INSTITUTIONS AND INTERNATIONAL INVESTMENTS:

EVIDENCE FROM CHINA AND OTHER EMERGING MARKETS

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INTRODUCTION

One of the most important elements of the current phase of globalization is that formerly isolated large developing countries (e.g. China, India, and Brazil) become integrated into the world economy. With the advent of computer networking and other communication techniques, cross-border production and outsourcing are stimulated, so as to exploit local comparative advantages in these emerging markets. Over the last thirty years, foreign direct investment (FDI) towards emerging markets has increased dramatically from 20 percent of the world FDI inflows in 1980 to 43 percent in 2008 (UNCTAD, 2009). In a first phase, the involvement in international trade led to specialization in low cost production. However, more recently these large emerging markets have raised their wage level, increased their research and development (R&D) spending, and become more and more competitive in knowledge intensive industries. Further, firms from emerging markets are becoming substantial foreign investors in both developed and developing countries, of which the buying of Corus (the former Hoogovens) by India's Tata is a case in point for the Netherlands. Most notable are China's FDI outflows, which jumped from an average of 2.3 billion US dollars in the 1990s to 52 billion dollars in 2008 (China Commerce Yearbook, 2009).

This thesis empirically investigates the underlying factors that explain these new global trade and production patterns. At the baseline level, three questions on the globalization process of emerging markets are addressed. The first issue is the discussion on the deeper determinants of economic development. The current debate centers on the question how important economic and political institutions are for economic development. At the conceptual level, few would dispute that institutions provide secure property rights, which are the key prerequisites for economic development. For trade and FDI also are substantial drivers of development, it is important to understand to what extent 'good' domestic institutions contribute to international economic integration. On the one hand, the integration process is strengthened by FDI and outsourcing, which rely on property rights protection and contract adherence and, hence, good institutions. On the other hand, emerging markets have a comparative advantage in labor intensive production, for which cheap labor and infrastructure are important. One may argue that good institutions go against this advantage, because they erode the bargaining power of local elites in international joint production.

To empirically investigate this issue, one is faced with three difficulties, which are all addressed in this thesis. First, in the process of globalization, outsourcing production and vertical specialization of countries are becoming increasingly important. However, we lack time-varying measures of outsourcing at the country level. In addition, proper care should be taken to proxy local institutional quality, as 'institutions' is a general term which should be composed into specific elements such as economic and political institutions, 'hard'- and 'soft' institutions. Moreover, institutions in themselves depend on the level of integration in the world economy. For this reason, endogeneity problems hamper the identification of causal relations between institutional quality and foreign investments.

The second issue addressed in this thesis is that of regional disparities within large emerging markets and especially how regional characteristics interact with international trade and investments. For large emerging markets like China, disparities across provinces or states cause the uneven regional distribution of FDI, which in turn may result in a higher degree of regional imbalances. Therefore, regions at different stages of development may attract different types of investments, so that local factors such as infrastructure and governance may exert different effects within a country. Empirically, since there are only a limited number of emerging economies, studying individual regions within these countries improves efficiency and sheds more light on the deeper causes of the development process. Further, focusing on regional characters helps to control for various types of heterogeneity which are hard to capture at the country level. For example, by assuming local governments across Chinese provinces have similar behavior, we are able to reveal how they respond to different incentives in providing public goods.

The third subject discussed in this thesis is what drives firms in emerging markets to invest abroad and locate their foreign subsidiaries. From an institutional perspective, emerging economies well fit into the research context of understanding the present international investment dynamics. To promote economic growth, over time emerging economies have been experiencing remarkable policy development and institutional changes. The transition property therefore implies that for different time periods multinationals from emerging markets may be motivated by different reasons. Moreover, the empirical issue is whether theories that explain FDI from developed countries also explain the patters of FDI from emerging economies. It is well acknowledged that as emerging multinationals are competitive in labor intensive

production, traditional FDI theories based on the experience of knowledge intensive multinationals need to be carefully tested and modified. However, despite the differences in the relative importance of FDI determinants, emerging and advanced economies may share something in common with respect to the investment development pattern. For example, this thesis argues that Chinese multinationals first exploit comparative advantages in low value added production to establish external linkages and networks (e.g. exports, inward FDI, outsourcing deals, and knowledge transfers), through which their own competitive advantages are then increased. Hence, China's outward FDI begins with foreign operations in labor intensive manufacturing and natural resource sectors, and gradually moves to higher value added production and services. This path is to some extent consistent with the investment pattern of multinationals from developed economies. Along with the process of climbing up the value ladder, they first invest in locations with natural resource and cheap labor, later stress the role of transportation infrastructure, and then pay large attention to local institutional quality in for example rule of law and property rights protection.

This thesis contributes to the existing literature by bringing an innovative perspective to address *how* (causal links), *where* (country or region), *when* (stage of investments), and *what types* (infrastructure and governance) of institutions matter for multinational activities towards and from emerging economies. Chapter 2 constructs a new measure to capture outsourcing trade and further tests the causal link between institutional quality and outsourcing using this new outsourcing proxy. To investigate causality, our measure is time-varying, so that – in contrast to most previous cross-sectional studies – panel techniques can be used. One observation in this chapter is that institutions only affect outsourcing within lower-middle income countries. To explore the sources of endogenous institutions, Chapter 3 introduces a theoretical model in which institutions are shaped by incentives for local governments. Using regional data for China, this chapter also presents evidence that the differences in infrastructure across Chinese provinces are partly explained by the variation in local rents. Chapter 4 offers a novel method to first objectively define what institutions are and then to test their importance against the other determinants of trade and investment. Again based on Chinese data at the provincial level, there is evidence that infrastructure is a main driver of FDI inflows. Chapter 5 provides some insights into the motivations behind the newly arisen outward activities of China's multinationals.

It is implied that China's dynamic institutional environment has a significant influence on the structural change of its outward FDI.

More in detail, Chapter 1 offers theoretical foundations for this thesis. It reviews traditional theories and relevant empirics on locational and organizational choice of multinational enterprises. Motives for horizontal and vertical FDI are first presented in a summary of the existing literature. Following both conventional and relatively new lines of thinking, the literature shows how multinationals respond to firm-specific, industry-specific, and country-specific FDI determinants. The second part of Chapter 1 is focused on international outsourcing. To analyze how multinationals choose between FDI and independent contracting, theories on transaction costs, managerial incentives, property rights, and team production all fit well into the framework. Related papers on organizational forms are categorized based on input, industry, and environment characteristics. Chapter 1 concludes with the limitations of the existing literature in explaining emerging markets and sketches how to apply traditional theories in this thesis.

Chapter 2 discusses the causal relation between outsourcing and institutional quality. Although with technology development international contracting of intermediate goods has become an important new strategy for firms, hypotheses on outsourcing determinants have not been thoroughly tested. The foremost challenge is to measure the degree to which international trade is associated with outsourcing. Therefore, one of the contributions in this chapter is to create an index to measure outsourcing for developing countries where subcontractors produce the intermediate inputs for their foreign principals. For outsourcing is often relationship-specific, I construct a proxy based on industry trade data, a contract intensity index, and the Herfindahl intermediate inputs index. With this outsourcing proxy for 89 developing countries from 1980 to 2004, panel estimation can then be applied to account for dynamic patterns and tackle the endogeneity problem. The findings of this chapter provide significant policy implications for developing countries aiming at attracting international contracts. Institutional quality is the priority for lower-middle income countries and emerging markets which start drawing higher value added deals, while the positive impact of institutions on outsourcing is marginal for low and high income developing countries, conditional on other local factors such as wage and market size.

One implication drawn from Chapter 2 is that institutions depend on the dynamic patterns of international outsourcing and need careful empirical treatment.

With both theoretical and empirical components, Chapter 3 shows the strategic interaction between foreign investors and local government. The first part presents a simple mechanism based on the incentives for both production parties and local government. In this chapter the focus is on joint ventures, where local government is a second agent in a principal-agent relation who provides public goods such as infrastructure and rule of law. In the presence of government commitment, extra incentives may have to be paid to local government for sufficient local public goods. Such dual agency problem becomes more complicated with the possibility that a large number of foreign firms may free ride on a common pool of non-rival public goods. The second part of this chapter gives some empirical support for the dual and common agency theory using data on equity division in joint ventures established between 1995 and 2006 across Chinese provinces. An interesting finding is that free riding among foreign investors has a negative effect on local public goods provision.

Chapter 4 concentrates on the regional determinants of FDI distribution across Chinese provinces. A novel feature in this study is that a two-stage econometric approach is performed to test rival theories on FDI. In the first eclectic stage a factor analysis helps to summarize information embodied in nearly forty variables, while in the second stage four latent factors related to institutions, labor costs, markets, as well as geography are estimated for their significance in driving FDI patterns across Chinese regions. This chapter also illustrates certain general conditions under which such a two-stage factor-based method produces more efficient and less biased results compared to the regression-based methodology. Employing the instrumental variable (IV) estimation and Arellano-Bond dynamic panel GMM technique, I show that comparative advantage in labor costs matters most for FDI location within China, which implies the prevalence of vertical FDI. Large market size and good infrastructure are also critical premises for a Chinese province to attract foreign investors. Moreover, in line with the new economic geography literature, sizable agglomeration effects are presented in a dynamic panel setting.

Chapter 5 reveals how host country characteristics affect Chinese outward FDI over time from 1994 to 2008. Transaction-enforcing FDI theory is tested against hypotheses on the market seeking motive, resource seeking motive, efficiency seeking motive, and psychic distance influenced FDI. Low wage rate, essential for low value added production, is identified as the most important factor to attract China's FDI throughout the whole sample period. Furthermore, since 2001 host countries with

more Chinese exports, larger market size, richer natural resource, larger investment in China, and better institutions have become more attractive for FDI from China. In this chapter, two specific empirical issues are discussed in detail. First, though exports and FDI are known to be closely related, either in a substitutable or complementary way, casual link between these two has not been clear. Second, the persistent property of FDI implies that a dynamic setting may be necessary to avoid model misspecification. This chapter deals with such problems by applying Arellano-Bover dynamic panel GMM estimation. It is stressed that FDI from China follows exports to secure and enlarge overseas markets by serving existing customers and developing local distribution channels.

Finally, emphasizing what new elements have been attached to previous studies, the concluding chapter summarizes the main results and lessons we could learn from these findings. Some remarks are also available, discussing the limitations of the thesis and pointing out potential directions for future research in the field of international economics.

CHAPTER 1
THEORETICAL BACKGROUND

1.1 INTRODUCTION

By establishing production or delivering services in more than one country, multinational corporations play an important role in international factor movement and technology transfer. Because of their relatively large size and strong competitiveness, multinational firms can have a significant impact on world economy and international relations. For this reason, there has been a large body of literature investigating economic issues related to the activities of multinationals. For example, why do firms become multinational? What are the determinants of multinational enterprises' actions? Why some countries are more attractive to multinational enterprises than others? All these questions are closely related to one fundamental concern: incentives behind multinational firms' locational and organizational choice.

In general, geographic dispersion and concentrated ownership are two distinctive characteristics of multinational firms. In contrast to national firms, multinational enterprises organize cross-border operations in at least one foreign country. Conventionally, they launch foreign subsidiaries through foreign direct investment (FDI). They can replicate domestic production to supply local or regional markets (horizontal FDI) or fragment production to benefit from low local production costs (vertical FDI). Nevertheless, with technology shocks and improvements in transportation and communication, more and more products have become contractible and therefore international arm-length contracting has become an attractive form of organization. Instead of owning physical assets abroad, firms can outsource intermediate inputs to other independent local producers. Offshore outsourcing offers low set-up costs, large flexibility, and better incentives for local production, yet it causes problems in coordinating and controlling the actions of local contractors. Since saving some costs by adopting an alternative mode of international production always generates new types of costs, multinational firms face trade-offs when they draw the boundaries of the firm and decide which activities should be undertaken in-house and which activities should be outsourced.

In order to provide a theoretical and empirical background for this thesis, this chapter investigates the motivations that drive multinationals to choose among different locations and organizational forms. The reminder of this chapter is organized as follows. Section 1.2 presents the traditional and more recent FDI theories to reveal reasons why firms become transnational. Section 1.3 discusses the factors that affect internalization and outsourcing. Section 1.4 summarizes and shows the link between the existing literature and the following chapters of this thesis.

1.2 MOTIVATIONS FOR FDI

Compared to domestic firms, multinationals incur additional costs of operating in a distant foreign location. These costs may come from uncertainties on local market conditions and investment environment, varieties in culture and language, communication difficulties between the parent and the foreign subsidiary, and so on. To keep competitiveness in another country, a firm has to hold some advantages which can mitigate the significant costs of foreign production. Dunning summarizes the necessary conditions of multinationals in his OLI paradigm as 'O' – ownership advantage, 'L' – location advantage, and 'I' – internalization advantage (Dunning, 1977, 1981, 1993, 1997). Becoming a multinational requires a firm to possess some firm-specific assets which can be transferred cross borders to gain market power overseas. These assets could be knowledge capital and innovative outputs, firm-level economies of scale and scope, and the access to factor endowment. Location advantage refers to some country-specific characteristics of both the home and host countries, such as economic development, government policies favoring foreign investors or stimulating firms to produce abroad, as well as physical and cultural differences between countries. Internalization advantage plays a significant role in a multinational's organizational choice. To enter a foreign market, a firm can choose to export, contract, or establish a foreign plant. Whether to (partly or wholly) own a foreign subsidiary or to rely on market mechanisms is determined by how many rents will be obtained by choosing different entry modes. Benefits of internalization can be illustrated as efficiency of multinational hierarchies and low level of opportunism.

Further, Carr et al. (2001) and Markusen and Maskus (2002) highlight the role of knowledge capital in cross-border investment. As proximity benefits can be too costly to be realized by simply replicating home production in another country,

multinationals specialize in activities which they own comparative advantages, such as knowledge capital intensive headquarter services (Horstmann and Markusen, 1987; Ethier and Markusen, 1996; Markusen, 1997, 2001, 2002). Hence, FDI is attributed to knowledge-based assets including product know-how and innovation, marketing systems, scientific and technical personnel, patent, trademark, financial services, and so on. The non-excludible and non-rival property of knowledge capital allows multi-plants production in different countries to apply the same knowledge at the same time, so as to increase firm-level economies of scale. Furthermore, knowledge-based assets are skilled labor intensive relative to the production process and can be easily transferred, which provide incentives for production fragmentation. Therefore, abundant knowledge capital gives firms competitive advantage to become multinationals and compete against local firms. Although not explicitly discussed in the model, the non-rival property of knowledge also induces multinationals to produce in-house rather than outsource to avoid dissipation of intangible assets.

Drawn from these theories, FDI is mainly driven by large foreign markets which cannot be efficiently accessed by exporting due to high trade costs (horizontal FDI), or low production costs resulting from factor endowment and price differences across countries (vertical FDI). With horizontal FDI, multinationals supply local or regional markets by entering foreign countries to undertake production in duplicated plants. By doing so, multinationals gain from firm-level economics of scale such as reputation and brands, reduced trade costs, as well as other strategic advantages like client services and interactions with other competitors. Yet, they bear fixed costs of setting up a new plant and foregone plant-level returns of scales. With respect to vertical FDI which shifts some stages of production abroad, a similar trade-off has to be faced by multinationals in choosing between low production costs and new fixed costs. Based on these trade-offs, theoretical and econometric models investigating why firms choose to be multinationals can be formulated.

Moreover, observing the rapid rise of multinationals from emerging markets, business scholars have stressed that the relative importance of the ‘O’, ‘L’ and ‘I’ factors may be unique for these new global investors. As argued by Goldstein (2007), since firms from emerging markets often do not have competitive ‘O’-advantages and the host market ‘L’-advantages often can be ignored for low value added bulk production, the motives for developing countries’ FDI focus on the internalization advantages. However, the nature of the ‘I’-driver is again different for firms from

emerging markets. Whereas firms from developed countries consider asset exploitation important in vertically integrated foreign operations, the motivation for firms from emerging markets is often strategic asset seeking, so as to overcome (knowledge) resource hurdles in the supply chain. This insight has given rise to the Linkage, Leverage, and Learning (LLL) framework pioneered by Mathews (2002, 2006, 2007), which concentrates on the dynamic path through which internalization of strategic assets is achieved. Typically, firms from emerging markets first team up with firms from developed countries through linkages (joint ventures with knowledge transfer, outsourcing deals and cooperation in supply chains, and distribution partnerships). After that, emerging markets' firms leverage their resources in these partnerships by using their competitive advantages within the network and by moving towards higher value added activities. To this end, they learn and therefore dynamically create new competences (Teece et al., 1997). This in turn results in new linkages of a different nature.

It is well recognized that the growth path of multinational firms in emerging markets goes hand in hand with investment flows at the macro level. Following the OLI approach, Dunning (1981) develops the Investment Development Path (IDP) theory which has been tested by some empirical studies, for example by Liu et al. (2005) for China. The central reasoning is that a country attracts FDI through its location advantages (e.g. cheap labor) and then gradually moves to develop its own ownership advantages. As argued by Dunning, this investment pattern is often associated with higher levels of income and follows from economic development and the building up of human capital. More in detail, it can be argued that the road from 'L' to 'I' goes through a process of linkage, leverage and learning. By using local content requirements and mandatory technology transfers, in the first stage inward FDI creates linkages with multinational firms from the west. This allows leverage towards new, higher value adding competitive advantages (e.g. basic R&D or design), often related to the fruits of technology. The accumulation of human capital through education over time increases local absorptive capacity, which in turn generates higher levels and speed of learning. This then creates 'O'-advantages, especially with respect to outward FDI towards other developing countries. Such interesting investment pattern of multinationals from emerging markets, typically China, is further discussed in Chapter 5.

