to institutional modularity), but short interviews we conducted with respondents after our pilot study confirmed that they understood precisely what the questions were about. This gave us more confidence that the questions were formulated in an accessible way. Fourth, scale format and anchors seem also not to be a problem, as there is a substantial variation in answers to the questions (as will be subsequently confirmed by our econometric analysis). Fifth, we do not have any negatively worded questions, our questions do not seem to be embedded in the positive/negative context, and they are very neutral – hence obviating the last two potential causes of bias.

Furthermore, our construct items were placed together within general topic categories, as opposed to being grouped together by variable. The logic is that respondents would be unable to detect readily which items belong to which constructs or guess the relationship between predictor and criterion constructs. We also have a large number of questions related to control variables (which can be perceived as key variables by respondents), which makes it very difficult for respondents to discover what relationship is of key interest to the survey and modify their responses accordingly. Thus, although common method bias may potentially be present in a study conducted via a survey filled in by a single respondent, the way our questionnaire was

designed helped to alleviate this problem and made it a lesser concern. It might also be worth noting that a similar approach has been taken by other researchers who have relied on questionnaires in recent publications. For instance, Robson & Bello (2008), Monsen & Boss (2009), and Chua, Ingram & Morris (2008) amongst others, used a similar logic to substantiate their methods.

RESULTS

Table 4 presents the results of estimation of ordered logit models using *ologit* command in STATA 9.0. To ensure that our results were not driven by peculiarities of the sample and estimation technique, we also ran OLS, which, despite its theoretical deficiencies for ordinal data analysis, has been shown to produce results qualitatively similar to results obtained using logit regression (Allison, 1999). Indeed, OLS estimates were very similar to the ones we report in Table 4, thus increasing our confidence in our results.

We present six different estimation specifications in Table 4. The first five specifications share the subsidiary performance as a dependent variable, whereas the sixth specification is run with "difficulty of overcoming differences" as a resulting variable (H5).

The first specification (S1) only includes firm and sector control variables as regressors; more explanatory variables are added in specification 2. Most control variables have relatively low power in explaining the variance in our dependent variable in specification 1, other than market share, which is positive and in the expected direction (we would obviously expect that high market share would be associated with higher satisfaction, though the direction of the causality is not clear). Input measures, or size measures (such as investment or employee number) do not have a clear directional impact on satisfaction: it appears that size or magnitude of investment cut both ways, leading to higher expectations and as such no clear link to satisfaction. It is also worth noting that the overall ability of the model to explain variance is limited; the pseudo-R-squared, is just under 19%.

The second specification has full set of control variables, i.e. we add country-level (CAGE) variables to the earlier set of firm- and sector-level controls.⁶ We notice that their inclusion does moderately improve the fit of the model – the pseudo-R-squared goes up to 28.7%. However, the significance of the CAGE variables themselves is low, with only economic distance measured by difference in GDP being significant and in expected direction.

The third specification (S3) includes our explanatory variables and firm-level controls. Most control variables have relatively low power in explaining the variance in our dependent variable in specification 1 again. Only *market share*, *percentage of intermediate products exported*, *develop new products* and *other CIS investments* seem to play a role. Input measures, or size measures (such as investment or number of employees) do not have a clear directional impact on satisfaction: it appears that size or magnitude of investment can cut both ways, leading to higher expectations and as such no clear link to satisfaction.

Percentage of intermediate products exported is significant with a negative sign. Our explanation is that this might indicate that subsidiaries that are set up to produce a significant amount of intermediate goods for export back to the headquarters face a number of difficulties related to manufacturing to exact specifications from the headquarters in a timely manner, or possibly problems with export/import operations.

Interestingly, managers of those subsidiaries that were created to develop new products for local and CIS markets (*develop new products*) seem to be more satisfied with the firm's performance – possibly due to the relative ease of product development versus bringing product to market in the countries in the sample.

⁶ We tested all CAGE variables we discussed earlier, yet we excluded some of the less significant variables from S2, due to the concern with degrees of freedom. We also conducted principal component analysis of the corresponding variables for each CAGE element. None of the principal components appeared to be significant in our model, hence we went back to analyzing of the impact of individual variables.

Another interesting relation is the role of previous experience in expansion (*other CIS investments*), which, perhaps counter-intuitively, is significant in a *negative* direction – that is, if a firm has another subsidiary in another country, it tends to be *less* satisfied. This might seem odd at first, yet could be consistent with our thesis: firms with experience in moving abroad could possibly expect that they would be able to carry their expertise through to a different country (and different industry architecture) but fail to do so, finding themselves more dissatisfied than happy. This might be an interesting issue for further research.

 Insert Table 4 about here

Next, we consider how our explanatory variables affect the results. First, we note the very substantial impact as they increase the variance explained from 19% (or 28% including CAGE) to 55% as measured by pseudo-R-squared. Furthermore, *sector modularity* and *sector similarity* are both highly significant (well below the 1% level) and in the expected direction; the more modular a sector is, and the more it resembles that of the home country, the greater the satisfaction. We also find that *local dependency* is highly significant (at the 1.4% level) and in the expected direction – the more locally dependent (to other industry participants) a firm is, the lower the satisfaction. *Home embeddedness* – the extent to which a firm has strong links with other supply chain partners in its country of origin – appears to be in the expected direction, but is insignificant. An important control variable *global dependency* has the predicted sign, but is not significant. As we mentioned earlier, testing for *global dependency* helps ensure that *local dependency*'s potential significance is not due to the fact that *any* dependencies along the value chain are detrimental, but rather that *local* connections in the industry architecture make expansion difficult.