1.2.1 HORIZONTAL FDI

Geographic proximity to local markets has been acknowledged as one essential reason why foreign production is preferred to national production (Horstmann and Markusen, 1992; Brainard, 1993; Markusen and Venables, 1998, 2000). Engaging in horizontal FDI lowers the transport costs (proximity) and therefore results in a larger market share, while the firm has to bear the fixed costs of the new plant (a lack of concentration). Facing this so-called 'proximity-concentration' trade-off, the firm chooses the mode with higher operating profits. Brainard (1997) presents empirical evidence for such a trade-off by investigating firm- and plant-level economics of scale. Within an industry, firm-level scale is measured by the number of production workers in the median plant, and plant-level scale is measured by the number of non-production workers in the average US-based firm. These concentration factors are tested against proximity measured by trade costs, as well as alternative firm-specific assets such as advertising intensity and R&D activities.

Brainard's results are in support of horizontal FDI and echoed in a number of other empirical studies with a broader set of determinants. In general, a foreign firm has strong incentives to supply the local market with local production when the host market size is large, return to firm-level economics of scale overwhelms the lost from plant-level economics of scale, the host country is distant with high transport costs, and local producers are protected by high tariffs and other trade barriers. For example, using data on Swedish multinationals, Ekholm (1998) identifies some important country determinants of FDI with OLS and Probit estimation. A positive impact of market size on FDI, together with a negative impact of geographic distance, supports the hypothesis on proximity advantages. However, concentration advantages, measured by the relative size of foreign plants, are shown to work against establishing foreign affiliates. Carr et al. (2001) analyze foreign activities of US multinationals by using a Tobit model to distinguish between the investment decision and the level of foreign production. They find that market size, captured by income elasticity of affiliate production, has a significant positive impact on FDI. In addition, they provide evidence for the positive relation between trade costs and horizontal FDI, which is also illustrated in Markusen and Maskus (2001) and Yeaple (2003).

Moreover, endogeneity of multinationals has been introduced into a general equilibrium context. For example, Markusen and Maskus (2001) use a generalized

framework to provide some insights into the endogenous entry rate in response to trade policy. Based on a model with firm-level heterogeneity, Helpman et al. (2004) show a mechanism which sorts firms into domestic producers, exporters, and foreign investors. Participation constraints are fulfilled in the way that firms with productivity lower than the cut-off level cannot break even. Incentive compatibility is realized when a firm chooses the mode which yields higher profits over the others, given its firm-specific productivity. Therefore, to become a multinational, it is necessary to have sufficiently high productivity in order to cover the substantial fixed costs associated with foreign production. In line with their theoretical work, Helpman et al. (2004) also test the model by applying data on foreign affiliates of US multinationals across industries and host countries. The size dispersion of firms is used to measure the degree of heterogeneity in productivity. They find a sorting pattern that firms with high productivity tend to produce abroad rather than export.

In addition, according to the new economic geography literature, which is further discussed in section 1.2.3, export-platform FDI is motivated by positive externalities of neighboring countries' demand and industrial productivity. For example, Motta and Norman (1996) use a three-country, three-firm model to analyze the impact of economic agglomeration on FDI in a general equilibrium framework. They show that increased intra-regional market accessibility provides incentives for foreign firms to invest in platform countries. This export-platform motive is also studied by Neary (2002) with an extended theoretical model accounting for heterogeneous countries in the union. Using data on US multinationals investing in North America and Europe, Ekholm et al. (2007) test hypotheses on both the horizontal and vertical elements of export-platform FDI and find evidence for agglomeration effects.

1.2.2 VERTICAL FDI

In a general equilibrium setting, Helpman (1984, 1985) and Helpman and Krugman (1985) argue that vertical FDI is closely associated with international factor endowment differences. They assume that firms tend to find the cost-minimizing locations for production which involves two stages: component production and assembly. As these two activities have different factor intensities, international differences in factor price provide incentives for firms to engage in vertical FDI.

Nevertheless, one essential condition for firms to benefit from their strategic locational choice is that production can be geographically split at low costs. Therefore, low trade costs are important for international fragmentation of production. Especially, the impact of trade costs on cross-border investment depends on the type of FDI: reducing trade costs favors vertical FDI (complementary), while it makes horizontal FDI less attractive compared to exports (substitute).

The explanatory power of production costs has been tested by a number of previous empirical studies (Kravis and Lipsey, 1982; Wheeler and Mody, 1992; Braumerhjelm, 1994; Hatzius, 1997), yet the results are mixed. For instance, Kravis and Lipsey (1982) consider labor costs, capital costs, and costs of material inputs as potential factors that determine the pattern of US world production, based on a sample of 49 host countries in which US multinationals set up foreign plants. In addition to compensation of wage rates, quality and productivity of labor are included to estimate labor cost per unit of output. Disappointingly, at both aggregate and industry levels, labor costs present only a marginal contribution to exports share of US affiliates. Such ambiguous impact of factor cost differentials may result from the failure to precisely measure labor costs and control for labor skill intensity. Estimating domestic and foreign labor demand functions using panel data, Hatzius (1997) finds that Swedish multinationals are sensitive to the change of foreign labor costs in allocating their world employment. Both the OLS and IV estimation results show that more works would be shifted back home with a higher price of foreign production, in consistent with predictions of vertical FDI theory.

Recent studies draw a more complete picture of vertical FDI patterns accounting for factor endowments of skilled and unskilled labor. Using human capital variation to measure the difference in skilled labor endowment between the home and host country, Ekholm (1997) notes the importance of skill intensity in explaining the outward activities of US multinational corporations. She finds that skill abundance in the home country is positively related to the high affiliate sales of these multinationals. Similarly, Yeaple (2003) explores the interaction between the country-level skilled labor endowment and the industry-level skill intensity by employing sector disaggregated US data. He shows the effect of industry heterogeneity on locational choice of foreign production. Host countries with low skill abundance are attractive for FDI from low skill intensive sectors, while firms with high skill intensity invest in countries with large skill endowment.

Even though horizontal FDI is more prevalent than vertical FDI in Carr et al. (2001) and Markusen and Maskus (2002), recent studies find evidence of significant vertical FDI based on large datasets on countries with large variations in size and endowment features. Hanson et al. (2001) argue that the popularity of vertical FDI is underestimated in many previous studies, which fail to extract intra-firm vertical specification from the overall foreign affiliates' activities. To account for outsourcing of US multinationals, they measure vertical FDI by the difference between affiliate imports in intermediate inputs and affiliate total sales. The negative effects of market size and geographic distance, and positive influence of labor productivity on US foreign production all suggest the significance of vertical FDI. Braconier et al. (2005) use detailed data on different types of labor and find that more than 20 percent of US affiliate sales are attributed to comparative advantage in relative wage costs. In their study, developing countries attract FDI from US mainly for their abundant and cheap unskilled labor. Applying a new empirical specification with some non-linear relations between FDI and skills, Davies (2008) also demonstrates that the fraction of horizontal FDI may have been exaggerated in previous research and vertical FDI is more common than what we have acknowledged. A more neutral explanation is that horizontal FDI is the dominant type of investment during 1970s-1990s since most FDI flows to developed countries in this period, while vertical specialization is becoming more and more important at the current stage with reduced trade barriers and technology development in transportation and communication.

1.2.3 OTHER RELATED THEORIES

New economic geography

The new economic geography literature highlights how agglomeration effects explain the spatial patterns of FDI. From a microeconomic perspective, Krugman (1991) investigates aggregation economies by focusing on the interaction among economies of scale, transportation costs, and market size, which provides incentives for establishing local subsidiaries close to large markets and other agents. By setting up a model with two industries, two countries, and two factors, he also argues that agglomeration of manufacturing production is driven by positive pecuniary externalities such as thick market for labor, knowledge diffusion, and information

spillover. This ‘core-periphery’ pattern of economic activities is further expanded by emphasizing intermediate inputs and supply linkages (Krugman and Venables, 1995; Venables, 1996; Puga, 1999), investment dynamics (Baldwin, 1997), and spillovers at regional level (Puga and Venables, 1996).

Summarizing important recent studies in geographical economics, Brakman et al. (2009) discuss core theoretical models and present ample empirical evidence for aggregation at global, continental, as well as country level. One of the very first empirical trials is Wheeler and Mody (1992), who conduct a cross-country study and measure agglomeration by the industrial base, the level of FDI inflows, and infrastructural quality. Their results indicate that US based multinationals tend to invest in countries attractive to other firms. Applying a conditional logit model, Head and Ries (1996) find a dynamic pattern of FDI distribution across Chinese cities, in which the entry of foreign funded enterprises accelerates the growth of local upstream industry and such industry base in turn creates a better investment environment for future potential multinationals. In this way, agglomeration effects reinforce the impact of preferential policies offered to selected Chinese cities. Their study is further extended by Amiti and Javorcik (2008), who construct spatially weighted measures of market access and supply access by considering trade barriers and suppliers within and outside the province of the foreign establishment. Braunerhjelm et al. (2000) investigate the country and industry factors that drive the spatial distribution of Swedish multinationals. They find that intra-industry agglomeration plays a large role in attracting FDI, conditional on conventional FDI determinants like market size and labor costs.

Moreover, there is some evidence for aggregation at multi-country or multi-region level. Export-platform FDI is to a large extent motivated by country-level agglomeration effects among neighboring economies. For example, Head and Mayer (2004) show that market size captured by distance-weighted aggregate demand of EU countries is a significant determinant of Japanese FDI in Europe. In addition, the significant effect of spatial interdependence on FDI has been identified in recent studies, for instance in Blonigen et al. (2007) for the US and Garretsen and Peeters (2009) for the Netherlands. Both studies employ the spatial lag variable and a market potential variable represented by distance-weighted GDP, while Blonigen et al. (2007) show a relatively time-invariant spatial interaction for the US sample.

Most previous literature in this field is focused on advanced economies. However, according to Krugman (2010), in recent years geographical economics is more relevant to emerging markets and fast growing countries like China. Since emerging markets on the one hand account for a large share of global growth in manufacturing and on the other hand still have low levels of income, he argues that in the current phase emerging markets fit well into the new economic geography framework. This argument is consistent with the emergence of Chinese core-periphery economic pattern and large variation in development across regions.

New institutional economics

New institutional economics, first coined by Oliver Williamson in 1975, emphasizes the importance of transaction costs in efficient institutional design. As knowledge can be easily transferred and absorbed by local contractors or licensees, FDI occurs when firms have strong incentives to apply and guard their own knowledge-based assets. Furthermore, in keeping with the Grossman-Hart-Moor property rights approach (Grossman and Hart, 1986; Hart and Moore, 1990), contracting firms may be held up when relationship-specific contracts are imperfect with some degree of non-contractible characteristics, while FDI reduces transaction costs with the residual rights under control of multinationals.

Box 1.1 shows a simple theoretical example how contract incompleteness affects international organizational form. Intuitively, contract incompleteness may result in moral hazard and a so-called 'hold-up' problem. When contracts are incomplete and/or not easy to be enforced, the threat of not trading, after the asset-specific investment by the other party has been sunk, may gain a larger share of profits for the party making such a claim. Bearing the risk of being held up, subcontracting results in lower levels of investment and therefore lower profits than in-house production. Nonetheless, internalization advantages are only effective when multinationals are willing to provide sufficient incentives for local agents and able to effectively monitor actions of local managers. This is because moral hazard and weak incentives are not only common in outsourcing contracting, but also prevalent in the principal-agent relation between the parent and the foreign subsidiary. New institutional economics is further discussed in the next section.

Box 1.1. Incomplete contracts and 'make-or-buy'

Contract theory refers the notion of an 'incomplete contract' to a contract under which some actions might occur without clarified legal consequences. Grossman and Helpman (2003) study the trade-off between FDI and offshore outsourcing: subcontractors are more efficient but their investments are constricted by incomplete contracts. Contract imperfection is captured by a parameter γ which denotes the fraction of the required investment being covered by a contract between the intermediate inputs supplier and the final goods producer (assumed to be less than 1/2). Due to trade costs and matching issues, only firms which can locate suppliers within a certain distance x^o find outsourcing profitable:

$$x^o = S^o / [2\mu (1- \gamma)]. \quad (1.1)$$

In the equation above S^o represents the maximum joint profits under the standard assumptions of constant elasticity of substitution preferences and symmetrically differentiated varieties, and μ shows the units of labor required in customized production. It is straightforward that the cut-off distance is an increasing function of contract completeness γ, so that more firms engage in in-house international production with lower degree of contract enforcement.

Entry mode of FDI and international business studies

The choice of FDI entry modes, referring to greenfield investment and mergers and acquisitions (M&A), has received large amounts of attention in recent studies. Though establishing entirely new foreign plants preserves rents for multinationals and reduces transaction costs, attractive risk sharing and low fixed costs make M&A the main entry mode in developed counties. Most previous studies on M&A are focused on the market power driving cross-border acquisitions. For example, Horn and Persson (2001) study the impact of trade costs on the profitability of international M&A and asset prices. Contrary to the traditional view of 'tariff jumping', they argue that low trade costs give rise to cross-border M&A because they decrease the incentives for domestic competitors to acquire the same assets in an international oligopoly market. Similar to their work, Bjorvatn (2004) shows that economic integration lowers the

business stealing effect and the reservation price of the target firm, and therefore encourages M&A. At the industry level, heterogeneity has been introduced to obtain general equilibrium. Nocke and Yeaple (2007) set up a theoretical model to study how firms with heterogeneous capabilities choose among exporting, greenfield FDI, and cross-border M&A. They argue that FDI is driven by a motive to acquire non-mobile capabilities in other countries. An industrial equilibrium is achieved with the pattern that the most efficient firms take over firms with the least capabilities. Using firm-level data on Japanese FDI, Raff et al. (2006) test a general equilibrium model with heterogeneous firms and find that greenfield FDI, cross-border M&A, and exporting are selected by firms with the highest, lower, and the lowest productivity, respectively. Raff et al. (2009) further add an intermediate mode of governance structure, namely joint ventures, to the choice set of foreign market entry modes. Joint ventures and M&A are preferred given the low fixed costs incurred and reduced costs of collaboration, with greenfield FDI as an outside option.

Foreign market entry and equity sharing have been extensively analyzed in international business studies. Different from economics which puts a large emphasis on modeling a general framework for an industry or the whole economy, international business studies driven by antecedent and stylized facts take a micro-scope perspective on international organizational choice. As one of the pioneering studies, Dubin (1976) shows that the internal expansion through greenfield projects is favored over M&A by US multinationals in developing countries, where the levels of opportunism and environment volatility are high. Hennart and Park (1993) find that Japanese FDI in the US takes the form of acquisition when the target market is mature with high scale of economies. Andersson and Svensson (1996) conclude that organizational skills are crucial for a multinational to tackle transaction issues in M&A, while greenfield production is attractive when the firm has strong technological skills. In addition to costs minimization, from a dynamic point of view, the choice between greenfield and M&A also depends on a multinational's business development strategies. For instance, Barkema and Vermeulen (1998) start with a learning standpoint and highlight the influence of FDI experience on multinationals' international expansion strategy. Gilroy and Lukas (2006) work on an evolutionary process of FDI and show the importance of the sequence of foreign expansion. Based on a real option approach, they indicate that the initial entry mode has a significant impact on the following foreign investment.

Though joint ventures gain relatively little theoretical ground in the economic literature, a large number of international business studies have been focused on equity sharing. Equity sharing in joint ventures can be interpreted as a bargain for control (Blodgett, 1991; Hennart, 1991; Lee et al., 1998), a response to ex post opportunism (Chen and Hennart, 2004), an incentive mechanism to preserve rents for local managers (Kogut and Singh, 1988; Pisano, 1989; Chi, 1994), a risk sharing scheme in an uncertain environment (Luo, 2001), a consequence of difficulties in separating desired assets (Hennart and Reddy, 1997; Das and Teng, 2000), and a real option reacting to technology uncertainty (Folta, 1998). As business studies illustrate micro cases by working closely with other social sciences like sociology, a multidisciplinary trial to combine business and economics seems very promising and requires future efforts. For example, accounting for geographic, economic, social, cultural, as well as political factors, with emphasis on sector-level and firm-level elements, Buckley and Casson (1976) illustrate a broad set of FDI determinants and present a framework to study FDI from developing countries.

1.3 INTERNALIZATION AND OUTSOURCING

Owning foreign facilities minimizes assets dissipation and the risk of being held up at the cost of high start-up costs. By contrast, subcontracting offers low fixed costs and flexibility but requires strong incentives for local producers. Since independent subcontractors often hold different objectives than their foreign principals, incentives are crucial to reduce opportunistic behavior in relationship-specific investments with incomplete contracts (Williamson, 1979; Grossman and Hart, 1986; Hart and Moore, 1990). Market failures due to moral hazard, such as agency problems, are also embedded in internalized international production. When it is hard to monitor the local managers' activities, they have strong incentives to defect and provide insufficient efforts. Such agency problems can be very serious when FDI concerns intangible assets like technology and knowledge. In this case, sufficient incentives have to be provided not only to generate local efforts, but also to prevent local managers becoming new competitors by learning.

In recent years, international arm-length contracting and vertical specialization have become increasingly important given the fact that innovations in technology and policy allow more and more previous non-tradable goods and services to be tradable,

and non-contractible goods and services to be contractible (Hummels et al., 2001; Markusen and Venables, 2007; Grossman and Rossi-Hansberg, 2008). To understand how firms choose between outsourcing and internalization, prior research has stressed how factor characteristics, industry characteristics, and environment characteristics affect the organization of firms.

1.3.1 FACTOR CHARACTERISTICS

Factor properties have important effects on firms' organizational decision. For example, property rights theory implies that in physical capital intensive production vertical integration is more profitable than outsourcing, since it protects multinationals from ex post hold-up when relationship-specific contracts are imperfect (Antràs, 2003, 2005; Helpman, 2006; Antràs and Helpman, 2006). The essence of this approach is that ownership is defined as a property right to anything left when the contract breaks down. Because physical capital is fully excludable, no party of a collapsed contract can claim any positive outside option because in this case the intermediate inputs are rubbish. On the contrary, vertical integration always allows the multinational to use the assets left in some valuable way. Regarding knowledge capital, the rent structure is focused on the relationship between the multinational and the local manager. Despite the fact that outsourcing is excluded to avoid knowledge dissipation in the first place, incentives are still vital to keep technology from leaking in in-house production. By studying a product cycle when both the multinational and the local manager can defect, Markusen (2001) illustrates that rent-sharing is necessary and rents for the subsidiary are larger when the local manager has stronger bargaining power.

Moreover, the choice between outsourcing and vertical FDI is determined by the contractibility of inputs or the degree to monitor local activities. In a principal-agent setting with multiple tasks of local agents, Holmstrom and Milgrom (1991) adopt an incentive-system approach and analyze the incentive structure when only some of these tasks can be measured. They show that higher incentives have to be offered to the independent agent who is engaged in those immeasurable tasks. Antràs and Helpman (2006) formulate a partial contracting model and allow the degree of contractibility to vary across inputs. Contrary to the traditional transaction costs literature (Williamson, 1975, 1985), in which outsourcing is encouraged by general

contractual improvements, one interesting finding in this paper is that the impact of contractibility on integration depends upon different origins of inputs. Increasing the contractibility of inputs provided by the foreign final goods producer tends to favor outsourcing, while improvements in the contractibility of inputs invested by the local producer promote internalization. Such results come from a central assumption that incentives bring efficiency. For example, the increase in the contractibility of local components results in weaker incentives for the local supplier. This lowers the productivity of outsourcing production and therefore makes vertical integration more attractive. Acemoglu et al. (2007) employ a similar partial contracting framework and study the relation between incomplete contracts and technology adoption.

Empirical evidence supports the claim that ownership and control tend to belong to one party when contract incompleteness increases. Anderson and Schmittlein (1984) study a case in the American electronic components industry to analyze the impact of contract uncertainty on vertical integration. Transaction costs are assumed to come from difficulties in writing and enforcing asset-specific contracts and in evaluating local performance. Using semantic differential scales to measure firm characteristics and environmental uncertainty, they estimate a logistic response function using firm-level data and find evidence for the positive relation between contract incompleteness and internalization. Similar findings are shown by Anderson (1985), who investigates the 'make-or-buy' decision of 159 US sales districts in 13 electronic component manufacturers. Based on the Grossman-Hart-Moore property rights approach, Feenstra and Hanson (2005) test two instruments aimed at solving the moral hazard problem, plant ownership and input control, in a sample of Chinese export processing factories. These two instruments are supposed to deal with contract incompleteness since they are related to the costs of supplying efforts. Estimation results of a multinominal logit model imply that local rents decrease with the costs of contracting and the importance of local processing.

1.3.2 INDUSTRY CHARACTERISTICS

At the industry level, factor intensity and input specificity have significant influence on the patterns of international business activities. Antràs (2003) uses a production cost-sharing structure to partly substitute the rent-sharing scheme and tests his model with US intra-firm trade data. In this paper, instead of providing high rents to the local

suppliers, the final goods producers may share local investment costs to induce local efforts in relationship-specific investments. However, the ex post bargaining power of the local producers is lowered due to such an investment-sharing structure, which may expose the final goods producers to opportunistic behavior. Following the Grossman-Hart-Moor property rights approach, efficiency requires the party having stronger bargaining power or undertaking a relatively more important investment to control the residual rights. Therefore, the final goods producers opt to engage in vertical integration when the shared costs are sufficiently large. Because physical capital costs are much more likely to be shared than labor costs, in physical capital intensive industry where cost sharing is prevalent, intra-firm production is more attractive than international subcontracting. When labor inputs are more important to produce the intermediate goods, it is optimal to allocate the residual rights to the local suppliers in order to reduce underinvestment, causing a high propensity to outsourcing in labor intensive industry. Similarly, Antràs and Helpman (2006) argue that in sectors with low headquarter intensity, naturally high labor intensity, firms outsource because efficiency relies on incentives for local suppliers. By contrast, in headquarter intensive sectors vertical FDI is attractive conditional on contract incompleteness.

A more detailed discussion on capital factor can be found in Chen et al. (2008), who combine fully excludable physical capital and partially excludable knowledge capital in a single model. Local subcontractors under outsourcing may defect because of moral hazard. For the same reason, local managers may deviate from the objectives of their parents. The key assumption is that knowledge capital can be protected by owning physical capital. In-house production therefore on the one hand gains from efficient knowledge transfer and reduced opportunism, on the other hand suffers from shirking behavior of local managers. They conclude that physical capital intensive industry chooses subcontracting, while knowledge capital intensive industry favors vertical FDI. In addition, the costs of customization are closely associated with the specificity of inputs (Grossman and Helpman, 2002). As a result, production of more mature and standardized products is more likely to be outsourced because these products are more contractible and less relationship-specific with nontrivial outside options. Empirical tests on the relation between input specificity and subcontracting can be found in Anderson and Schmittlein (1984), Anderson (1985), Hanson (1995), Feenstra and Hanson (2005), and Yeaple (2006).

1.3.3 ENVIRONMENT CHARACTERISTICS

Without prior knowledge of the environment in which multinationals operate their international business, it is hard to understand the behavior of these firms. Anderson (1985) focuses on environmental uncertainty in sales force management. Unstable and complex sales markets create difficulties in controlling and monitoring local sales managers, which give rise to direct sales force. Hanson (1995) studies a trade-off between the moral hazard risk under subcontracting and the natural risk in an uncertain environment under vertical integration. Taking the Mexican apparel industry as an example, he shows that in-house investment cannot catch up with the highly volatile demand for fashion since launching a new product line takes substantial time and efforts.

More importantly, host institutional determinants are crucial given the cross-border nature of multinational production. For instance, Grossman and Helpman (2003) focus on contractibility related institutional hazards and claim that a better local contracting environment is supposed to accommodate more outsourcing. More recently, Slangen and Beugelsdijk (2010) analyze the influence of the formal and informal (governance and culture) institutions on multinational activities. Based on a sample of US foreign subsidiaries between 1996 and 2004, they find that vertical FDI is more negatively affected by bad institutions than horizontal FDI and that the negative consequence of governance imperfection is more difficult to be internalized than cultural distance.

Some previous empirical trials have shown the significant effect of local institutional quality on outsourcing equilibrium. Levchenko (2004) uses disaggregated US imports data to test a model of institutions and trade. He classifies industries based on their institutional dependence and finds that institutional disparities across countries significantly affect trade outcomes. Box 1.2 provides another example of such a relationship, referred in Chapter 2 as baseline to construct an index to measure international outsourcing.

Recent studies reveal some sophisticated interrelationships between contracting environment and vertical specialization. For example, using a two-country model, Grossman and Helpman (2005) show that the positive direct effect of contractibility on the relative profitability of outsourcing is mitigated by its indirect effect through changes in labor demand. Antràs and Helpman (2006) illustrate that the

institutional effects on outsourcing depend on whose benefits are better protected by the rule of law (the local supplier or the foreign producer) and which inputs are better contracted (intermediate components or headquarter services). Anderson (2009) shows that a stimulus to trade may induce traders to alter rules or processes to improve enforcement, making institutions endogenous.

Box 1.2. Institutions and international trade

In order to examine the influence of institutional quality on trade patterns, Nunn (2007) estimates an econometric model:

$$lnx_{ic} = \alpha_i + \alpha_c + \beta_1 z_i Q_c + \beta_2 h_i H_c + \beta_3 k_i K_c + \varepsilon_{ic}. \qquad (1.2)$$

The dependent variable is country c's total exports in sector i. The most interesting independent variable is an interaction term between an industry-level relationship-specificity (z_i) and a country-level institutional quality (Q_c). A positive β_1 would imply that countries with higher institutional quality export more in contract intensive sectors. The model also controls for skill and capital intensity by industry (h_i and k_i) and their abundance by country (H_c and K_c).

The sample covers trade, institutions, and factor endowments of 146 countries and 222 industries in 1997. Contract intensity across industries is captured by an indicator of whether the relationship between the intermediate inputs provider and the final good producer is investment specific. The main measure of the country-level institutional quality is an index of the rule of law and contract enforcement. Controlling for country and industry dummies, OLS regression results present the first evidence that institutional differences may cause the differences in productivity. Such finding is robust to considering institutional endogeneity with countries' legal origins as instrumental variables and propensity score matching techniques. Countries with good institutions have comparative advantage in contract-intensive industries. However, as Levchenko (2004), this paper is a cross-sectional study and fails to show dynamic trade patterns.

In an industrial equilibrium model, Antràs and Helpman (2004, 2006) investigate the endogenous organizational choice of a continuum of firms with heterogeneous

productivities. They claim that firms choose ownership structures according to their capabilities and the equilibria are affected by local institutional changes. Grossman and Helpman (2004) account for both incentives for the local managers and local suppliers in the sorting pattern of firms, with an emphasis on the contractibility of local management. They also find that the relation between institutions and firms' organizational choice depends on firm heterogeneity. Empirically, Yeaple (2006) identifies the effect of firm heterogeneity on firm boundaries by posing a positive correlation between productivity dispersion and US foreign investment. Utilizing Japanese firm-level data on trade, FDI, and outsourcing, Tomiura (2007) tests the firm sorting over international organizational modes. In this paper, conditional on firm and industry characteristics the most productive firms conduct FDI, in turn followed by outsourcers and exporters. A similar ordering is shown in Defever and Toubal (2007) based on French firm-level data.

1.4 CONCLUSION

The debate on topics like what determines the distribution of multinational investment and production, what effects multinational firms may exert on both the home and host countries, and who is the winner or loser of global economic integration, has never nearly concluded. To answer these questions, we have to understand the key role of incentives in multinationals' locational and organizational choice. Profit-maximizing multinationals face trade-offs in choosing among different locations and different foreign operation modes, referring to trade, horizontal FDI, vertical integration, as well as outsourcing. Taking participation constraints and incentive compatibility into account, the relative profitability of various international business strategies can be formulated to decide whether or not to become a multinational and which type of multinational is optimal. Because incentives determine efficiency, adequate bonus mechanisms are essential in international principal-agent relations when contracts are incomplete and local government may intervene.

To investigate the role of emerging markets in globalization, as this thesis will do, some theories may gain more relevance than others. For example, the rise of vertical specialization has placed the new institutional economics theory, emphasized in Chapters 2 and 3, at the centre of the question whether or not to internalize foreign production. The closely related theories of contract, managerial incentives, property

rights, and transaction costs are therefore all important for studying emerging markets. As pointed out by Krugman (2010), the new economic geography framework is most suitable to explain the geographical distribution of economic activities across regions within emerging markets. As a case in point, Chapters 3 and 4 illustrate how to apply provincial data to explore locational determinants of investment and regional differentiation. Dunning's theory which links a country's foreign investment position to its economic development may attract more and more attention with the expansion of multinationals from emerging economies. This is because the OLI theory is not only useful in exploring the investment development path of a country, but also lays down some theoretical premises for applying the general FDI theory to fast-growing emerging markets as shown in Chapter 5.

In fact, the mismatch between the existing research and new facts does not mean that traditional FDI theories lose their importance at all. Instead, this raises the significance of emerging markets based applied research. How to appropriately test horizontal and vertical FDI determinants and combine these factors with elements special for emerging countries, highlighted in this thesis, will gain great prestige in the future.

CHAPTER 2
THE CAUSAL EFFECT OF INSTITUTIONAL QUALITY ON OUTSOURCING[1]

2.1 INTRODUCTION

Over recent decades, one of the distinguishing features of economic globalization is increased offshore outsourcing.[2] This process is mainly driven by technology shocks, such as computer networking and improved access to communication, which allow firms to effectively exchange information. Further, more flexible production techniques, such as just-in-time delivery, split the supply chain into separate tasks, of which some can be located in cost-efficient emerging markets (Holmstrom and Milgrom, 1991; Grossman and Rossi-Hansberg, 2006).

On top of technological improvements, in economic theory more emphasis has been placed on institutional changes that affect the behavior of firms. As offshore outsourcing often requires a significant level of relationship-specific investment, in which the value of the outside option is low, weak contract enforcement potentially generates moral hazard problems. Hence, good institutions, such as property rights protection and the rule of law, reduce opportunism and provide incentives for outsourcing (Coase, 1937; Williamson, 1975, 1985).

Since the beginning of the 1990s, there has been a worldwide trend towards improving institutional quality. For example, over the period 1996-2008, around 60 percent of 212 countries and territories experience a significant change in at least one of the following six dimensions of governance: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption (Kaufmann et al., 2009). Among countries with substantial institutional improvements, over 90 percent are low and middle income countries. Examples include more effective government in countries such as China, Indonesia, Malaysia, Colombia, and Ethiopia, and better control of corruption in countries such as Tanzania, Albania, Liberia, and Rwanda. By contrast, high income countries put relatively marginal efforts into building better institutions. Some even

[1] This chapter is an adapted version of Roelfsema and Zhang (2009).
[2] As estimated by Yeats (2001), at the turn of the century trade in intermediate products took a share of 30 percent of the world trade in manufactures. Hummels et al. (2001) show that around one-third of world export growth is related to trade in vertical fragmentation.

suffer from lowered institutional quality, such as declines in government effectiveness in Italy and Spain, as well as higher levels of corruption in Greece.

Although there is an abundance of theoretical contributions on the link between institutional quality and outsourcing, relatively little empirical evidence is presented. The first explanation for this discrepancy is that outsourcing is difficult to measure because data on contracted components are not readily available. Moreover, the endogeneity of institutions hampers identification of causal relations. One example of the endogeneity issues is reverse causality: when outsourcing is important for a country to gain from trade, policy makers may be keen to build good institutions.

By tackling these two empirical problems, this chapter aims to show the causal impact of institutional quality on outsourcing to developing economies. We start by constructing a proxy to measure outsourcing based on industry trade data, a contract intensity indicator (*CII*), and the Herfindahl index of intermediate input use (*HII*), all discussed in detail in Section 2.3. This time-varying proxy measures a growing importance of the sectors that are prone to outsourcing, so that we are able to evaluate whether a country develops a comparative advantage in intermediate goods exports over time. The second key issue is to establish a *causal* relation between institutional quality and outsourcing. While others have used instruments in cross-sectional studies – see the literature review below – we apply panel data techniques. To account for endogeneity, with panel data we can exclude the unobserved time-invariant country-specific effects, control for dynamic factors, and use the lagged values of the explanatory variables as internal instruments.

Based on a panel of non-rich economies, the results indicate that institutional improvements have a significant positive impact on outsourcing within lower-middle income countries. For low, upper-middle, and high income countries, changes in institutional quality fail to explain the within-country differences in outsourcing over time. These findings suggest that low income countries attract outsourcing because of a cost advantage in labor intensive production, for which a stringent institutional setting may actually be seen as a burden. By contrast, with a relatively skilled labor force, lower-middle income countries are attractive destinations for a higher value added type of outsourcing which depends on institutional improvements, for example, in protecting intellectual property. For upper-middle and high income countries which already have relatively good institutions, a further increase in institutional quality may not significantly affect outsourcing. Moreover, since there is a positive correlation

between income per capita and institutions, enhancing institutional quality in these countries could even result in a decrease in outsourcing due to increased wage rates.

The rest of the chapter is organized as follows. In the next section, we review the related literature on outsourcing and institutions. Section 2.3 discusses the measurement of outsourcing, data on explanatory variables, and estimation methods. In Section 2.4 we present the regression results. Section 2.5 concludes.

2.2 RELATED LITERATURE

New institutional economics and the related transaction costs theory, first introduced by Coase (1937) and further formalized by Oliver Williamson, discuss how to design proper institutions to minimize costs in relationship-specific investments. Williamson (1975, 1985) establishes a theory of contracts in the shadow of uncertainty and asymmetric information, accounting for bounded rationality and opportunistic behavior of investment parties. In line with his theory, high asset specificity, uncertainty, and infrequency of contracting all give rise to sizeable transaction costs and therefore lower the attractiveness of outsourcing. For example, in order to gain a larger share of profits of joint production, one may take advantage of contract incompleteness and make a threat of not trading after the relationship-specific investment by the other party has been sunk. Bearing such opportunistic risk of the so called ‘hold-up’ problem, independent subcontracting is inefficient and inferior to vertical integration. Hence, without effective contract enforcement mechanisms, the efficiency loss due to large transaction costs results in a high propensity to internal production than outsourcing.

The Grossman-Hart-Moor property rights theory (Grossman and Hart, 1986; Hart and Moore, 1990) addresses two important questions in international vertical specialization: When should firms choose to internalize production? Who should be the owner of the residual claims? According to this line of thinking, the efficiency of the ownership structure is determined by individual incentives and the relative importance of local assets. Specifically, a firm prefers vertical integration to subcontracting when the external party cannot be easily monitored and local inputs are crucial to generate profits. Hence, institutional quality is closely linked to outsourcing for the reason that contract enforcement reduces opportunism and that the

owner of a private property right relies on legal compulsion to prove his ownership before a court.