We again add country-level controls (CAGE) into our next specification S4. Yet, we have to omit some of the less significant (theoretically and statistically) firm-level controls such as *market share*, which despite being borderline significant, is not reported by a number of respondents, potentially reducing our sample size; its omission did not materially affect the coefficients.

Looking at the results of this specification, we observed that the inclusion of CAGE variables does not affect the significance of our key variables of interest – *sector modularity* and *sector similarity* – at all. Also, it does not substantially increase the significance of the overall regression in terms of fit. In fact, the pseudo-R-squared drops to 48%, which is not surprising as there were fewer degrees of freedom (since several new variables were added), and as we eliminated some of the insignificant controls from S3 to avoid over-specification.

Interestingly, with inclusion of our explanatory variables more CAGE variables become significant. In particular, culture, geographic (distance and transport) and economic distance (differences in GDP and consumer incomes) are significant at high levels and work in the expected directions. Interestingly, although CAGE model does not seem to be highly significant on its own, the inclusion of our explanatory variables improves significance of CAGE variables also. This raises the intriguing possibility that CAGE and industry architecture attributes are *complementary* means of explaining success in expansion abroad.

We also ran a related specification (S5) where we tested H2 through the variable *percentage of global value chain partners* (an objective measure of value-chain structure). In this specification, we excluded *local dependency* and *global dependency* from S3, as they refer to the same conceptual constructs as *percentage of global value chain partners*. While *percentage of global value chain partners* has more missing variables, the results held up, and the variable was significant in the 4.7% level of confidence. The other relationships remained without much change. The key variables – *sector modularity* and *sector similarity* – remained significant at about 1% level; and *home embeddedness* became significant at the 5% level. The latter relationship has a negative sign; reflecting the fact that the more embedded the company is in its home country's value chain, the more difficult its international expansion would be. This finding provides direct support for H2. The CAGE variables become even more significant in this specification, whereas some of the firm-level controls lose their significance. Of course, given the more reduced sample size, these results have to be interpreted with caution.

Finally, we test Hypothesis 5 in our sixth model (S6). This time, the dependent variable is the perceived difficulty of overcoming differences in the industry structure. All the other variables are the same as in S3 (except for *market share*). It is important to note that the controls here are largely not significant (and neither would there be any *ex ante* reason to expect them to be). Sector similarity is in the expected direction, but at a lower significance level of just 9%. However, sector modularity is very significant (again, at the 1% level). Thus, as predicted, modularity and similarity of a sector make it easy to overcome the difficulties – interestingly, even more so than global dependencies, which, while in the expected direction, are almost borderline 10% significant. It is also noteworthy that few other variables whether measured on the same scale or not, can account for how difficult it is to overcome these problems. This thus supports H5 as higher levels of institutional modularity of a sector alleviate perceived difficulty of overcoming the differences in the industry structure between host and home economies.

In terms of further robustness checks, we did try the regressions with different sub-samples, both randomly and systematically constructed (by country of destination). The results did hold up. We also made a jackknife estimation, to ensure that the results were not driven by data particularities.

DISCUSSION

Interpreting our Results

Taking a general view, we can see that the results of our survey offer support, at varying levels of confidence, to our hypotheses. Starting with Hypothesis 1 (“the more institutionally modular a sector is, where a firm expands internationally, the more successful the firms’ foreign operations will be”), we find strong support regardless of specification. The related variable (*sector modularity*) is significant below the 1% level in essentially every model, and when it is included to the regression, it adds substantially to the increase in the fit of overall fit. Its economic impact appears to be also quite important.

Hypothesis 2 (“the greater the embeddedness of a firm in its home environment, the less successful its foreign operations will be”) has received mixed support. A direct measure of the *home embeddedness* is only significant in S5, in which we substituted *global dependency* and *local dependency* for an objective measure of linkages *percentage of global value chain partners*. It is not significant in specifications containing the former two variables.

Our third hypothesis (“the greater the dependencies of a firm in the value chain of its host environment, the less successful the firms’ foreign operations will be) is strongly supported. Hence, local dependencies are reported to negatively affect the success of foreign operations for multinational firms. Our control variable on *global dependency* yields a non-significant positive result, which means that not *all* dependencies along the value chain are detrimental in our sample – only the *local* ones do. This confirms our argument that dense linkages with local value chain partners aggravate the difficulties created by the differences in industry architecture that, in its turn, has a negative effect on satisfaction with foreign operations.

Furthermore, in an additional, independent test of H3 through the variable *percentage of global value chain partners* (an objective measure) also provides significant results. We find that the more a firm sources from its home country or its subsidiaries, the greater the satisfaction with global expansion; this is consistent with H3. It is worth stressing that this correlation draws on objective as opposed to perceptual data, but is in the same direction with the perceptual variable – and significant. This increases the confidence in our previous results.

The fourth hypothesis (“the greater the similarity in value chain structure between host and home country, the more successful global expansion will be”) appears to be supported strongly again: *sector similarity* has a strong positive coefficient, and is significant in the regressions we report below 1% (though depending on specification its significance can drop somewhat, unlike that of modularity, up to the 1.5% level). Thus, similarity in terms of industry architectures, even when we account for numbers of suppliers and buyers, modularity, etc, still seems to be a substantial driver of success with (or, more strictly put, satisfaction with) international expansion, as we predicted.