These insights have informed the more recent theoretical advances on outsourcing in international economics. For example, Helpman (2006) provides a literature survey to explain new trade developments and investment patterns. By investigating firms' sourcing strategies between FDI and outsourcing, he suggests that institutional quality has become a new source of comparative advantage across countries and industries. Grossman and Helpman (2003) analyze the connection between local contracting environment and international production efficiency. They show that better institutions attract more offshore contracts, as transaction costs associated with moral hazard decrease with the degree of contractibility. Based on the Melitz (2003) model, Grossman and Helpman (2004) further explore how firm heterogeneity determines the link between country-specific institutions and multinationals' organizational choice. They show that outsourcing is favored over FDI by low-productivity firms because high payment to independent suppliers provide strong incentives to bring local efforts, by high-productivity firms because cost sharing makes outsourcing more profitable than FDI, and by firms with some intermediate range of productivity when local management has a low degree of contractibility. Antràs (2003, 2005) analyzes the trade-offs between internalization and outsourcing in a setting where renegotiation of contracts is possible. As efficiency requires the party undertaking a relatively more important investment to control the residual rights, he argues that outsourcing is more prevalent in labor intensive production. Similarly, Antràs and Helpman (2006) illustrate a model of partial contracting and demonstrate that the contractibility of intermediate inputs has a large influence on multinationals' outsourcing decision. They claim that in sectors with low headquarter intensity, naturally high labor intensity, firms outsource because efficiency relies on incentives for local suppliers.

The effects of institutions on international economic activities have been documented in a growing body of empirical literature. For instance, Anderson and Marcouiller (2002), Berkowitz et al. (2006), and Ranjan and Lee (2007) all find that a country's volume of trade increases with institutional quality. Globerman and Shapiro (2002) present evidence that a good political infrastructure facilitates a favorable investment environment and therefore matters for attracting FDI. Rossi and Volpin (2004) show that institutions affect cross-border merger and acquisition activities

since laws and regulations define financial market performance. Investigating Chinese data on the processing trade, Ma (2006) provides empirical evidence for the factors that determine the choice between internalization and offshore contracting. She finds that preferential policies affect both vertical integration as well as outsourcing. Using International Country Risk Guide (ICRG) governance indicators (on which the measure of institutional quality in this chapter is based), Mishra and Daly (2007) show a significant positive impact of institutions on outward FDI. Nordås (2008) argues that an economy performs better in vertical specialization with a better control of corruption and improved governance.

In addition, alternative theories on what explains outsourcing point out the importance of market thickness (Mclaren, 2000; Grossman and Helpman, 2005) and international differences in relative factor prices (Feenstra and Hanson, 1996; Kohler, 2004). Outsourcing is fenced to a matching problem of finding suitable partners. Since free trade enlarges input markets, increased openness can help firms to find potential suppliers. Alternatively, low labor costs in developing economies motivate multinationals to substitute domestic intermediate inputs with imported inputs. We combine these arguments into our study by controlling for openness and wage rates.

This chapter is most closely related to two recent empirical contributions, Levchenko (2004) and Nunn (2007), which try to quantify institutional dependence of manufacturing industries. By adding institutional intensity to an empirical model of Romalis (2004), Levchenko (2004) tests the impact of institutions on comparative advantage with USA import data. He employs the Herfindahl index of intermediate input use to measure product complexity and institutional dependence. In his view, countries with better institutions export more in industries which rely on institutions. Nunn (2007) further explores the correlation between institutional quality and comparative advantage by applying a contract intensity index (Rauch, 1999). Products are regarded as relationship-specific if they are not likely or difficult to be resold in the market. Nunn finds that across countries institutional quality has a positive effect on exports of contract-intensive products. These two papers take care of reverse causality by using exogenous variables, such as legal origin, latitude, and settler mortality, to instrument institutions. However, as already noted in the introduction, these cross-country studies have limited scope to tackle the endogeneity issues involving omitted variables and individual dynamics. In a panel setting, we are able to effectively control for the unobserved time-invariant country-specific characteristics.

Moreover, accounting for the dynamic patterns of outsourcing reduces omitted variable bias, because the frequency of contracting is considered as a critical variable to determine transaction costs. Finally, panel data provide internal instruments for time-varying endogenous variables, which are clearly hard to be instrumented by constant variables used in cross-sectional studies.

2.3 DATA AND METHODOLOGY

To provide an intuitive overview of the steps towards the construction of a time-varying outsourcing index, let us focus on three key elements. First, previous studies (e.g. Nunn, 2007) have argued (and measured) that in some industries many inputs are exchanged within companies or through direct contracting with external suppliers. A first step therefore is to identify these industries. Second, other studies have argued that when the supply chain is very complex, firms use outsourcing over vertical FDI. If we combine these two insights, we are able to identify industries in which the probability of outsourcing is high. As a last step, we argue that when a developing country exports more in the industries above, it becomes more engaged in attracting outsourcing deals over time.

For the first two steps, we propose a way of building an industry-level index of outsourcing probability based on a contract intensity indicator (*CII*) and the Herfindahl index of intermediate input use (*HII*). First, more vertical specialization, in the form of outsourcing or FDI, is expected to occur in industries which need more relationship-specific components in production. Borrowing from Rauch (1999) and Nunn (2007), we use a contract intensity indicator (*CII*) to measure the degree of relationship-specificity in a manufacturing sector. As in Nunn (2007), we assume that an input is transaction-specific if it is neither traded on an organized exchange nor reference priced. Equation (2.1) shows that the value of the contract intensity index for sector *j* is larger if more relationship-specific intermediate inputs are used:

$$CII_j = \sum_h \theta_{hj} R_h , \tag{2.1}$$

where θ_{hj} is the value of the intermediate input h used to produce one unit of the final good in industry j and R_h is the proportion of input h that is neither sold on an

organized exchange nor reference priced.[3] In sectors with high *CII*, the option of purchasing relationship-specific intermediate inputs in an open market is with low degree of feasibility. Hence, these industries can be characterized as predominantly making use of arms-length contracting and offshore in-house production.

Table 2.1: Contract intensity, Herfindahl, and outsourcing probability indices

Code	Industry	*CII*	*HII*	*INPROUTS*
311	Food products	0.121	0.060	0.201
313	Beverages	0.223	0.054	0.415
314	Tobacco	0.223	0.054	0.271
321	Textiles	0.427	0.158	0.271
322	Wearing apparel, except footwear	0.557	0.238	0.234
323	Leather products	0.485	0.142	0.342
324	Footwear, except rubber or plastic	0.485	0.142	0.342
331	Wood products, except furniture	0.382	0.107	0.358
332	Furniture, except metal	0.382	0.107	0.358
341	Paper and products	0.230	0.201	0.114
342	Printing and publishing	0.230	0.201	0.114
351	Industrial chemicals	0.297	0.238	0.125
352	Other chemicals	0.297	0.238	0.125
353	Petroleum refineries	0.194	0.362	0.053
354	Miscellaneous petroleum and coal products	0.194	0.362	0.053
355	Rubber products	0.297	0.238	0.125
356	Plastic products	0.297	0.238	0.125
361	Pottery, china, earthenware	0.322	0.063	0.515
362	Glass and products	0.322	0.063	0.515
369	Other non-metallic mineral products	0.322	0.063	0.515
371	Iron and steel	0.145	0.172	0.084
372	Non-ferrous metals	0.105	0.180	0.059
381	Fabricated metal products	0.325	0.119	0.272
382	Machinery, except electrical	0.479	0.100	0.478
383	Machinery, electric	0.527	0.120	0.438
384	Transport equipment	0.597	0.151	0.396
385	Professional and scientific equipment	0.527	0.120	0.438
390	Other manufactured products	0.369	0.065	0.570

Note: The outsourcing probability index (*INPROUTS*) is scaled zero to one.

Furthermore, industry complexity is applied as a filter to distinguish between outsourcing and vertical FDI, with the presumption that firms tend to outsource rather than establish a new factory for one input if the final product involves many intermediate inputs. We apply the Herfindahl index of intermediate input use (*HII*) to measure the concentration of inputs by industry. The Herfindahl index is defined as the sum of the squares of intermediate input shares for producing one unit of the final good. This index has a smaller value when more intermediate inputs are used in an

[3] Rauch (1999) provides both liberal and conservative estimates. In robustness checks, we show the results of using the liberal estimates and an intermediate level of relationship-specificity (products not sold on an exchange but having reference prices).

industry. Hence, in sectors that have both higher *CII* and lower *HII* (more complex), firms are more likely to outsource.

In contrast to previous cross-country studies (Levchenko, 2004; Nunn, 2007), this chapter creates an aggregate time-varying outsourcing index so as to show the dynamics of outsourcing. We first calculate *CII* and *HII* for each individual industry in 20 selected developed countries based on their input-output tables.[4] For consistency, we convert the 4-digit SITC Rev. 2 system in Rauch (1999) into the 3-digit ISIC Rev. 2 system. Second, we take the mean values of *CII* and *HII* across countries (CII_j and HII_j) and use these averaged data to obtain an industry-level index of outsourcing probability (*INPROUTS*), which is specified as:

$$INPROUTS_j = CII_j / HII_j \quad . \tag{2.2}$$

We try alternative methods of constructing this probability index, such as by giving different weights to CII_j and HII_j. Different specifications give similar results in robustness checks. Table 2.1 presents the values of the contract intensity indicator, the Herfindahl index, and the outsourcing probability index for each sector in our study. Finally, we calculate a normalized Balassa index to represent the relative export performance of 89 developing economies by industry. Export data are taken from UNCTAD Handbook of Statistics 2005 and converted from the 3-digit SITC Rev.3 system into the 3-digit ISIC Rev. 2 system. Using outsourcing probabilities ($INPROUTS_j$) as weighting factors, we claim that a developing country attracts more outsourcing if it has higher export performance in the 'outsourcing-more-likely' sectors. Hence, the outsourcing proxy (*OUTS* for a country *i* in year *t*) is defined as[5]:

[4] We assume that the final goods are produced in developed countries. Hence, we use the input-output tables in developed countries to define industry characteristics. Developed countries in our sample include Australia, Austria, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, the Netherlands, Norway, New Zealand, Portugal, Spain, Switzerland, UK, and USA.

[5] For simplicity, Equation (2.3) only accounts for outsourcing within industries. Focusing on the intra-industry intermediate inputs trade is justified by the fact that the largest part of inputs used in an industry comes from the same industry. It would be more general to consider the relative exports of all industries which provide the intermediate inputs to sector *j* (weighted by the share of each input used). A related remark is that our measure may work best on the import side rather than the export side, since inputs in one sector exported by a developing country might be imported for the final goods production in another sector. For robustness, we also calculate a general outsourcing proxy with information on both intra- and inter-industry trade. The correlation between the intra-industry and general outsourcing indices is 0.92.

$$OUTS_{it} = \frac{\sum_j INPROUTS_j \times Balassa_{ijt}}{\sum_j Balassa_{ijt}} . \quad (2.3)$$

Table 2.2 illustrates the values of the standard Balassa index and the outsourcing proxy for some major emerging markets. We find that much of the increase in outsourcing occurs in the 1990s. To check whether outsourcing in the 1980s and thereafter is driven by different motives, we split our data into two sub-periods (1980-1989 and 1990-2004) in robustness analysis.

Table 2.2: Balassa and outsourcing indices of major emerging markets

	Balassa Index (non-normalized)			*OUTS* Index		
Eco.\ year	1985	1995	2004	1985	1995	2004
Argentina	19.85	31.52	38.25	2.45	2.63	2.46
Brazil	31.72	41.17	41.04	2.62	2.64	2.86
China	28.08	35.06	30.08	2.78	3.12	3.26
Colombia	24.20	37.79	43.17	2.78	3.01	2.46
Egypt	12.75	25.07	33.46	1.53	1.88	2.52
India	48.34	49.72	52.50	3.98	3.88	3.62
Indonesia	19.32	40.06	42.80	2.01	2.67	2.55
Malaysia	24.68	22.15	22.38	2.66	3.11	2.88
Mexico	39.43	26.02	25.53	3.18	3.18	3.27
Philippines	31.98	25.96	13.79	2.88	2.95	3.42
Thailand	35.96	33.54	30.52	3.17	3.20	2.86

Applying the outsourcing proxy (*OUTS*) as the dependent variable, we test the impact of institutional quality on outsourcing based on the econometric model below:

$$\begin{aligned} OUTS_{it} = {} & \alpha + \lambda OUTS_{it-1} + \beta_1 ICRG_{it} + \beta_2 ICRG_{it} * LMIDDLE + \beta_3 ICRG_{it} * UMHIGH \\ & + \gamma CONTROL_{it} + \delta_1 YEAR_t + \delta_2 COUNTRY_i + \varepsilon_{it} \end{aligned} . \quad (2.4)$$

In line with theory, we first include the lagged dependent variable to account for the dynamics of outsourcing. International contracting is likely to be persistent over time because a partnership between the intermediate inputs supplier and the final goods producer may last for a long period. The Political Risk Service (PRS) group provides a set of International Country Risk Guide (ICRG) indicators to measure the political stability of a country.[6] We construct an aggregate ICRG index (*ICRG*) by averaging

[6] The political risk of a country is assessed upon the following aspects: Government Stability (0-12); Socio-economic Conditions (0-12); Investment Profile (0-12); Internal Conflict (0-12); External Conflict (0-12); Corruption (0-6); Military in Politics (0-6); Religious Tensions (0-6); Law and Order (0-6); Ethnic Tensions (0-6); Democratic Accountability (0-6); Bureaucracy Quality (0-4). In the brackets are the ranges of risk rating points assigned to indicators.

the values of three components – 'Corruption', 'Law and Order', and 'Bureaucracy Quality' (scaled zero to one for normalization). We highlight these three aspects of country risk because they are most relevant to international outsourcing. For example, corruption, in the form of rents and bribes associated with capital flows, import and export licenses, or tax treatments, increases the costs of international production and therefore may result in the withholding or even withdrawal of an investment. A good legal system is crucial to enforce contracts and protect property rights in relationship-specific transactions. Moreover, for international production and trade in intermediate inputs, government efficiency captured by 'Bureaucracy Quality' determines time and procedures of doing business, so as to affect the profitability of outsourcing deals. Assuming that institutions may exert different effects on outsourcing in countries at different stages of development, we then split developing countries in our sample into three income categories.[7] We use the low income group as the baseline category. A dummy variable *LMIDDLE* equals to one if a country is in the lower-middle income group, zero otherwise. Similarly, dummy variables *UMHIGH* takes on the value one to represent upper-middle or high income countries. For the sake of efficiency, we, rather than study sub-samples, explore the impact of institutional quality within different income groups by generating interactions of the ICRG index and income dummies (*ICRG*LMIDDLE* and *ICRG*UMHIGH*).

We account for some country characteristics as control variables (*CONTROL*). Gross domestic product per capita (*GDPPC*) is used as a proxy for wage rates in outsourcing destinations, as in Brainard (1997). Related to the market thickness argument, we include the openness of a country (*OPENNESS*). Since rich countries tend to establish good institutions and a country's exports increase with its openness, controlling for these two variables is essential to identify the marginal institutional effect on outsourcing. We incorporate variables on road density (*ROAD*) and airport density (*AIRPORT*) to capture local infrastructure conditions. As transportation is the key for the on-time and high-quality delivery of intermediate inputs, good infrastructure reduces trade costs. Adding these variables on infrastructure also reduces omitted variable bias because the quality of public good provision represents to some extent government performance (La Porta et al., 1999). We also capture

[7] Xu and Chiang (2005) apply a similar assumption to analyze the relation between trade and technology diffusion. According to 2005 gross national income per capita (The World Bank), we group countries as: low income, $875 or less; lower-middle income, $876 to $3465; upper-middle income, $3466 to $10,725; high income, $10,726 or more.

economic freedom of a country with respect to inward FDI (*FREEFDI*) and the information markets (*FREEINFOR*), both closely linked to offshore outsourcing. We have discussed in the literature review that FDI is a potential substitute for independent contracting. Hence, a country's degree of openness to FDI may have a negative effect on outsourcing. The free flow of information lowers communication costs for the final goods producers to locate their local partners. It may also increase market transparency and reduce the level of opportunism in outsourcing deals. We then include three time-invariant variables: latitude (*LATITUDE*), a region dummy (*REGION*), as well as the distance to the USA (*DISTUSA*). A country's latitude is correlated with its institutional quality because temperate zones have better capabilities to develop their economies, given more favorable climates for agricultural production and health (La Porta et al., 1999). We use a region dummy to classify the world into seven groups accounting for geographic proximity and more importantly the regional understanding of democratization (Hadenius and Teorell, 2005). In addition, we measure cross-border transportation costs by the geographic distance of a developing country to the world's most important market. Because these geographic variables are time-invariant, they are only relevant in the random effects model. Finally, we add year dummies to control for time trend in all regressions. The logarithm transformation is applied for continuous variables in order to alleviate heteroskedasticity and obtain standardized regression coefficients. We provide data description in Table 2.3 and definitions of variables in Appendix 2.

Using data for 89 developing economies from 1980 to 2004, we start with testing panel cointegration. To identify institutional changes 'within' individual countries over time, we then employ the fixed effects estimation to get rid of constant country-specific factors (*COUNTRY*).[8] Finally, we perform a range of robustness checks. To test reverse causality, we apply the dynamic panel two-stage least squares (2SLS) IV estimation with internal instruments for the ICRG index and the lagged dependent variable (Anderson and Hsiao, 1981). Lagged variables are valid instruments when we assume weak exogeneity and zero serial correlation in the error term. In addition, we show the results of using income sub-samples, sub-periods, and a set of alternative dependent variables.

[8] In our sample of 25 years, 'Nickell bias' is negligible since the bias is of order of $1/T$ (Wooldridge, 2002). This argument is supported by similar results of the fixed effects estimation and the dynamic panel data estimation in Table 2.6.

2.4 RESULTS

Table 2.4 indicates that the explanatory variables are cointegrated, so that our results are not driven by spurious correlations. Based on the interaction variables of institutional quality (*ICRG*) and income dummies, Table 2.5 displays the static and dynamic estimation results using panel data. The main dependent variable applied in Columns (1) to (6) is the outsourcing proxy in Equation (2.3). For robustness, we report the results of using two alternative outsourcing measures. The outsourcing probability shown in Equation (2.2) is replaced by the contract intensity index in Column (7) and another combination of the *CII* and *HII* indices in Column (8).

We first report the fixed effects and the random effects estimates of the static model in Columns (1) to (3). The results of the F-test indicate that only the variables *ICRG* and *ICRG*LMIDDLE* are jointly significant. This implies that over time institutional improvements are only important for lower-middle income countries to attract outsourcing. Such finding is robust to applying the random effects estimation in Column (3). Nevertheless, we are in favor of the fixed effects model, so as to focus on differences 'within' individual countries. Columns (4) to (8) show the fixed effects regression results of the dynamic econometric model specified in Equation (2.4). Across panels, the following findings stand out. First, the lagged dependent variable has a significant positive impact on current outsourcing. This is consistent with the argument that duration of partnership is crucial to reduce transaction costs in relationship-specific contracts. Second, comparing the results in Columns (2) and (5), we note that the omission of the dynamic path leads to an overestimation of the impact of institutional quality. However, after controlling for the dynamic factor, the institutional quality variable *ICRG* still has a significant positive effect on outsourcing to lower-middle income countries. In Column (6), the results of an error correction model show that a significant long-run influence of institutions on outsourcing is only observed within lower-middle income economies. In other income groups, we fail to identify a clear causal link between institutions and outsourcing. One possible explanation for the insignificant *ICRG* variable within low income countries is that firms outsource low value added production to these countries for local comparative advantage in labor costs, leaving other potential determinants of outsourcing insignificant.

Table 2.3: Summary and correlations

Variable	Obs.	Mean	Std. Dev.	Min	Max
OUTS (ln)	2916	0.916	0.381	-0.616	1.630
ICRG (ln)	2243	-0.876	0.480	-3.178	-0.087
GDPPC(ln)	2962	6.997	1.267	4.142	10.508
OPENNESS(ln)	2342	4.143	0.594	2.210	5.832
ROAD (ln)	3012	1.204	0.830	-1.571	4.185
AIRPORT (ln)	2766	2.641	2.547	-2.303	8.999
FREEFDI	2625	2.952	0.903	1	5
FREEINFOR	2625	3.781	1.177	1	5
LATITUDE	3025	0.186	0.118	0.011	0.667
REGION	3125	4.189	2.253	1	7
DISTUSA (ln)	3100	8.975	0.553	7.479	9.692

Variable	*OUTS*	*ICRG*	*GDPPC*	*OPEN~*	*ROAD*	*AIR~*	*FREEFDI*	*FREEIN~*	*LATI~*	*REGI~*	*DIST~*
OUTS (ln)	1.000										
ICRG (ln)	0.011	1.000									
GDPPC(ln)	-0.144	0.359	1.000								
OPENNESS(ln)	0.005	0.096	0.188	1.000							
ROAD (ln)	-0.111	0.111	0.355	0.047	1.000						
AIRPORT (ln)	-0.005	0.350	0.439	-0.143	-0.071	1.000					
FREEFDI	0.008	-0.169	-0.357	-0.010	-0.249	-0.113	1.000				
FREEINFOR	-0.012	-0.325	-0.445	-0.206	-0.041	-0.254	0.341	1.000			
LATITUDE	-0.033	0.100	0.171	-0.223	-0.120	0.183	0.014	0.070	1.000		
REGION	0.237	0.009	-0.131	0.236	-0.031	0.201	-0.008	-0.100	-0.141	1.000	
DISTUSA (ln)	0.040	0.133	-0.258	-0.036	-0.166	0.323	0.167	-0.036	0.057	0.342	1.000

Table 2.4: Panel cointegration tests

Fisher test	p-value: 0.00	*N* = 89	Significance level 1%
Levin-Lin-Chu test	p-value: 0.00	*N* = 55	Significance level 1%
Im-Pesaran-Shin test	p-value: 0.00	*N* = 55	Significance level 1%
Nyblom-Harvey (2000) test	Statistic: 11.46; Critical Value: 5.91 (*N* = 75); 4.09 (*N* = 50)	*N* = 55	Significance level 1%

Note: Null hypothesis: no cointegration. Based on three panel unit roots tests (*Levin-Lin-Chu test*, *Im-Pesaran-Shin test*, and *Hadri panel unit root test*), all series are I (1).

Table 2.5: Basic results of panel estimation (Income grouped)
Dependent variable: Outsourcing index *OUTS (ln)*

Independent Variable	(1) FE	(2) FE	(3) RE	(4) FE	(5) FE	(6) Error correction	(7) *INPROUTS = CII_j*	(8) *INPROUTS = CII_j* (1- HII_j)*
$OUTS_{t-1}$ (ln)				0.639***	0.659***	0.659***	0.608***	0.632***
				(0.040)	(0.051)	(0.051)	(0.053)	(0.051)
ICRG (ln)	-0.025	-0.058	-0.043	-0.006	-0.024	-0.024	0.008	0.001
	(0.038)	(0.037)	(0.034)	(0.020)	(0.021)	(0.023)	(0.009)	(0.010)
*ICRG*LMIDDLE*	0.121**	0.138***	0.113**	0.053**	0.060***	0.061**	0.013	0.023*
	(0.055)	(0.051)	(0.048)	(0.023)	(0.023)	(0.025)	(0.013)	(0.013)
*ICRG*UMHIGH*	-0.122	0.063	0.038	-0.045	0.012	0.001	-0.055***	-0.042*
	(0.080)	(0.096)	(0.082)	(0.051)	(0.037)	(0.039)	(0.020)	(0.022)
GDPPC (ln)		0.009	-0.001		-0.006	-0.003	0.002	0.001
		(0.023)	(0.023)		(0.016)	(0.017)	(0.009)	(0.010)
OPENNESS (ln)		0.095***	0.095***		0.068***	0.067***	0.044***	0.053***
		(0.030)	(0.027)		(0.025)	(0.025)	(0.012)	(0.014)
DISTUSA			-0.141*					
			(0.073)					
REGION			0.044***					
			(0.016)					
F-test (p-value)	LM: 0.06	LM: 0.02	LM: 0.05	LM: 0.00	LM: 0.02	LM:0.02	LM: 0.05	LM:0.05
	H: 0.11	H: 0.29	H: 0.46	H: 0.57	H: 0.48	H: 0.50	H: 0.02	H: 0.13
No. of Obs.	1908	1541	1541	1940	1480	1479	1480	1480
No. of Countries	85	76	76	89	76	76	76	76

Note: Robust standard errors in brackets *** p<0.01, ** p<0.05, * p<0.1. Variables used are in natural logarithm form. All regressions control for year dummies. Except for Columns (1) and (4), variables which are not significant and not reported include: latitude, road and airport density, and the freedom of FDI and information markets. For the error correction model, the short-term effects are not significant and not reported. In static settings the standard errors are corrected for the first order autocorrelation. In dynamic models the standard errors are robust. For F-test results, 'LM' represents lower-middle income countries, 'UH' represents upper-middle and high income countries. Results not reported here show that the effects of institutional quality are robust to using samples excluding high income countries or low income countries.

For upper-middle and high income countries which may already have relatively good institutions, further institutional improvements could yield marginal increase in outsourcing. The insignificant impact of institutions on outsourcing within these countries may also be explained by a positive correlation between variables *GDPPC* and *ICRG*. Economic theories of institutions argue that economic development generates a demand for good government, so that income per capita is positively associated with institutional quality (La Porta et al., 1999). Therefore, high institutional quality corresponds to high wage rates which negatively affect offshore outsourcing. As shown in Columns (7) and (8), because increasing institutional quality may bring a large cost burden, there can even be a negative effect of institutions on outsourcing within these relatively rich countries.

Across columns we find a significant positive relation between outsourcing and the openness of a country, which supports the market thickness theories. Among other control variables, only the region dummy and the distance to the USA are significant in explaining outsourcing. In Column (3), the negative impact of the distance variable (*DISTUSA*) on outsourcing implies the relative importance of transportation costs in international trade. In addition, the positive coefficient of the region dummy (*REGION*) indicates that firms tend to outsource manufacturing production to Asian economies (see Appendix 2 for region category). Fairly high correlations between income per capita and other independent variables such as infrastructure (*ROAD* and *AIRPORT*) may explain the insignificance of wage rates.

Table 2.6 shows the IV estimation results using internal instruments. Column (1) and Column (3) present the fixed effects estimation results as benchmarks for comparison. In Columns (2) and (4), we apply dynamic panel data models in which the lagged dependent variable is consistently estimated by using the lags (two and three years) of the level variable as instruments in the first-differenced model. To account for reverse causality, the *ICRG* variable and the corresponding interactions are instrumented with their past values lagged two years. Across panels the coefficients of the lagged dependent variable are similar in size and significance level, which implies that the 'Nickell bias' is negligible in our sample. Both the Hausman test for exogeneity and comparison of results indicate that once we control for the dynamic factor, the *ICRG* variable (and the interactions) can be viewed as exogenous so that reverse causality is no longer a severe issue.

Table 2.6: Endogeneity tests
Dependent variable: Outsourcing index *OUTS (ln)*

Variable	(1) FE	(2) IV	(3) FE	(4) IV
$OUTS_{t-1}$ *(ln)*	0.667***	0.648**	0.659***	0.671***
	(0.051)	(0.297)	(0.051)	(0.021)
ICRG (ln)	0.003	-0.059	-0.024	-0.031
	(0.014)	(0.136)	(0.021)	(0.021)
*ICRG (ln)*LMIDDLE*			0.060***	0.060**
			(0.023)	(0.030)
*ICRG (ln)*UMHIGH*			0.012	0.020
			(0.037)	(0.079)
GDPPC (ln)	-0.007	0.016	-0.006	-0.016
	(0.015)	(0.034)	(0.016)	(0.017)
OPENNESS (ln)	0.067***	0.068	0.068***	0.060***
	(0.024)	(0.050)	(0.025)	(0.020)
Sargan test		0.82		
AR (2) (p-value)		0.38		0.44
Hausman p-value		0.993		0.928
First stage p-value		0.00		0.00
F-test (p-value)			LM: 0.02	LM: 0.05
			UH: 0.48	UH: 0.19
No. of Obs.	1480	1352	1480	1419

Note: Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1. Insignificant control variables not reported include: year dummies, road and airport density, internet used, and the freedom of FDI and information market. For F-test results, 'LM' represents the lower-middle income group and 'UH' represents upper-middle and high income countries. Null hypothesis of the Hausman test: the lagged dependent variable is exogenous.

Table 2.7 presents the fixed effects estimation results for income sub-samples. We test a nonlinear relationship between outsourcing and institutions by adding the interaction of income per capita (*GDPPC*) and the *ICRG* variable. Consistent with the findings in Table 2.5, institutional quality is a crucial determinant of outsourcing only within lower-middle income economies. By contrast, in both low and high income countries, *GDPPC* is the only significant explanatory variable other than the lagged dependent variable. Results in Columns (1) and (2) imply that comparative advantage in labor costs is the key to attract outsourcing to low income countries regardless of local institutional condition. In upper-middle and high income economies, income per capita is irrelevant in Column (3), but statistically significant once we account for the interdependence of institutions and economic development in Column (4). Moreover, the significant negative coefficient of the interaction variable (*ICRG*GDPPC*) in Column (6) indicates that the marginal effect of institutional quality decreases with wage rates over time. This nonlinear relation and the importance of wage rates, therefore, to a large extent explain why institutional improvements have a trivial or even negative impact on outsourcing to upper-middle and high income countries.

Table 2.7: Fixed effects results for income sub-samples
Dependent variable: Outsourcing index *OUTS (ln)*

	Low income		Upper-middle & High		Lower-middle income	
Variable	(1)	(2)	(3)	(4)	(5)	(6)
$OUTS_{t-1}$ *(ln)*	0.648***	0.641***	0.500***	0.503***	0.747***	0.737***
	(0.077)	(0.077)	(0.112)	(0.138)	(0.049)	(0.049)
ICRG (ln)	-0.024	0.241	-0.048	-0.203	0.031*	0.381**
	(0.023)	(0.176)	(0.053)	(0.234)	(0.017)	(0.181)
*ICRG*GDPPC (ln)*		-0.048		-0.033		-0.052*
		(0.032)		(0.033)		(0.027)
GDPPC (ln)	-0.035*	-0.047**	-0.053	-0.074**	0.033	-0.012
	(0.020)	(0.021)	(0.042)	(0.032)	(0.025)	(0.033)
OPENNESS (ln)	0.032	0.014	0.068	0.068	0.052**	0.048**
	(0.048)	(0.048)	(0.052)	(0.050)	(0.024)	(0.024)
F-test (p-value)		*ICRG*: 0.21		*ICRG*: 0.42		*ICRG*: 0.03
		GDPPC: 0.07		*GDPPC*: 0.07		*GDPPC*: 0.08
No. of Obs.	537	532	324	317	617	616
No. of Countries	28	26	21	15	27	27

Note: Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1. Insignificant control variables not reported include: year dummies, road and airport density, internet used, and the freedom of FDI and information market.

Based on the results of a sub-period study in Table 2.8, we find that the effect of institutions on outsourcing has changed over time. In Column (1), the *ICRG* variable has a significant negative marginal effect on outsourcing to low income countries. One explanation for this negative relation in the 1980s is that outsourcing deals back then were mainly low value added. Improving institutional quality might increase local production costs and therefore discourage this type of outsourcing. On the contrary, results in Columns (4) and (5) imply that in recent years outsourcing is driven by improved institutional quality in lower-middle income countries which have started attracting higher value added production. Further, the dynamic panel IV estimation results show that short periods of time are insufficient to capture the significance of the lagged dependent variable.

Table 2.9 shows the fixed effects estimation results of using alternative dependent variables. In Columns (1) and (2), we apply two different methods to calculate the outsourcing probability. We then define a product to be contract intensive if it is not sold on an organized exchange but has a reference price in Column (3). Column (4) reports the results of using the liberal estimation in Rauch (1999) to classify goods. The outsourcing proxy in Column (5) is based on exports in monetary terms instead of the Balassa index. Estimates in Columns (1) to (5) are similar to those in Column (5) of Table 2.5 both in magnitude and significance.

Finally, we disregard the outsourcing probability and directly use the Balassa index in Column (7). The insignificant impact of institutional quality on a country's overall revealed comparative advantage implies that institutions are only crucial for relationship-specific transactions.

Table 2.8: Results for sub-periods

	1980 to 1989			1990 to 2004		
Variable	(1) FE	(2) RE	(3) IV	(4) FE	(5) RE	(6) IV
$OUTS_{t-1}$ *(ln)*			0.867			0.522
			(0.572)			(0.407)
ICRG (ln)	-0.182*	0.107	-0.287	-0.008	0.013	-0.138
	(0.101)	(0.089)	(0.633)	(0.050)	(0.044)	(0.497)
*ICRG*LMIDDLE*	0.160	-0.005	0.154	0.092*	0.066	0.189
	(0.111)	(0.084)	(1.193)	(0.050)	(0.041)	(0.600)
*ICRG*UMHIGH*	0.663	-0.103	0.589	0.082	0.005	0.168
	(0.397)	(0.192)	(4.805)	(0.064)	(0.053)	(0.772)
F-test (p-value)	LM: 0.19	LM: 0.37	LM: 0.88	LM: 0.01	LM: 0.02	LM: 0.94
	UH: 0.12	UH: 0.48	UH: 0.86	UH: 0.24	UH: 0.90	UH: 0.96
No. of Obs.	604	604	426	937	937	926

Note: Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1. Instruments used in dynamic panel IV estimation pass the instrument relevance test. For F-test results, 'LM' represents the lower-middle income group and 'UH' represents upper-middle and high income countries.

Table 2.9: Fixed effects estimation results of using different outsourcing proxy

	(1)	(2)	(3)	(4)	(5)	(6)
	INPROUTS	*INPROUTS*	*CII*	*CII*	*OUTS* on	Regular
Variable	$= CII_j - HII_j$	$= 2CII_j - HII_j$	Reference	Liberal	Exports	Balassa
ICRG (ln)	-0.018	-0.014	-0.022	-0.023	-0.025	-0.011
	(0.015)	(0.019)	(0.017)	(0.021)	(0.018)	(0.031)
*ICRG*LMIDDLE*	0.055***	0.064**	0.043**	0.059***	0.064***	0.007
	(0.021)	(0.028)	(0.018)	(0.023)	(0.021)	(0.037)
*ICRG*UMHIGH*	-0.015	-0.040	0.028	0.010	-0.014	0.060
	(0.037)	(0.046)	(0.029)	(0.037)	(0.034)	(0.054)
F-test (p-value)	LM:0.02	LM:0.04	LM:0.04	LM:0.02	LM:0.01	LM:0.93
	UH:0.37	UH:0.43	UH:0.40	UH:0.50	UH:0.19	UH:0.48
No. of Obs.	1480	1480	1480	1480	1480	1480

Note: Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1. Across panels, we estimate the dynamic models. In Column (1), we take linear transformation for the outsourcing index to get positive values. For F-test results, 'LM' represents the lower-middle income group and 'UH' represents upper-middle and high income countries.