Our last hypothesis looks at a different dependent variable, and considers what makes it easy to overcome such industry architecture challenges. H5 (“The greater the institutional modularity of a sector, the easier it is for a company to overcome differences in value chain structure between host and home countries”) is also supported at a high level of confidence. This further reinforces the findings that highlight the role of modularity as a factor that eases the transition to a new industry/country ecosystem. What is more interesting is that this relationship (which is valid at the 1% significance level) is still important if we throw in the “sector similarity” variable, and is actually more significant (statistically and economically) than similarity itself. In other words, modularity is a better predictor of how easy it is to adapt to a different structure than the extent of the difference between the home and the host country.

Summing up, our findings do seem to suggest a fairly broad support to the proposition that both similarities between the firm’s sector in its home country and the same sector in the host country, and particularly the modularity in the sector, are good predictors of satisfaction with, and probably success with international expansion. As such, the basic tenet of the paper appears to be supported, sample and method limitations notwithstanding.

Limitations

Before moving to the implications that these findings have for theory and practice, as well as their relationship to recent literature, some words of caution are called for. First, our analysis aspires to examine satisfaction with global expansion as subjectively identified by managers, as opposed to an objective measure, with all the potential shortcomings that this might entail. And while we believe that our approach is consistent, and that it tackles the thorny issue of accounting for the inputs that have gone into making a successful global venture work, we should still use caution in interpreting these results.

Second, we focus on success of foreign operations in both our theory development / hypotheses and our testing. This provides potentially useful but limited results, as the success of international expansion includes additional factors that go beyond success in local operations – or the satisfaction with them.

Thus, we do not consider broader benefits that might emerge in a multinational going abroad, such as the learning or network effects that accrue at the level of the entire firm. However, it does seem that these benefits are not, *prima facie*, correlated to either success or failure of local operations. The only interesting connection in this regard could be a potential positive correlation between learning and local failure, which could be considered in future research. Furthermore, from a methodological point of view, we feel that explicitly considering success of local operations only allows us to rely on the local managers, sidestepping the potentially thorny issues of distributed learning and its assessment in a large global organization.

Third, we have taken the modularity and overall structure of a sector (when comparing home and host) as a fairly simple / unitary issue. That is, we implicitly presumed that there is one architecture in each country that can be compared to that of another. This is a simplification, as in each country there can be a variety of ways in which labor can be organized and structured. This in and of itself does not pose too much of a problem, inasmuch as we substitute “industry architecture” with “potential industry architectures” in a sector in a country. But still, we do not look at the issue of how much choice in terms of the architecture firms have in each country; in one setting, for instance, it might be easy to choose from a long menu of options, unlike another. These issues have been side-stepped. Likewise, we have abstracted away from another important element, which is how firms can not only chose but also re-shape their architectures. What makes some firms that expand abroad able to re-shape their sector, or mould it to their own advantage, is not considered in this paper, and surely merits dedicated research.

Fourth, in common with other survey-based studies, we must note limits to the generalizability of our results. At the level of sectoral composition, we believe that this should not be particularly constraining, as the range of sectors involved was large, and as sectoral dummies were not significant. In terms of the countries we studied, greater reservations should be noted. It might be that factors relating to industry architecture are more relevant to countries such as Moldova, Ukraine, Georgia and Kyrgyzstan. While our results broadly held up in subsamples that looked at each country separately, and country dummies did not change the results, reservations do remain. In particular, we cannot know

if the results would hold equally for a developed country. We would leave this issue to be explored in future research.

Fifth, our study is also subject to concerns caused by the small sample size employed, given that we employ a maximum likelihood estimator. We have tried to address this concern by looking at separate sub-samples, which did replicate our results. Furthermore, the results for our main variables do have high p-values; and as such, we have followed current practice which expects that smaller p-values can compensate for the fact that the approximation to the normal or chi-square distributions may be poor (Allison, 1999). We have also estimated the model for different sub-samples, and the results held up.

Finally, we should register concerns with the potential common method bias. In our setting, we do think these are not highly relevant as our variables are conceptually unrelated, hence, it would have been very difficult for our respondents to guess any relationship between predictor and criterion constructs. Both questions that we put to managers, and the independent variables derived from the responses, relate to the *structure* of sectors, industries and value chains rather than the capabilities or performance of the individual firm or the acumen of its managers. Therefore, there is no *a priori* reason to expect that the executive providing the rating will fall prey to any attribution bias that might distort the results. In addition, since respondents are also assessing a broad range of other attributes of settings and sectors, there is no reason to expect that their evaluation of our independent variables will show a spurious correlation. Additionally, non-perceptual variables (such as *percentage of global value chain partners*) are consistent with the perceptual ones. Still, limitations of this approach should be noted.

Our findings in context and some conjectures

By emphasizing the role of *industry architectures* and the nature of the value chain (in terms of modularity and similarity), our paper sheds light on a relatively neglected driver of success in international expansion. This approach contextualizes some of the comparative institutional analyses of “varieties of capitalism” (e.g. Whitley, 1992), as our focus is not on a country overall, but rather on the *sector* within a country. Through this approach, we help address some nagging questions, such as why we see substantial international activity in some sectors and far less in others. It suggests that the extent

of modularity and the degree of similarity between different countries are important predictors of successful global expansion.

Our results could be also used to explain the findings of Makino, Isobe and Chan (2004) that engage in variance decomposition, comparing the strength of country, industry, corporate and affiliate effects in explaining the performance of foreign affiliates. They find that country effects are as strong as industry effects, followed by affiliate and corporate effects. Interestingly, they report that the joint significance of country and industry effects is significantly higher than the significance of each of the factors independently. This finding is consistent with the industry architecture approach, as it suggests that the way a particular industry is organised in a particular country is a more important factor explaining affiliates' performance than only country or industry effects seen in isolation.

Our findings also afford us the opportunity to make some conjectures and provide educated speculation. In that regard, it is important to note that the growing harmonization of business practices, either mandated by national and international regulatory agencies, or brought about by the institution of actual or presumed "best institutional practices", may lead to greater isomorphism in value chain "junctures" and structures. This, in turn, can help foster international inter-penetration. Thus, our approach provides a rationale for the phenomenon observed by Feenstra (1998) of the "dis-integration of production and integration of trade". As industry structures in different countries converge, and as they become *both* more modular and more similar, substantial benefits for inter-country specialization and international activities come about.

Such convergence is reinforced by global competitive dynamics: as some very effective global competitors emerge in particular parts of the value chain in one country, they may force changes in the value chains of other host countries. Local firms in these countries, in turn, try to accommodate and capitalize on these global competitors' capabilities in their national setting, by finding more effective, modular ways to link with them. As such the structures of industries are endogenously changed, with modularization of capabilities begetting institutional modularization, which in turn begets even more pronounced benefits from being modularized, in a process similar to that described by Jacobides &

Winter (2005). Thus, through competition, a global convergence in terms of value-chain structures is often self-reinforcing, and this process, when initiated, leads to increasing globalization of previously insular sectors, as evidenced by the drastic increase in intermediate trade.

Additionally, changes in information technology might affect strategy on the global and national level, by virtue of their creating a homogenized, decomposable value chain (Evans & Wurster, 1997; Tallon, Kraemer & Gurbaxani 2000; Koh, Kyungdo, Prybutok & Seogjun, 2007). While the impact of IT on industry structure might not be quite as pervasive as we once thought, efforts to homogenize value chains internationally do continue apace, driven not only by regulation but also, and mainly, by the firms that expect to profit from it – an element that has been overlooked in much extant research. Thus, studying how firms try to re-shape global value chains could be an exciting venue for research. This would expand Henisz's (2003) discussion on how firms succeed in global expansion through their capabilities in shaping their institutional environment abroad, by looking at the level of the *sector* and its attendant industry architecture.

Continuing on the conjectures these findings afford us, it is sensible to suggest that the rapid growth of outsourcing and offshoring allows firms such as Infosys or Capita to develop modules that do fit in particular industries; and suggest they try to do so by adapting or potentially changing the value chain structure. This paper's angle, which combines the analysis of value chains, industry architecture with exportability of competitive advantage, can thus help shed some further light to the growing phenomena of outsourcing and off-shoring, which surely merit more dedicated research. Our approach, supported by our empirical findings provides a foundation for further study, and a set of hypotheses about why and when we would see more such trade as a result of value-chain modularization and of increasing similarity along the value chain.

Finally, while recent research has started looking at the dynamics of "globally modular structures" (see Sturgeon, 2002) we have yet to consider similarity along the value chain as a driver of globalization. This may be an important area of study, as for many service sectors (which constitute the *majority* of the GDP – such as healthcare, education, or financial services) there is still substantial (albeit declining)

international heterogeneity. The degree to which countries might converge or diverge in terms of their industry architectures (within zones such as the European Union/ASEAN/NAFTA or globally) could be a substantial predictor of international activity. Given the empirical/economic importance of these sectors, the study of industry architecture dynamics at the global level seems called for.

To return to the broader theoretical context, it is worth quoting Meyer & Rowan (1977), who noted that organizations encompass "systems of coordinated and controlled activities that arise when work is embedded in complex networks and boundary spanning relations". This paper has provided one specific new way of looking at the evolution of these networks. It looks at the structure and the dynamics of the institutional layout of sectors; at the nature of the value chain and the relationships of actors within it.

CONCLUSIONS

In this paper, we offered a new explanation for the question of whether and how firms can capitalize on their competitive advantage in international expansion. Over and above the "normal" challenges of such expansion (cultural, institutional, physical and so on), the *comparative structure* of the value chain/industry architecture was shown to be a crucial determinant of success. In particular, we found substantial empirical support for both the role of institutional modularity, and of the similarity of industry architectures.

The focus on industry architectures could thus help expand our theoretical arsenal. Based on the premise that value chains are broken down differently in different countries, our findings suggest that we need to understand the nature, structure and capabilities of the vertical modules for the same industry in different countries. We also need to consider the "compatibility" of similar sectors in two different countries, as well as their respective degrees of modularity. Thus, the essential contribution of this paper is to identify an additional, critical level required in the analysis of globalisation: the structure of the value chain. If we aspire to understand why some sectors are so open to globalization, others hardly at all, we have to move beyond the study of individual firms and individual countries, focusing instead on the similarities and contrasts between similar value chains in different countries. By

doing so, we can identify the competitive advantages that can be transferred to new surroundings – those that have the potential to live “out of context”.