2.5 Conclusion

This chapter empirically investigates the causal relation between institutions and outsourcing by employing panel data for 89 developing economies over 25 years (1980-2004). Based on the panel estimation results, we conclude that institutional quality matters for outsourcing to lower-middle income countries. Within these economies, outsourcing is driven by good institutions, such as control of corruption,

contract enforcement, and government efficiency. In low, upper-middle, and high income countries, low labor costs rather than institutional quality are important for attracting outsourcing. The results imply that there are two critical conditions for institutional quality to act as a key determinant of outsourcing. First, good institutions are not important until a developing country is engaged in higher value added international production. Second, due to the positive correlation between wage rates and institutions, institutional improvements may deter outsourcing once a country enters the upper-middle income stage.

Discussion of these results could be focused around the following three issues which may qualify the empirical results. First, the dependent variable used in this chapter is a proxy for outsourcing, given the fact that outsourcing statistics are absent in most developing countries. Second, due to data availability, we are not able to account for service outsourcing which is increasing rapidly in recent years. Third, we assume exogenous wage rates for simplicity, while previous studies show that outsourcing affects wage in both the source and target countries (Grossman and Rossi-Hansberg, 2006; Grossman and Helpman, 2008). We acknowledge that these are important aspects to be considered in future studies. By constructing a time-varying outsourcing measure, however, the present chapter provides valuable indications for the causal and dynamic relations between institutional quality and outsourcing.

Appendix 2

Variable	*Description*	*Data Source*
OUTS	The constructed outsourcing proxy based on the contract intensity indicator (*CII*), the Herfindahl index of intermediate input use (*HII*), and the normalized Balassa index.	*CII* and *HII*: input-output tables in Global Trade Analysis Project (GTAP) database 5 (base year 1997) and Rauch (1999). Balassa index: calculated based on export data (in US dollars current prices and current exchange rates) in the UNCTAD Handbook of Statistics 2005.
ICRG	The mean value of the International Country Risk Guide (ICRG) variables 'Corruption', 'Law and Order', and 'Bureaucracy Quality', scaled 0-1. Each component is assigned a maximum numerical value. Higher value corresponds to a lower risk. 'Corruption': original rating value 0 to 6. 'Law and Order': original rating value 0 to 6 (0 to 3 for each). 'Bureaucracy Quality': original rating value 0 to 4.	The Political Risk Services Group (PRS)
GDPPC	Gross domestic product per capita (constant 2004 US dollar price)	UNCTAD Handbook of Statistics 2005
OPENNESS	Trade openness (ratio of total trade to gross domestic product)	World Bank Development Indicators 2005
LATITUDE	The absolute value of the latitude of the capital city (scaled value 0 to 1)	The Central Intelligence Agency (CIA)
REGION	Region dummy (1 to 7) 1: Latin America 2: North Africa and the Middle East 3: Sub-Saharan Africa 4: East Asia 5: South-East Asia 6: South Asia 7: The Pacific	Hadenius and Teorell (2005)
DISTUSA	Distance between the capital of the country and that of USA (km)	The CEPII Research Centre
ROAD	Road density (km of road per square km of land area)	World Bank Development Indicators 2005
AIRPORT	Airport density (number of airports per million population)	World Bank Development Indicators 2005
FREEFDI	Freedom of the information markets index (scale 1 to 5)	The Heritage Foundation
FREEINFOR	Freedom of FDI index (scale 1 to 5)	The Heritage Foundation

CHAPTER 3
DUAL AND COMMON AGENCY ISSUES IN INTERNATIONAL JOINT VENTURES: EVIDENCE FROM CHINA[9]

3.1 INTRODUCTION

Becoming engaged in international trade is crucial for poor countries in which income growth relies on external demand. Clearly, as many small and medium sized enterprises in developing countries cannot directly get access to world markets for final goods, in practice they cooperate with multinational enterprises to become part of the value chain. For example, supplying intermediate inputs to foreign producers is the most important activity for many Chinese and Indian firms.

In the relationship between foreign and domestic firms, the local government often plays an important role in supporting the partnership. For example, public agencies and officials need to improve infrastructure, abstain from corruption, and police contract adherence. Often, however, private parties complain about insufficient public services. Such undersupply can be explained by using two sets of arguments. First, privately motivated public officials may have limited incentives, because individual financial rewards for 'good governance' are absent. Even stronger, pay-offs may actually come from diverting funds earmarked for infrastructure, engaging in rampant corruption, and assisting in discretionary rulings in favor of cronies. A second reason for undersupply of public services is that benevolent, socially motivated public officials care only for the revenues of local suppliers. Hence, they do not internalize the benefits of public goods and services to foreign producers. Moreover, public goods and services often need to be supplied after the relationship of the domestic and foreign producers is in place, so that such limited incentives ex post create a commitment problem for local governments.

The aim of this chapter is to formulate the relationship between rent sharing in an international equity joint venture (EJV) and local public goods provision. Clearly, full ownership makes the firm claimant on all of the foreign venture's profits. However, the transaction costs theory (Williamson, 1979), the property rights literature (Grossman and Hart, 1986; Hart and Moore, 1990), as well as the

[9] This chapter is an adapted version of Roelfsema and Zhang (2010).

managerial incentives literature (Holmstrom and Milgrom, 1991) argue that when activities of the subsidiary's managers are imperfectly contractible, equity sharing reduces the moral hazard problem (Pisano, 1989; Chi, 1994). In addition, empirical research shows that sharing profits with local management could stimulate local innovation and make them cooperate in transferring knowledge (e.g. Chen and Hennart, 2004).

Another feature of equity joint ventures is that profit sharing preserves incentives for government assistance, which adds to the institutional resource base of the joint venture (Parkhe, 1993; Luo, 2001). When local managers have a larger share in the joint venture, they are better motivated to act as linking pins between foreign investors and the local government, so as to use their connections to improve the profitability of the venture (Shan, 1991). In this spirit, Chari and Chang (2009) demonstrate that cultural distance between the home and host country has a positive effect on incentives for local managers. For China, Lee et al. (1998) show that when the local partner in the EJV is connected to the local government, the level of its equity ownership is higher. Moreover, many case studies on EJVs find a negative effect of foreign equity shares on local government involvement in creating the right business atmosphere (e.g. Root, 1988; Prahalad and Hamel, 1990; Luo, 2001; Yan and Gray, 1994).

In our analysis, we start by setting up a theoretical model to investigate how contracts between foreign and domestic partners deal with limited incentives for local public officials. The key is that the local government performs as a dual agent whose ex post actions cannot be directly contracted in a principal-agent relationship between the foreign investor (the principal) and the local partner (the agent). Since the future revenues of the local private partner affect incentives for the local government to provide public goods and services, in the venture stage leaving more rents to the local partner (partly) solves the commitment problem. We then extend the model to include free riding in a common agency setting and the effects of local content requirements on profits. After that, we present empirical evidence for China on the relation between local equity shares and public investment by applying the dynamic panel two-stage least squares (2SLS) estimation. In line with our theoretical predictions on public incentives, infrastructural services across Chinese provinces increase with the level of local equity ownership in foreign funded enterprises (FFEs). Moreover, a negative

impact of the number of FFEs on local equity shares implies that free riding among foreign investors exerts a negative externality on public goods provision.

China is justified as an interesting case to study. First, China attracts large amounts of foreign direct investment (FDI), so that we are able to observe dynamic effects. Also, since China has not fully transited into a market economy, the role of local government is important in attracting FDI. Furthermore, the large heterogeneity in the quality of local governments is suggested to be a critical determinant for equity sharing in EJVs (Lee et al., 1998; Zhao and Zhu, 1998), and has important effects on the geographical distribution of FDI across Chinese provinces (Cheung and Lin, 2004; Cole et al., 2006; Fu, 2008).

Government commitment is a common theme in the international trade literature, for example in setting tariffs and export taxes. Our study is close to the spirit of Tirole (2003), who analyzes the commitment problem of governments in international finance. He shows that ex ante inefficient taxes on capital inflows may serve as an ex post efficient commitment devise for good domestic policies. His (and our) result echoes more general findings in the common agency literature that restrictions on the agent's behavior may improve efficiency by easing the common pool problem. For example, studying the interaction between a single agent and a group of risk-neutral principals, Bernheim and Whinston (1986) show when non-cooperative actions of these multiple principals may lead to efficient outcomes. Chortareas and Miller (2004) establish a common agency model to study the behavior of the central banker who has two principals – society and an interest group. They conclude that the central banker's choice can be dominated by either the formal contract with the government or the informal contract with the interest group.

The chapter commences as follows. In section 3.2, we present a dual agency model which highlights the government commitment problem and its effects. Based on some important trade-offs, we then investigate common agency issues with multiple foreign investors and the way in which local content requirements alleviate agency problems. Section 3.3 tests theoretical hypotheses with data from China. Section 3.4 concludes.

3.2 THE THEORETICAL MODEL

This section presents a simple incentive mechanism for a principal-agent relationship in international contracting. The essential element is that the local government has time-inconsistent preferences and maximizes its own utility function. Therefore, with commitment the local government responds to different incentive schemes offered by the foreign investor. We consider the unit production of a final good *z* for which the price in the world market depends on the quality of the inputs. Production takes place in a partnership between a final goods producer and a specialized component producer. In line with most of the literature, we suppose that there are two private inputs: the quality of headquarter services *h* and that of the component *m*. In addition, production needs a public input *a* into the production process. We assume that the revenues of selling *z* are $R = R(x)$, strictly concave in all its arguments with third derivatives close to zero, where $R(x)$ is the vector of inputs. We further assume that the inputs *m*, *h,* and *a* are complementary to each other and that the mixed second-order derivatives (R_{mh}, R_{ma}, and R_{ha}) are close to zero, as in Anderson (2009). The costs to supply quality of each input are captured by a convex cost function $C(x)$. Clearly, the first-best is a forcing contract on the quality of the inputs that maximizes profits $\Pi = R(x) - \sum C(x)$ with the first-order conditions $R_x = C_x$.

The set-up of our model is an equity joint venture (EJV) where quality of the inputs is non-contractible so that incentives have to be provided.[10] The foreign firm is the senior partner in the EJV and (as principal) has to decide on the equity share $(1-\beta)$ it will take. Hence, the pay-offs for the foreign and the domestic firms in the EJV are:

$$\Pi^h(m,h,a) = (1-\beta)R(m,h,a) - C(h), \tag{3.1}$$

$$\Pi^m(m,h,a) = \beta R(m,h,a) - C(m). \tag{3.2}$$

With commitment the local government's objective function maximizes the pay-off of the local supplier subject to the social costs of public investment:

[10] There may be various reasons to consider this set-up. For example, when quality of the inputs depends on unobservable efforts and cannot be verified before the final sale, efficient production relies on tying the rewards of the input producers to total revenues. It may also capture the case where there is some uncertainty in the contracting stage how high the price will be in the world market for a given quality. In that situation it may be optimal to design a bonus scheme that relates the rewards of the input producers to the revenues in the world market when the input suppliers have observed the price-quality relation before they maximize profits. Further, when renegotiation is possible in the stage that the inputs have to be put together, forcing contracts may be non-credible. In addition, forcing contracts may give rise to well-known multiple equilibria when financial sanctions are non-enforceable.

$$G = \beta R(m,h,a) - C(m) - C(a) \quad (3.3)$$

The timing of events is as follows. In stage 1 the foreign partner in the EJV decides on the equity share β for the local supplier; In stage 2 the government decides on the level of public investment a; In stage 3 the firms set production levels and share the profits according to the equity shares. We then solve for subgame-perfect equilibria with backward induction.

In stage 3, the firms choose h and m to maximize profits. The first-order conditions for choosing the optimal quality of inputs are:

$$(1-\beta)R_h(m^*,h^*,a) - C_h(h^*) = 0, \quad (3.4)$$

$$\beta R_m(m^*,h^*,a) - C_m(m^*) = 0. \quad (3.5)$$

It is evident that both firms under invest in quality compared to the first-best, in line with Holmstrom (1982), who shows that in the absence of side-payments or third party enforcements first-best incentives cannot be implemented since they break the budget constraint. Totally differentiating we can show that $dm^*/d\beta > 0, dh^*/d\beta < 0$ and $dm^*/da > 0, dh^*/da > 0$ (see Appendix 3), so that public investment not only has a direct effect on revenues, but also increases the marginal returns to the private inputs.

In stage 2, the government realizes that public investment will increase the revenues of both partners in the EJV, but it only cares for those of the local firm. Hence, it sets the level of public investment to satisfy:

$$dG/da = \beta R_a(m^*,h^*,a^*) + \beta(dh^*/da)R_h(m^*,h^*,a^*) - C_a = 0. \quad (3.6)$$

When compared to the first-best public investment $R_a = C_a$, the first part of equation (3.6) indicates underinvestment in public goods when $\beta < 1$. The second term shows that (to some extent) such weak incentives for public investment are mitigated by the fact that the government wants to induce higher investment from the foreign producer, so as to increase the profits of the local supplier. Totally differentiating equation (3.6)

it is straightforward to show that $da^*/d\beta > 0$.[11] This means that increasing β gives the local supplier a higher share in the profits and, hence, its government a stronger incentive to provide public goods.[12]

In the first stage, there is a trade-off for the foreign investor. Increasing incentives for the component producer raises the local input quality of which he also benefits. However, these stronger incentives induce higher payment to the component supplier, which puts a dent in the profits of the final goods producer. In the first stage the final goods producer chooses incentives β so as to maximize his own profits. The optimal β maximizes equation (3.1), which (using the envelope theorem) gives:

$$\begin{aligned} &d\Pi^h/d\beta = -R(m^*,h^*,a^*) + (1-\beta^*)(dm^*/d\beta)R_m(m^*,h^*,a^*) \\ &+(1-\beta^*)(da^*/d\beta)R_a(m^*,h^*,a^*) + (1-\beta^*)(da^*/d\beta)(dm^*/da)R_m(m^*,h^*,a^*) = 0 \end{aligned} . \quad (3.7)$$

Equation (3.7) reveals that four arguments explain why the commitment problem forces incentives for the local supplier to be strong. Before we go over the arguments, recognize that investments in *m*, *h*, and *a* are higher when no commitment problem is present and so are returns *R*. The first term of equation (3.7) shows that revenues *R* are lower with government commitment than without it, so that giving incentives at the margin is less costly. By the second term, when the provision of *m*, *h*, and *a* is lower due to the commitment problem, the marginal productivity of the local supplier is higher, which raises the rewards of providing incentives. The third term is positive and shows that the final goods producer has a motive to push the government to enhance public investment, which in turn increases the revenues of the foreign producer. Lastly, the fourth (positive) term reveals that more local rents further raise the investment of the local supplier through the increased public goods investment.

Intuitively, since the government only cares for the local supplier's benefits, leaving more rents to the local supplier also generates incentives for the local government to invest in public goods. The two-fold gains from stronger incentives for both the local supplier and government increase the total revenues and the payoffs to

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[11] With zero third-order conditions and sufficient small cross second-order conditions, we get: $da^*/d\beta = [R_a + R_h(dh^*/da)]/[C_{aa} - \beta R_{aa}] > 0$.

[12] An interesting side-result is that an unbiased social planner would conduct a higher level of public investment than the first-best level when the team structure of production provides too weak incentives for the firms. Such a social planner would maximize: $G = R(m,h,a) - C(m) - C(h) - C(a)$. Since the envelope theorem does not apply, this gives: $dG/da = R_a - C_a + dm/da\,(R_m - C_m) + dh/da\,(R_h - C_h) = 0$. Since the last two terms are positive, incentives for investing public goods may be higher than in the first-best case.

the foreign producer. Hence, when public goods are insufficient due to opportunity costs, the foreign producer would like to stimulate public investment by giving the local supplier more rents. With results in Appendix 3 and some assumptions, we solve for the optimal incentives by substituting $dm^*/d\beta$ and $da^*/d\beta$ in equation (3.7)[13]:

$$\beta^* = \frac{R^*_m{}^2 + R^*_a{}^2 - R^*(C_{mm} - R_{mm})}{R^*_m{}^2 + R^*_a{}^2 - R^* R_{mm}} = 1 - \frac{C_{mm} - 2R_{mm}}{(R^*_m{}^2 + R^*_a{}^2)/R^* - R_{mm}} \,. \qquad (3.8)$$

Equation (3.8) shows some critical factors which determine the optimal rents left for the local partner. First, local rents increase with the relative importance of local private input and public goods in joint production ($\partial\beta^*/\partial R_m > 0, \partial\beta^*/\partial R_a > 0$). Second, with a concave revenue function, more local rents β^* will be provided when the decreases of the marginal returns to local inputs are smaller ($\partial\beta^*/\partial|R_{mm}| < 0, \partial\beta^*/\partial|R_{aa}| < 0$). Third, higher revenues mean a larger direct loss from sharing rents and therefore lead to weaker local incentives ($\partial\beta^*/\partial R^* < 0$). Government commitment results in larger marginal gains of local inputs (R_m and R_a) and lower revenues (R^*), compared to the first-best case, and hence raises local rents.

3.2.1 FREE RIDING

A common agency problem is a translation of the dual agency problem from the side of firms' managerial choices to the local government's behavior. When a large number of foreign firms engage in international team production, the local government is a common agency of all production teams to provide non-rival and non-excludable public goods and services. The optimal level of public investment depends on the overall incentives offered by all foreign firms. Yet, at least some foreign producers intend to provide weak incentives for the local suppliers, because they can free ride on public goods generated by other foreign producers' shared rents. When the local government only cares about local suppliers' benefits, however, it invests less in public goods given lowered local profits. In other words, common agency and free riding result in dual moral hazard of both the local government and

[13] We assume that R_{mh}, β^2, $(1-\beta)^2$, and $\beta^*(1-\beta)$ are sufficiently small; both producers have the same revenue and cost structures $R_{mm} = R_{hh} = R_{aa}$ and $C_{mm} = C_{hh} = C_{aa}$.

the foreign firms, which cause under-provision of public goods and under-provision of local incentives. Clearly, negative externalities of common agency and free riding give rise to production efficiency loss. Therefore, when the public goods are scarce, foreign firms have motivation to encourage the local government to improve the level of public investment through rent sharing.