Our findings point towards new sets of prescriptions for firms – and for regulators too. For managers considering international expansion, assessing their own resources and capabilities and analysing the potential host nation should be accompanied by a careful assessment of the potential set of interdependencies within the home and host country’s value chains; and the similarity of the value chains in different countries. Our findings also suggest that firms might benefit from shaping industry structures in countries they aspire to operate in, as well as ensuring there are modular interfaces to facilitate international relations (see Puranam & Srikanth, 2007). This set of prescriptions could also yield useful advice for firms that might face new challenges from global competitors, brought about by the increasing modularization and homogenization between sectors that is facilitated by technology and international treaties.

Regulators could also benefit by considering such sector-level analyses. First, this might help them understand where the real bottlenecks for globalization are. For instance, the examination of the international differences at the level of the sector could help baffled European regulators understand why European integration in services or sectors such as construction (Winch, 2000) is so slow to emerge; and it could help identify factors that might promote more international activity. It might also provide a blueprint on how changes in technology and regulation (which may affect value chain structure and modularity) might stimulate changes in terms of local and global competition.

As we have seen, some sectors are more heterogeneous, others less so. But the picture is always changing, which is why studies in this area are so important. It is not an exaggeration to state that worldwide economic development in the coming decades will be shaped by the global homogenization of value-chain structures. There can be no doubt that the trend is towards greater homogeneity. Production is becoming less integrated, while trade is becoming more so (Feenstra, 1998). Service globalization, aided by the offshoring of service components to low-cost economies, has transformed industry architectures, and the current crisis is making many

countries re-think the way they organize and regulate sectors, both locally and globally. As such, the *explicit study* of the “comparative industry architectures”, and the examination of whether they converge or diverge, can prove to be a useful tool not only to predict success of particular firms as they try to expand their advantage abroad, but also an important predictor of globalization trends. In this spirit, we hope that this study might become part of a growing body of evidence and theory, with concrete implications for practice.

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TABLE 1**Company Distribution by Sector and Country**

| Industry | Ukraine | Moldova | Kyrgyzstan | Georgia | Total |
|--|----------------|----------------|-------------------|----------------|--------------|
| Food industry | 4 | 4 | 7 | 4 | 19 |
| Financial services | 4 | 7 | 4 | 8 | 23 |
| Trade | 7 | 2 | 4 | 1 | 14 |
| Transport & Communications | 3 | 4 | 4 | 2 | 13 |
| Construction | 1 | 4 | 4 | | 9 |
| Oil refinery | | 3 | 1 | 2 | 6 |
| Machinery and equipment | 2 | | 1 | | 3 |
| Chemicals | 2 | | 1 | 1 | 4 |
| Textile and leather industry | 1 | | 1 | 1 | 3 |
| Woodworking, pulp and paper industry, publishing | 1 | | 1 | | 2 |
| Mining | 1 | | | 2 | 3 |
| Energy | | 1 | | 3 | 4 |
| Agriculture | 1 | | | 1 | 2 |
| Other activities | 2 | 4 | 1 | 5 | 12 |
| Total | 29 | 29 | 29 | 30 | 117 |

Source: survey results

TABLE 2
CAGE Variables and their Operationalization

| CAGE Element | Variable Employed in Our Analysis | Operationalization | Source |
|-------------------------|--|--|--|
| Cultural Distance | Culture | Euclidean distance of the four cultural dimensions by Hofstede | www.geert-hofstede.com |
| | Language | Dummy variable, 1 = different | CIA World Factbook |
| | Ethnicity | Dummy variable, 1 = different | CIA World Factbook |
| | Religion | Dummy variable, 1 = majority different | CIA World Factbook |
| Administrative Distance | Colonial ties | Dummy variable, 1 = no | Various sources |
| | Shared association (CIS) | Dummy variable, 1 = no | Membership in the CIS |
| | Political institutions | Dummy variable, 1= election system different | Database of political institutions, WB |
| | Institutional quality | POLCON III & POLCON V averaged for each country, the value presented is the absolute value of the difference between the two countries | POLCON dataset, W. Henisz |
| Geographic Distance | Distance | The distance between the 2 countries using the great-circle distance formula (Coval & Moskovitz, 1999) | www.mapcrow.info |
| | Common border | Dummy variable, 1 = no | CIA World Factbook |
| | Transportation infrastructure | Number of registered air carrier departures from recipient countries | World Development Indicators 2007, WB |

| | | | |
|-------------------|------------------|--|---------------------------------------|
| Economic Distance | Consumer incomes | Difference in GDP per capita | World Development Indicators 2007, WB |
| | GDP | Difference in GDP | World Development Indicators 2007, WB |
| | Communications | Difference between the number of landline per 100 people | World Development Indicators 2007, WB |