Now we suppose that there are N equity joint ventures (N is large and can be close to infinity). In stage 3 all EJVs choose the optimal levels of investments m_i^* and h_i^* given the incentive structure ($i = 1, 2, \cdots, N$). In stage 2 the local government solves for the optimal level of public goods based on its objective function:

$$G = \sum_{i=1}^{N} \beta_i R_i(m_i^*, h_i^*, a) - \sum_{i=1}^{N} C_i(m_i^*) - C(a), \tag{3.9}$$

$$dG/da = \sum_{i=1}^{N} \beta_i [R_{i_a} + (dh_i^*/da) R_{i_h}] - C_a = 0. \tag{3.10}$$

Given all equity shares of other firms β_j ($j \neq i$), we totally differentiate equation (3.10) and show the change of public investment with respect to individual local rents β_i:

$$da^*/d\beta_i = [R_{i_a} + (dh_i^*/da) R_{i_h}] \Big/ (C_{aa} - \sum_{i=1}^{N} \beta_i R_{i_{aa}}). \tag{3.11}$$

In stage 1 the foreign firms decide on their own local rents left for the local producers based on profits maximization:

$$d\Pi_i^h/d\beta_i = -R_i^* + (1-\beta_i^*)(dm_i^*/d\beta_i) R^*_m + (1-\beta_i^*)(da^*/d\beta_i) R^*_a = 0. \tag{3.12}$$

Compared with equation (3.7) in the baseline model, for simplicity here we omit the last term on the second-order effect without changing the main results. Imposing symmetry in equilibrium ($\beta_1^* = \beta_2^* = \cdots = \beta_N^*$ and $\Sigma\beta_i^* = N\beta_i^*$) and solving for optimal incentives with the same procedure in the single-firm case gives:

$$\beta_i^* = 1 - \frac{R_i^*}{(da^*/d\beta_i) R^*_a + (dm_i^*/d\beta_i) R^*_m} = \frac{R^{*2}_m + R^{*2}_a - R_i^*(C_{mm} - R_{mm})}{R^{*2}_m + R^{*2}_a - N R_i^* R_{mm}}. \tag{3.13}$$

In equation (3.13), R^*_m represents the marginal returns to local inputs in the singe-firm case. Keeping other parameters constant, local shares decrease with the number of foreign investors when multinationals free ride on public incentives ($d\beta_i/dN < 0$). This is an important result, because recent empirical research indicates that EJVs are increasingly replaced by fully foreign owned production facilities (Branstetter and Lardy, 2008). The argument in this chapter is that when the number of foreign firms increases, this gives the individual investor less incentive for profit sharing.

Totally differentiating equation (3.10) with symmetry in equilibrium, we find:

$$\frac{da}{dN} = \frac{[R_{i_a} + (dh_i^*/d\beta_i)R_{i_h})]}{C_{aa} - N\beta_i R_{i_{aa}}}[\beta_i + (d\beta_i/dN)N]. \tag{3.14}$$

Equation (3.14) represents the negative externalities from free riding. Local rents diminish with the opportunistic behavior among foreign firms ($d\beta_i/dN < 0$), which in turn discourages the local government in public investment. In addition, the positive second-order derivative of *a* with respect to *N* corresponds to a non-linear relation supported by the empirical evidence in section 3.3.

3.2.2 LOCAL CONTENT REQUIREMENTS

Local content requirements on foreign investments, which oblige foreign investors to use a minimum proportion of locally produced intermediate goods and services, are commonly imposed in developing countries to increase local employment. Although such requirements in developed economies have been abolished for fair trade, our model suggests that requiring certain amount of local rents in developing countries, where government commitment is prevalent, can alleviate externalities and increase the profits of *foreign* firms.

In particular, when foreign firms free ride on a common pool of local public goods, simultaneously they reduce local rents so that the local government decreases the level of public investment (an extreme case occurs if zero public investment). When public goods are critical for the joint production, foreign profits are fenced by limited local public services. In this case local content requirements could effectively keep foreign investors from opportunistic behavior, which in turn stimulate local

public investment with more local rents, increase the total revenues and therefore the profits for *both* local and foreign producers. Yet, our model does not imply that any local content requirement policy could be beneficial. Compared to the total revenues of the joint production with zero local public investment $R_i^* = (1-\beta_i^*)(dm_i^* / d\beta_i)R_i^*{}_m$, revenues only increase with local content requirements ($R_i^{LC} > R_i^*$ where R_i^{LC} denotes for the total revenues with local content requirements) under the condition below:

$$\beta^{LC} < 1 - \frac{(1-\beta_i^*)(dm_i^* / d\beta_i)R_i^*{}_m}{(da^{LC} / d\beta^{LC})R_i^{LC}{}_a + (dm_i^{LC} / d\beta^{LC})R_i^{LC}{}_m}. \tag{3.15}$$

Our results on the relationship between local content requirements and public goods provide some important policy implications for technology transfer and intellectual property rights protection. The fact that very few foreign firms have engaged in high value added production in emerging markets is to a large extent determined by their concerns about knowledge dissipation and poor local property right protection. Some argue that foreign investments in knowledge intensive sectors would be further restricted when local intellectual property requirements are implemented to promote technology transfer, popular policy considerations in many developing countries. Regarding property right protection as one necessary dimension of public goods, we conclude from our theoretical framework that pushing foreign investors to transfer more technology leaves more rents to their local partners and therefore encourages the local government to enhance local institutional quality in protecting property rights. This sequentially creates a better investment environment for foreign firms to obtain higher potential profits in the long run. Summarizing the critical trade-offs in this simple model, in the next section we test the following hypotheses:

> ***Hypothesis 3.1****: High levels of local ownership result in high levels of public goods provision.*
>
> ***Hypothesis 3.2***: *When levels of public goods increase, foreign firms have weaker incentives to leave rents to domestic firms.*
>
> **Hypothesis 3.3**: *More foreign firms within a region results in free riding and, hence, in lower local ownership shares and lower level of public goods.*

Table 3.1: Data summary and correlation

	Levels					First Differences				
Variable	Obs.	Mean	Std. Dev.	Min	Max	Obs.	Mean	Std. Dev.	Min	Max
Local shares	369	0.359	0.098	0.111	0.552	338	-0.011	0.046	-0.187	0.333
Public goods	371	-0.030	0.990	-1.317	4.506	340	0.071	0.171	-0.541	0.998
GRP per capita (ln)	369	8.972	0.671	7.348	10.963	338	0.134	0.098	-0.123	0.488
FFEs total investment (ln)	369	13.921	1.572	9.567	17.294	338	0.094	0.444	-3.156	3.320
Number of FFEs (1000 units)	369	7.481	11.122	0.051	61.999	338	0.110	1.063	-5.177	3.934

	Levels					First Differences				
Variable	*Local shares*	*Public goods*	*GRP per capita*	*FFEs investment*	*FFEs number*	*Local shares*	*Public goods*	*GRP per capita*	*FFEs investment*	*FFEs number*
Local shares	1.000					1.000				
Public goods	-0.362	1.000				-0.102	1.000			
GRP per capita (ln)	-0.612	0.622	1.000			0.042	0.089	1.000		
FFEs total investment (ln)	-0.563	0.748	0.688	1.000		-0.153	0.063	0.068	1.000	
Number of FFEs (1000 units)	-0.469	0.730	0.494	0.737	1.000	-0.080	0.418	0.157	0.403	1.000

3.3 EMPIRICAL EVIDENCE

To test the relation between rent sharing and public incentives, we use aggregated data for foreign funded enterprises (FFEs) across 29 Chinese provinces between 1995 and 2006.[14] Data are taken from Chinese Statistical Yearbook (1995-2007) published by the Chinese National Bureau of Statistics. Data on equity sharing allow us to capture local rents by the ratio of local capital in total registered capital of foreign funded enterprises (*Local shares*).[15] Using a principal component factor analysis approach, we measure local public goods by a factor of provincial infrastructure (*Public goods*) derived from observed variables on transportation and communication, including length of city roads, area of city road, capacity of freight, length of railways, length of highways, length of inland waterways, capacity of telephone exchanges (long-distance, local, and mobile phone), and length of cable lines. In addition, we collect data on the total number of foreign funded enterprises and the amount of their investments at provincial level. The former is considered helpful to capture free riding and the latter is added to control for the absolute value of foreign investment. We then incorporate provincial Gross Regional Production (*GRP*) per capita to account for the possible positive correlation between public goods provision and local economic development. Table 3.1 present summary and correlation for the level and first-differenced variables.

3.3.1 ECONOMETRIC MODEL

With data above we test our hypotheses by estimating two econometric models:

$$Publicgoods_{it} = \lambda_1 Publicgoods_{it-1} + \alpha_1 Localshares_{it} + \alpha_2 Localshares_{it-1} + \theta NumberFFE_{it} + \delta_1 CV_{it} + \delta_2 CV_{it-1} + \varepsilon_{it} \quad [3.1]$$

$$Localshares_{it} = \pi_1 Localshares_{it-1} + \pi_2 Localshares_{it-2} + \gamma_1 Publicgoods_{it-1} + \gamma_2 Publicgoods_{it-2} + \varphi NumberFFE_{it} + \rho_1 CV_{it} + \rho_2 CV_{it-1} + \upsilon_{it} \quad [3.2]$$

[14] Since there are no data for Chongqing before 1998 and no FDI inflows data for Tibet throughout the sample period, our sample excludes Chongqing and Tibet.

[15] For this measurement two remarks are in place. First, entry modes of multinationals in China can be classified into contractual joint ventures, cooperative ventures, and fully foreign funded enterprises. We assume that the division of surplus is determined by capital contribution. Second, China sets no upper limit to the proportion of foreign capital in total registered capital.

The dependent variable in the econometric model [3.1] is the level of public goods represented by a local infrastructure factor and *CV* represents other control variables. A dynamic setting is crucial, since public goods provision is usually persistent over time. To account for autocorrelation, lag one is selected based on t-statistics. According to our *hypothesis 3.1*, a positive α_1 indicates that local governments invest more in infrastructure with more local shares, which therefore shows the presence of government commitment.

Model [3.2] illustrates a possible solution to the commitment problem when foreign investors take into account the role of local governments in equity sharing. To capture the dynamics of local rents, the optimal order of the lag length is selected to be two. The previous rather than contemporary level of public goods is interesting because in our theoretical model in equity sharing stage foreign investors are not acknowledged of the level of public goods ex post provided by local governments. Hence, the existing level of public goods is used as a referenced baseline. If investors are satisfied with the existing level of infrastructure, zero γ_1 and γ_2 are expected because the commitment problem is not relevant in this case. However, if the accessible public goods are insufficient, negative γ_1 and γ_2 mean that foreign firms leave local rents to stimulate local governments in public investment and therefore provide evidence for our *hypothesis 3.2*.

Table 3.2: Panel Unit Root Tests

	Level		First differences	
Variable	P-value	Order	P-value	Order
Local shares	0.000	I (1)	0.830	I (0)
Public goods	0.000	I (1)	0.393	I (0)
GRP per capita (ln)	0.000	I (1)	0.453	I (0)
FFEs investment (ln)	0.000	I (1)	0.997	I (0)
Number of FFEs (ln)	0.000	I (1)	0.999	I (0)

Note: the null hypothesis of Hadrilm test (with Heteroskedastic error) is that all time series in the panel are stationary processes.

Panel unit roots tests in Table 3.2 show that all the level variables are integrated at order one and first differencing yields stationary series. To get unbiased estimates for our dynamic models, we employ the dynamic panel two-stage least squares (2SLS) estimation. We first transform the original models [3.1] and [3.2] into the first-differenced ones, because first differencing eliminates the region-specific time-invariant characteristics and in the same time reports the coefficients of the level

models. Since the first-differenced lagged dependent variables are endogenous by specification, lagged two years level variables are selected to be instrumental variables, as proposed by Anderson and Hsiao (1981).

3.3.2 ESTIMATION RESULTS

The first two columns in Table 3.3 show the results of estimating model [3.1]. We can see that the impact of equity sharing on public goods provision is statistically significant positive, consistent with our *hypothesis 3.1*. In particular, local governments tend to raise the infrastructure factor by 0.21 percentage points if foreign investors leave one percent more rents for their local partners. Regression results of model [3.2] in Column (3) imply that foreign investors strategically respond to public goods provision, and hence support *hypothesis 3.2*. In provinces with one unit lower infrastructure factor, local equity share increases by around 4 percent. This indicates that foreign investors deal with the government commitment problem by offering stronger local incentives when more public goods are needed (e.g. the level of the existing infrastructure is low). Moreover, in Column (3) the significant negative impact of the number of FFEs on equity sharing points out free riding among foreign investors, as illustrated in *hypothesis 3.3*.

To see the effects of free riding on public goods provision, we then report estimates of model [3.1] without controlling for local rents in the last two columns. The overall effect of the number of FFEs on public investment is shown in Column (4). First, when more foreign invested firms are established, local governments expect more local rents as incentives for public investment. Without raised local rents, the benefits of involving more FDI are marginal. Therefore, a failure to realize the local governments' expectation results in low level of public investment, as shown in Column (1) where we keep local shares constant. More importantly, there is an indirect effect of the number of FFEs on public goods through equity sharing, as free riding reduces local rents and public incentives. The specific effect of free riding is obtained by comparing results in Columns (1) and (4). Specifically, the difference between the magnitudes of the number of FFEs variable in Columns (4) and (1) can be viewed as the effect of free riding on public incentives.

Furthermore, in Columns (2) and (5) the positive coefficients of the squared FFEs number variable show a turning point of increasing foreign firms implied by

equation (3.14). The negative externalities of free riding can be internalized when foreign investors realize the efficiency loss and decide to increase local rents. When the level of public goods hits the bottom due to free riding, at least some of the foreign investors may stand out to alleviate the inefficiency. Alternatively, local governments may exert local content requirements. With certain requested amount of local rents, foreign investors have an obligation to share profits and are forced to provide public incentives.

Table 3.3: Dynamic Panel Estimation Results (2SLS)

	Model [3.1]		Model [3.2]	Model [3.1]	
Variable	(1)	(2)	(3)	(4)	(5)
Public goods$_{-1}$	0.955***	0.941***	0.012	0.952***	0.937***
	(0.108)	(0.108)	(0.025)	(0.108)	(0.108)
Public goods$_{-2}$			-0.044*		
			(0.024)		
Local shares	0.209*	0.200*			
	(0.118)	(0.117)			
Local shares$_{-1}$	0.042	0.035	0.174		
	(0.144)	(0.143)	(0.333)		
Local shares$_{-2}$			0.099		
			(0.167)		
Number of FFEs (ln)	-0.062**	-0.038	-0.102*	-0.071**	-0.045
	(0.027)	(0.039)	(0.060)	(0.029)	(0.041)
Number FFEs squared (ln)		0.012			0.013
		(0.009)			(0.010)
GRP per capita (ln)	0.336**	0.338**	0.039	0.338**	0.340**
	(0.147)	(0.148)	(0.039)	(0.145)	(0.146)
GRP per capita$_{-1}$ (ln)	-0.069	-0.064	-0.013	-0.065	-0.060
	(0.170)	(0.169)	(0.052)	(0.167)	(0.166)
FFEs investment (ln)	0.087***	0.075**	0.046	0.092***	0.078**
	(0.028)	(0.031)	(0.055)	(0.029)	(0.032)
FFEs investment$_{-1}$ (ln)	-0.004	-0.009	-0.011	-0.006	-0.011
	(0.011)	(0.010)	(0.012)	(0.010)	(0.010)
IV first-stage	0.000	0.000	0.006	0.000	0.000
Test H0: Exogeneity	0.000	0.000	0.000	0.000	0.000
Joint significance (F-test)		0.004			0.005
R-squared	0.453	0.461	0.356	0.452	0.460
No. of observations	308	308	276	308	308

Note: Standard deviation in parentheses, significance level 1% ***, 5% **, and 10% *. Since provinces may interact with each other, standard errors are corrected for cross-provincial (spatial) and temporal dependence. In Column (3) robustness test shows that the current public goods variable is insignificant. Regressions control for year dummies. We report p-value of IV first-stage, endogeneity, and joint significance tests.

3.4 CONCLUDING COMMENTS

This chapter has investigated the dual and common agency problems in international investment strategies of multinational firms and provided some important policy

implications. So far, papers that discuss the interaction between the headquarter firm and the production facility have taken government behavior as given. This is a significant omission, since the role of the (local) government is a potential critical source of the contract imperfection. We model such a contract imperfection explicitly by introducing a dual agency problem. We show that the headquarter firm may leave more rents for the production facility's management to induce its government to behave well. Although it is difficult to isolate these effects in a macro-political environment, we do present some evidence for China on the trade-off between foreign rents and local government incentives.

Our discussion on local content requirements may open up to a broader discussion on the merit of trade barriers. For example, Ornelas and Turner (2008) investigate the effects of trade protection when firms enter in imperfect contracts. They show that when tariffs increase the rewards to domestic factors of production, they may also raise the rents to domestic firms in vertical relationships, and therefore may increase social welfare. For this reason, in our set-up a government may strategically lift trade barriers so as to credibly commit to good policies and hence higher income for domestic workers.