TABLE 3. Descriptive Statistics and Common Sample Correlations

| Variable | Mean | Std. Dev. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | | | |
|--|------------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|-------|------|------|------|--|--|--|
| 1 Subsidiary performance | 4.15 | 0.72 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 Difficulty of overcoming differences | 2.30 | 0.92 | -0.20 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 Years of operation | 9.78 | 15.75 | 0.14 | 0.15 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 Turnover | 38.21 | 126.24 | 0.03 | 0.19 | -0.05 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 Number of employees | 333.13 | 543.78 | 0.17 | 0.13 | 0.03 | 0.72 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 Initial investment | 36.05 | 82.35 | 0.05 | 0.16 | -0.04 | 0.79 | 0.60 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 Market share | 30.48 | 28.99 | 0.25 | 0.14 | 0.20 | 0.09 | 0.26 | 0.15 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Percentage of intermediate products exported | 15.20 | 34.35 | 0.05 | 0.20 | 0.02 | -0.07 | 0.07 | -0.01 | 0.32 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Percentage of final products exported | 28.68 | 39.80 | 0.05 | 0.03 | 0.04 | -0.16 | -0.06 | -0.15 | 0.34 | 0.49 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 Market access | 3.94 | 1.27 | 0.35 | -0.19 | 0.02 | -0.16 | -0.19 | -0.05 | 0.15 | -0.19 | -0.11 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 Develop new products | 2.88 | 1.49 | 0.15 | -0.09 | 0.06 | -0.01 | 0.19 | 0.09 | 0.27 | -0.11 | 0.28 | 0.09 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 Cost of resources | 1.89 | 1.39 | 0.10 | -0.04 | 0.12 | -0.10 | 0.02 | -0.05 | 0.36 | 0.29 | 0.41 | -0.03 | 0.24 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 Other CIS investments | 0.65 | 0.48 | -0.01 | 0.07 | 0.11 | 0.09 | 0.17 | 0.10 | 0.22 | 0.26 | 0.14 | -0.18 | -0.01 | -0.02 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 Number of suppliers | 12679.21 | 91621.09 | -0.02 | 0.12 | -0.05 | 0.09 | 0.17 | 0.15 | 0.06 | -0.06 | -0.10 | -0.11 | -0.09 | -0.09 | 0.03 | 1.00 | | | | | | | | | | | | | | | | | | | | | | | |
| 15 Number of customers | 586.06 | 2901.91 | -0.07 | -0.08 | -0.06 | 0.07 | 0.04 | -0.03 | -0.15 | -0.08 | -0.14 | -0.10 | 0.01 | -0.13 | 0.13 | -0.02 | 1.00 | | | | | | | | | | | | | | | | | | | | | | |
| 16 Sector modularity | 2.78 | 1.27 | 0.19 | -0.20 | 0.01 | -0.08 | 0.06 | -0.22 | 0.22 | 0.14 | 0.07 | 0.09 | 0.00 | 0.19 | 0.07 | -0.11 | 0.13 | 1.00 | | | | | | | | | | | | | | | | | | | | | |
| 17 Sector similarity | 3.39 | 1.10 | 0.07 | -0.08 | 0.03 | 0.04 | 0.13 | -0.01 | 0.14 | -0.07 | 0.03 | -0.16 | -0.02 | -0.13 | 0.30 | 0.07 | 0.10 | 0.00 | 1.00 | | | | | | | | | | | | | | | | | | | | |
| 18 Home embeddedness | 3.62 | 1.47 | -0.14 | 0.15 | -0.02 | -0.30 | -0.38 | -0.23 | 0.04 | 0.08 | 0.11 | 0.02 | -0.18 | 0.05 | 0.03 | -0.10 | -0.10 | 0.02 | 0.00 | 1.00 | | | | | | | | | | | | | | | | | | | |
| 19 Local dependency | 2.97 | 1.35 | -0.02 | 0.19 | 0.11 | 0.10 | 0.12 | 0.16 | 0.25 | 0.27 | 0.06 | 0.11 | 0.04 | 0.08 | 0.27 | -0.02 | 0.14 | 0.24 | -0.07 | 0.18 | 1.00 | | | | | | | | | | | | | | | | | | |
| 20 Global dependency | 3.34 | 1.27 | 0.24 | -0.03 | -0.05 | -0.10 | -0.16 | -0.07 | 0.16 | -0.03 | 0.02 | 0.28 | -0.05 | 0.06 | 0.06 | -0.12 | -0.05 | 0.19 | 0.09 | 0.39 | 0.09 | 1.00 | | | | | | | | | | | | | | | | | |
| Percentage of global value | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 21 chain partners | 0.68 | 0.33 | -0.08 | 0.05 | -0.21 | -0.02 | -0.25 | -0.10 | -0.15 | -0.05 | 0.09 | -0.09 | -0.34 | -0.16 | 0.05 | 0.09 | -0.21 | 0.05 | 0.01 | 0.48 | -0.33 | 0.33 | 1.00 | | | | | | | | | | | | | | | | |
| 22 Culture | 58.29 | 35.18 | 0.01 | 0.05 | -0.01 | 0.03 | -0.11 | 0.05 | -0.15 | 0.10 | -0.03 | 0.04 | -0.09 | -0.02 | 0.06 | -0.05 | -0.09 | 0.12 | -0.23 | -0.07 | 0.08 | -0.01 | -0.04 | 1.00 | | | | | | | | | | | | | | | |
| 23 Language | 0.20 | 0.40 | -0.10 | -0.15 | -0.11 | 0.00 | -0.02 | -0.06 | 0.03 | -0.14 | 0.03 | 0.02 | -0.01 | 0.02 | -0.11 | -0.08 | 0.08 | -0.04 | 0.23 | 0.07 | -0.07 | -0.07 | 0.11 | -0.71 | 1.00 | | | | | | | | | | | | | | |
| 24 Religion | 0.17 | 0.38 | 0.09 | -0.09 | -0.08 | -0.02 | -0.08 | -0.09 | 0.05 | -0.06 | 0.12 | 0.14 | 0.07 | -0.03 | -0.07 | -0.06 | 0.04 | -0.16 | 0.09 | 0.11 | -0.12 | 0.17 | 0.24 | -0.56 | 0.37 | 1.00 | | | | | | | | | | | | | |
| 25 Colonial ties | 0.25 | 0.43 | -0.09 | -0.07 | -0.13 | 0.04 | 0.13 | -0.08 | 0.07 | -0.11 | 0.01 | -0.04 | 0.00 | -0.02 | -0.03 | 0.14 | 0.05 | -0.03 | 0.25 | 0.03 | -0.08 | -0.14 | 0.14 | -0.70 | 0.88 | 0.35 | 1.00 | | | | | | | | | | | | |
| 26 Shared association | 0.18 | 0.39 | -0.02 | -0.12 | -0.10 | 0.02 | 0.01 | -0.04 | 0.09 | -0.12 | 0.06 | 0.10 | 0.02 | 0.06 | -0.15 | -0.07 | 0.09 | 0.02 | 0.21 | 0.03 | -0.03 | 0.00 | 0.09 | -0.66 | 0.94 | 0.35 | 0.83 | 1.00 | | | | | | | | | | | |
| 27 Institutional quality | 0.25 | 0.17 | 0.02 | 0.26 | 0.18 | 0.11 | 0.19 | 0.12 | 0.21 | 0.29 | 0.12 | 0.06 | -0.03 | 0.04 | 0.18 | -0.13 | -0.15 | 0.02 | 0.01 | 0.05 | 0.30 | 0.05 | -0.19 | 0.08 | 0.01 | -0.20 | 0.05 | 0.08 | 1.00 | | | | | | | | | | |
| 28 Political institutions | 0.42 | 0.50 | 0.02 | -0.20 | -0.13 | 0.00 | -0.02 | 0.00 | -0.17 | -0.31 | -0.11 | 0.07 | -0.09 | -0.09 | -0.23 | -0.13 | -0.03 | -0.12 | 0.03 | -0.18 | -0.25 | -0.01 | -0.02 | -0.06 | 0.41 | 0.05 | 0.37 | 0.41 | 0.01 | 1.00 | | | | | | | | | |
| 29 Distance | 4188.48 | 3413.01 | 0.19 | -0.18 | -0.06 | -0.12 | 0.04 | -0.14 | -0.17 | -0.08 | 0.22 | -0.07 | 0.03 | -0.18 | -0.10 | -0.08 | 0.01 | -0.24 | -0.21 | -0.18 | -0.03 | -0.07 | 0.44 | -0.21 | -0.11 | -0.28 | -0.18 | -0.29 | 0.48 | 1.00 | | | | | | | | | |
| 30 Common border | 0.16 | 0.37 | -0.11 | -0.05 | -0.11 | 0.03 | 0.04 | -0.07 | 0.03 | -0.11 | 0.11 | -0.13 | 0.07 | -0.09 | -0.09 | 0.04 | 0.10 | 0.00 | 0.21 | 0.03 | -0.10 | -0.05 | 0.26 | -0.42 | 0.35 | 0.34 | 0.46 | 0.39 | 0.05 | 0.22 | -0.25 | 1.00 | | | | | | | |
| Transportation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 31 infrastructure | 12.05 | 12.53 | 0.13 | 0.03 | -0.05 | 0.22 | 0.20 | 0.25 | 0.00 | -0.04 | -0.29 | 0.18 | -0.07 | -0.04 | 0.09 | -0.09 | -0.13 | -0.05 | -0.04 | 0.00 | 0.23 | 0.14 | 0.04 | 0.22 | -0.19 | -0.14 | -0.09 | -0.16 | 0.28 | 0.14 | 0.12 | -0.04 | 1.00 | | | | | | |
| 32 GDP | -2637963.0 | 4114413.0 | -0.15 | 0.13 | 0.02 | 0.05 | 0.12 | -0.05 | 0.18 | 0.21 | 0.11 | -0.16 | 0.06 | 0.05 | 0.12 | 0.08 | 0.08 | 0.05 | 0.15 | 0.16 | 0.17 | 0.00 | 0.06 | -0.56 | 0.30 | 0.27 | 0.34 | 0.28 | 0.15 | -0.52 | -0.85 | 0.24 | -0.20 | 1.00 | | | | | |
| 33 Consumer incomes | -17175.70 | 14007.17 | -0.14 | -0.03 | -0.05 | -0.12 | 0.02 | -0.15 | 0.00 | -0.11 | -0.02 | -0.08 | 0.05 | -0.01 | -0.12 | 0.10 | 0.03 | -0.09 | 0.13 | 0.15 | -0.08 | -0.03 | 0.17 | -0.85 | 0.57 | 0.49 | 0.62 | 0.54 | 0.02 | -0.09 | -0.59 | 0.48 | -0.24 | 0.72 | 1.00 | | | | |
| 34 Communications | -25.96 | 16.68 | -0.19 | 0.15 | 0.06 | 0.06 | 0.14 | 0.03 | -0.01 | 0.00 | -0.03 | -0.15 | -0.07 | -0.14 | -0.01 | 0.07 | -0.09 | -0.18 | 0.12 | 0.18 | 0.06 | -0.04 | 0.10 | -0.70 | 0.48 | 0.41 | 0.56 | 0.46 | 0.30 | -0.02 | -0.57 | 0.43 | 0.01 | 0.57 | 0.81 | 1.00 | | | |

TABLE 4.**Results**

| <i>Dependent Variable</i> | Subsidiary performance | | | | | Difficulty of overcoming differences |
|---|------------------------|------------------|---------------------|---------------------|----------------------|--------------------------------------|
| <i>Independent Variables</i> | S1 | S2 | S3 | S4 | S5 | S6 |
| Sector modularity | | | 1.859*** (0.000) | 1.526*** (0.000) | 1.465*** (0.002) | -0.642*** (0.010) |
| Sector similarity | | | 1.569*** (0.002) | 1.239*** (0.004) | 1.171** (0.015) | -0.483* (0.092) |
| Number of suppliers | | | 0.0001 (0.361) | 0.00002 (0.819) | 0.001 (0.472) | 0.00002 (0.786) |
| Number of customers | | | 4.27e-06 (0.336) | 6.88e-07 (0.872) | -8.49e-07 (0.940) | 2.47e-06 (0.324) |
| Home embeddedness | | | -0.489 (0.234) | -0.521 (0.198) | -2.214** (0.048) | 0.078 (0.721) |
| Local dependency | | | -1.274** (0.014) | -0.669* (0.054) | | 0.380 (0.123) |
| Percentage of global value chain partners | | | | | 7.911** (0.047) | |
| <i>Control Variables</i> | | | | | | |
| Years of operation | 0.044 (0.217) | 0.043 (0.366) | 0.012 (0.821) | -0.065** (0.035) | 0.053 (0.517) | 0.012 (0.755) |

| | | | | | | |
|--|---------|---------|---------|-----------|---------|---------------|
| | -0.004 | -0.001 | -0.004 | -0.013* | -0.028 | |
| Turnover | (0.492) | (0.936) | (0.667) | (0.061) | (0.135) | 0.002 (0.715) |
| Number of employees | -0.0001 | -0.001 | -0.002 | 0.002 | -0.001 | 0.0004 |
| | (0.920) | (0.299) | (0.353) | (0.405) | (0.677) | (0.773) |
| Initial investment | 0.007 | 0.009 | 0.019 | 0.014** | 0.048 | -0.0008 |
| | (0.392) | (0.396) | (0.240) | (0.050) | (0.121) | (0.883) |
| | 0.025** | 0.019 | 0.05** | | | |
| Market share | (0.043) | (0.252) | (0.025) | | | |
| Percentage of intermediate products exported | 0.002 | 0.006 | -0.035* | | | -0.001 |
| | (0.909) | (0.701) | (0.082) | | | (0.949) |
| Percentage of final products exported | -0.0006 | 0.011 | -0.008 | | | 0.003 |
| | (0.947) | (0.981) | (0.472) | | | (0.751) |
| Market access | 0.167 | 0.726 | -1.419 | | | -0.233 |
| | (0.703) | (0.484) | (0.833) | | | (0.474) |
| Develop new products | 0.203 | 0.504* | 0.653* | | | -0.142 |
| | (0.323) | (0.056) | (0.069) | | | (0.486) |
| Cost of resources | -0.264 | -0.556* | 0.678 | | | -0.015 |
| | (0.291) | (0.096) | (0.110) | | | (0.956) |
| Other CIS investments | -0.042 | -0.098 | -2.01** | -2.969*** | -2.652* | -0.698 |
| | (0.935) | (0.884) | (0.026) | (0.002) | (0.066) | (0.247) |

| | | | | | | |
|-------------------------|-------|-------|-------------|------------|-------------|---------|
| Global | | | -0.691 | 0.697 | | 0.472* |
| dependency | | | (0.238) | (0.115) | | (0.101) |
| | | | -0.005 | -0.053** | -0.131*** | |
| Culture | | | (0.813) | (0.039) | (0.006) | |
| | | | 0.433 | 1.786 | -0.669 | |
| Colonial ties | | | (0.756) | (0.339) | (0.757) | |
| Shared | | | 1.867 | -1.697 | -1.666 | |
| association | | | (0.231) | (0.369) | (0.527) | |
| Institutional | | | -1.886 | 3.715 | -5.196 | |
| quality | | | (0.496) | (0.232) | (0.420) | |
| Political | | | -0.790 | -0.509 | 2.772 | |
| institutions | | | (0.456) | (0.658) | (0.197) | |
| | | | -0.001 | -0.001* | -0.001** | |
| Distance | | | (0.149) | (0.097) | (0.012) | |
| | | | 0.228 | 1.644 | -0.611 | |
| Common border | | | (0.836) | (0.162) | (0.805) | |
| Transportation | | | 0.022 | 0.101* | 0.227*** | |
| infrastructure | | | (0.739) | (0.055) | (0.006) | |
| | | | -4.19e-07** | -0.0001** | -0.0003** | |
| GDP | | | (0.046) | (0.044) | (0.032) | |
| Consumer | | | -0.00001 | -4.243-07* | -1.04e-06** | |
| incomes | | | (0.821) | (0.075) | (0.017) | |
| <i>Pseudo R-</i> | | | | | | |
| <i>squared</i> | 0.187 | | 0.287 | 0.549 | 0.482 | 0.534 |
| | | | | | | 0.249 |
| <i>LR chi2</i> | 30.46 | 39.47 | 80.96 | 72.72 | 55.61 | 47.45 |

Number of

observations

78

69

68

74

49

75

* p-values in parentheses