Our model on equity sharing may also capture the incentives brought about by knowledge sharing and technology transfer EJVs. Often, local government is more interested in such transfers than in profits of local firms, for promoting domestic production in high value added sectors. For example, to take advantage of low labor costs, Advanced Micro Devices (AMD), the world second-largest global supplier of microprocessors, has launched various production plants across China. In order to get government supports in local production, AMD has an interest in maintaining a good relationship with the Chinese government. This means that AMD sometimes has to do things which may run against its short run interest. As a case in point, with respect to AMD's research cooperation with one Chinese local computer chip producer, an AMD general manager pointed out: 'This is a potential competitor for AMD, but we are still doing that... This is the commitment of AMD to the Chinese government. If you want to do business here in China, you have to grow with China together'.

By endogenizing government behavior we may speculate on an additional set of results when the model is slightly enriched. First, we have set up the model in the managerial incentives tradition, which highlights the moral hazard problem in production. Alternatively, we may consider a situation where renegotiation takes

place after the initial production stage. We are confident that such a set-up would not alter the basic intuitions provided in the present study. Moreover, in such a setting we may model government effort as enforcement of private contracts. In that case an intriguing result arises in that the local government may strategically under invest in the rule of law, so as to induce higher rents for the domestic firm.

Lastly, what we have not done is to make the now standard connection to the literature on firm heterogeneity. As is well known, differences in firm productivity may cause differences in internationalization strategy. Clearly, taking up government incentives may affect the choice over FDI or outsourcing. To speculate, it may well be that the dual agency problem inflicts a bias towards outsourcing. The reason is that outsourcing contracts – in contrast to FDI - can easily be cancelled in the short run, so that they discipline the government in providing public goods.

APPENDIX 3

Proof: $dm^*/d\beta > 0, dh^*/d\beta < 0$; $dm^*/da > 0, dh^*/da > 0$

Given public goods, totally differentiating equations (3.4) and (3.5) results in:

$$-R_h d\beta + (1-\beta)R_{hh}dh^* + (1-\beta)R_{hm}dm^* - C_{hh}dh^* = 0$$

$$R_m d\beta + \beta R_{mm}dm^* + \beta R_{mh}dh^* - C_{mm}dm^* = 0$$

Then we solve for $dm^*/d\beta$ and $dh^*/d\beta$ (zero cross second-order effects):

$$\frac{dm^*}{d\beta} = \frac{[C_{hh} - (1-\beta)R_{hh}]R_m - \beta R_{mh}R_h}{[C_{hh} - (1-\beta)R_{hh}][C_{mm} - \beta R_{mm}] - \beta(1-\beta)R_{mh}^2} > 0$$

$$\frac{dh^*}{d\beta} = \frac{-[C_{mm} - \beta R_{mm}]R_h + (1-\beta)R_{hm}R_m}{[C_{hh} - (1-\beta)R_{hh}][C_{mm} - \beta R_{mm}] - \beta(1-\beta)R_{mh}^2} < 0$$

Similarly, given β in stage 1, totally differentiating equations (3.4) and (3.5):

$$\frac{dm^*}{da} = \frac{\beta[C_{hh} - (1-\beta)R_{hh}]R_{ma} + \beta(1-\beta)R_{mh}R_{ha}}{[C_{hh} - (1-\beta)R_{hh}][C_{mm} - \beta R_{mm}] - \beta(1-\beta)R_{mh}^2} > 0$$

$$\frac{dh^*}{da} = \frac{(1-\beta)[C_{mm} - \beta R_{mm}]R_{ha} + \beta(1-\beta)R_{hm}R_{ma}}{[C_{hh} - (1-\beta)R_{hh}][C_{mm} - \beta R_{mm}] - \beta(1-\beta)R_{mh}^2} > 0$$

CHAPTER 4
REGIONAL DETERMINANTS OF FDI IN CHINA: A FACTOR-BASED APPROACH[16]

4.1 INTRODUCTION

Over the last two decades, foreign direct investment (FDI) has become an important engine for Chinese growth. However, there are large differences in FDI patterns across Chinese regions. For example, in 2000 the East geo-economic region has received more than 85 percent of the country's total FDI inflows, whereas the Central and Western provinces have only attracted less than 15 percent (National Bureau of Statistics of China). Regions also differ in the type of FDI they attract (Huang, 2003). Urban growth centers increasingly develop into magnates for market seeking FDI, while other regions function as the factory of the world. For this reason, the determinants of FDI inflows across Chinese provinces are widely studied in international business. Most previous papers analyze the regional distribution of FDI from a specific theoretical angle. Some authors focus on comparative advantages of regions (Wei et al., 1999; Fung et al., 2002), others stress market factors and agglomeration (Buckley and Meng, 2005; Amiti and Javorcik, 2008), whereas more recent approaches highlight the importance of differences in institutions at the regional level (Du et al., 2008a, b; Cole et al., 2009).

This chapter contributes by tackling two restrictions of these studies, both in focus and method, which make our understanding of FDI into China incomplete. First, a common approach in the existing literature is to translate a theoretical hypothesis into a specific set of hand-picked proxy variables that acts as determinants of cross-regional FDI. By contrast, we take a more inductive route by deploying factor analysis, so as to construct these proxies in a systematic 'bottom-up' way. The inclusion of a wider set of explanatory variables also allows us to explicitly account for the complementarity of theories. A second limitation is that much of the literature on Chinese inward FDI struggles with moving from correlation to causality, which is an important issue in FDI studies. By applying factor analysis, in a panel setting we are able to efficiently control for time-varying omitted variables - on top of using

[16] This chapter is an adapted version of Boermans, Roelfsema and Zhang (2010).

panel data techniques which take care of the regional-specific time-invariant effects. Apart from this, the construction of time-varying factors allows us to use instrumented panel regressions so as to deal with reverse causality, a method which updates the older literature.

From the empirical analysis, the following results stand out. First, institutions, comparative advantage, and market size all matter, but there are important differences with respect to coastal and inner provinces and with respect to interaction effects among these factors. However, as a single factor, differences in comparative advantage and especially labor costs seem to matter most in explaining the FDI distribution between 1995 and 2006. Hence, from a policy perspective one may argue that the efforts to spread investments towards regions with lower labor costs have succeeded. Second, the Arellano-Bond dynamic panel GMM estimation results present strong agglomeration effects. Foreign investors tend to locate in the same province to benefit from potential positive externalities such as increasing returns to scales and knowledge spillovers. Third, although governance and infrastructure cluster into one factor, especially infrastructure seems a precondition for labor costs and market size to have sizeable effects on inward FDI. This calls for support of policies that promote (massive) infrastructural projects in regions where FDI is low, such as the Western and Central provinces. Lastly, we find positive effects of good governance and policy incentives on FDI, besides their connection with an increased supply of public goods.

The chapter commences as follows. The next section discusses related literature with the aim of providing a theoretical foundation for our empirical research. Section 4.3 introduces the data and empirical strategy in more detail, with a special emphasis on the role of factor analysis in this study. Following that, section 4.4 presents the core results. Then, section 4.5 performs robustness checks on the main findings. Section 4.6 concludes.

4.2 RELATED LITERATURE

Regionally dispersed inward FDI has created much policy debate within China because of its close links to the diversion in economic growth rates (Huang et al., 2003; Chan et al., 2008). The aim of this section is to reinforce the claim that there are many rival theories that explain the distribution of FDI *across Chinese provinces*. In

particular, we highlight the locational determinants implied by comparative advantage, economic geography, and new institutional economics as main drivers of FDI inflows.

It is well-known that the wave of setting up production facilities for assembly in China at least initially has been driven by a comparative advantage in labor intensive production (Liu et al., 1997; Wang and Swain, 1997). From this observation alone it is not clear whether differences in labor costs also explain the regional distribution of FDI *across* Chinese provinces. However, there is some (rather old) evidence that they do. Using an error correction model, Wei et al. (1999) analyze the long-run relationship between inward FDI and regional characteristics. They conclude that provinces with lower wage rates attract more FDI. Fung et al. (2002) study the location choice of the Japanese and US multinationals and find a lagged negative impact of wage rates on FDI from both countries for the period 1991-1997. In the business literature, some recent studies stress the growing importance of labor quality. Cheng and Kwan (2000) test a partial dynamic panel adjustment model using provincial level data. They show that the negative effect of wage rates on FDI is mitigated by high human capital levels, so that effective wage rates matter. Sun et al. (2002) also find that labor quality is crucial to attract FDI. In addition, they show a nonlinear relation between wage rates and FDI for the period 1986-1998, where wages positively affect FDI before 1991 and negatively affect it thereafter. Overall, differences in labor costs and quality across provinces are important FDI determinants.

Clearly, with a vast number of potential consumers and high growth rate, the increase in domestic demand has attracted FDI to sell in Chinese markets (Zhang, 2005). Again, there is evidence that disparities in regional demand explain variation of FDI across provinces. In an early cross-sectional study, Broadman and Sun (1997) show that a province's FDI stock increases with its market size. To control for initial conditions, Chen (1996) uses a conditional logit model and shows a similar positive relation between market size and FDI for a yearly panel that runs from 1987 to 1991. Buckley and Meng (2005) examine the horizontal and vertical FDI motives in the Chinese manufacturing sector. Despite the coexistence of both motivations, they argue that for the period 1992-2002 the market-oriented FDI dominates. The significant impact of market size on FDI regional distribution in China is also addressed in standard econometric settings by Wei et al. (1999), Fung et al. (2002), Sun et al. (2002), and Hong and Chin (2007).

The attention for agglomeration effects to explain FDI is related to the emergence of the new economic geography literature. The central thinking is that firm location choice involves a trade-off between making use of the positive externalities that come from agglomeration and the negative effects that agglomeration has on factor costs. Given that China has just recently opened up to foreign capital, it provides an ideal study ground to observe the *dynamics* of FDI location choice. The seminal paper in this approach is Head and Ries (1996) who, controlling for other geographical factors, find strong FDI agglomeration effects in the coastal areas' export processing zones. Many would follow in their footsteps. For example, Coughlin and Segev (2000) apply a spatial error correction model to control for spatial autocorrelation among Chinese provinces. Their results indicate that foreign investors tend to choose provinces with FDI intensive neighbors. Ng and Tuan (2006) study mainland investment decisions of Hong Kong firms and find agglomeration effects, also outside the nearby PRD region. Amiti and Javorcik (2008) use firm-level data to show the effects of agglomeration and cost advantages on FDI decisions.[17] Based on the pooled OLS estimation, Luo et al. (2008) focus on 98 Chinese inland cities and conclude that industrial agglomeration and policy are the most important factors for Western regions to attract FDI. In contrast to these studies, Sun et al. (2002) account for the shift in the nature of FDI and show that firms increasingly invest in provinces with relatively *few* other foreign firms.

The new institutional economics literature stresses the role of 'rules of the game' in economic development. It has been noted that there are large differences in institutional quality across Chinese provinces, for example in controlling corruption (Cole et al., 2009; Li and Park, 2006), property right protection (Cheung and Lin, 2004), and local absorption capacity (Fu, 2008). Previous studies show that these institutional aspects have positive effects on attracting FDI. Du et al. (2008a) study the impact of economic institutions on the inward FDI distribution. They find that strong contract enforcement, protection of intellectual property rights, weak government intervention, and low corruption all positively affect FDI. In a related study, Du et al. (2008b) show an interesting interaction between agglomeration and institutional quality as this agglomeration effect can mitigate the negative impact of

[17] With firm-level data it is important to note that often they restrict the analysis to cross section only, since there is no investment pattern at the firm level recorded over time. But clearly reverse causality is a problem when using firm-level data.

weak public institutions on FDI inflows. Moreover, institutions also refer to local government effectiveness and public goods (La Porta et al., 1999). For example, Cheng and Kwan (2000) claim that foreign investments flow to regions with high road and railway density. Based on an industrial census dataset, Li and Park (2006) show that multinationals invest in provinces with better infrastructure in the form of electricity provision, communication facilities, as well as roads.

Finally, a current wave of papers puts more emphasis on heterogeneity across firms engaged in FDI to China. Zhao and Zhu (2000) study heterogeneous macro motives for 50 source countries to invest in China. Their results indicate that foreign investors with different countries-of-origin have divergent reactions to location determinants like labor costs and infrastructure. Belderbos and Carree (2002) analyze investment behavior of Japanese firms in China. They conclude that small firms are interested in benefits from agglomeration, whereas large firms pay more attention to cost advantages. Hu and Owen (2005) find that firms from Hong Kong, Macau, and Taiwan (HMT) have different FDI motives compared to firms from OECD countries. More specifically, agglomeration effects are especially important for firms from OECD countries, while labor costs attract FDI from HMT firms. For such results it is important to keep in mind that over time FDI flows are driven by the fact that for firms from OECD countries enter later, existing firms become more acquainted in doing business in China and may therefore create a resource base comparable to firms from HMT, and that increasingly China is ‘discovered’ by medium sized firms. Shapiro et al. (2007) contribute to this literature by studying the entry-mode-specific FDI determinants across Chinese provinces. They show that agglomeration effects mainly exist for high control modes of entry, while FDI-favoring policies help to attract low control modes of entry.

In Table 4.1 we summarize several studies on the regional distribution of FDI in China. Clearly, various studies present some different results. Most mentioned studies have tackled the massive FDI inflows from an a priori background and highlighted a limited number of FDI determinants. In the next section we argue that using this traditional route requires proxies to test the broad theoretical constructs and as such can hamper causal inference due to measurement errors and omitted information. Given the relatively narrow focus of prior research, we take no ex ante stance regarding the discussed literature and hope to see that the empirical findings

Table 4.1: Selected studies on Chinese FDI distribution

Authors	Aggregation Level	Sample Year	labor Costs	Human Capital	Market Size	'First Nature' Geography	'Hard' Institution	'Soft' Institution	Agglomeration Effect
Liu et al. (1997)	Country	1983-1994	-		+	- distance		+	
Wang and Swain (1997)	Country	1978-1992	-		+			+	
Zhang (2005)	Country	1980-2001	-		+			+	
Chen (1996)	Province	1987-1991	+/I	-		+ resource	+		
Broadman and Sun (1997)	Province	1985-1992	+/I	+	+	+ coast	+		
Wei et al. (1999)	Province	1985-1995	-	+	+		+	+	+
Cheng and Kwan (2000)	Province	1985-1995	-	+/I	+		+	+	+
Coughlin and Segev (2000)	Province	1990-1997	-	+	+	+ coast	+/I		+
Belderbos and Carree (2002)	Province	1990-1995	-		+	-/I distance	-/I		+
Fung et al. (2002)	Province	1991-1997	-	+	+		+	+	
Sun et al. (2002)	Province	1986-1998	-	+	+		+	+	-
Hu and Owen (2005)	Province	1993-2003	-	-	+		-	+	-
Cole et al. (2006)	Province	1998-2003	-	+	+		+	+	+
Li and Park (2006)	Province	1995			+/I		+	+	+
Shapiro et al. (2007)	Province	1997-2000	-	+	+	+ coast	+	-	+
Amiti and Javorcik (2008)	Province	1998-2001	-		+	- distance	+		+
Du et al. (2008a and 2008b)	Province	1993-2001	-	+			+	+	+
Hong and Chin (2007)	City	1992-2001	-	+	+		+	-/I	+
Luo et al. (2008)	City	1999-2005	-/I	+	+	-/I resource	+	+	
Zhang and Yuk (1998)	Guangdong	1997	-			- distance	+	+	
Ng and Tuan (2006)	Guangdong	1998				- distance		+	+

Note: '+'and '-' represent the sign of the effect; 'I' denotes for 'insignificant', otherwise the determinant is 'significant.

can fit in with any theoretical background. Moreover, an empirical identification strategy which has the ability to make rival theories 'compete' against each other is valuable, so as to shed light on the predictive power of each of them.

4.3 DATA AND METHODOLOGY

China Statistical Yearbook (1995-2007), published by Chinese National Bureau of Statistics, provides data on FDI for Chinese provinces from 1995 to 2006. From this dataset, we take the number of foreign funded enterprises (FFE) and their investment levels as the dependent variables to measure the extensive and intensive scales of FDI. Navaretti and Venables (2004) argue that it is important to make a distinction between the location choice and the amount invested by a multinational, which essentially are different decisions of the firm. The number of foreign funded enterprises represents the binary decision whether or not to invest in a province, while the amount of investment of foreign funded enterprises shows how - after the location choice - firms set production levels. Using different measures to distinguish firms' decisions on location and production levels is important as FDI determinants may have different effects on these two stages. For example, geographical distance is negatively associated with the attractiveness of a host region due to transportation costs. However, once this region has been chosen, the further away the investment location, more goods are likely to be locally produced to serve the distant market.

As for explanatory variables, we derive latent factors that capture the variation of economic conditions across Chinese provinces by using factor analysis discussed in more detail below. As factor analysis concentrates variation of a large number of observed variables into (far) fewer aggregated dimensions (Forni et al., 2001; Bernanke et al., 2006), we hope to exploit a large set of information and still maintain the parsimony of the model. As a result, we endogenously derive the factors 'institutions', 'labor costs', 'geography', and 'market size'. We have to bear in mind that we are 'lucky' that the analysis translates into factors that closely match theory. Certainly, labeling is subjective (Comrey and Lee, 1992). Although some of the labels are relatively straightforward, it is important to note upfront that the 'institutions' factor covers infrastructure ('hard' institutions) as well as quality of government and rule of law ('soft' institutions). This is not a modeling choice: factor analysis is neutral in determining the composition of each factor, leaving us no room at this point

to split 'hard'- and 'soft' institutions as the loadings of observed variables cluster them into a single factor. The interesting interpretation is that there are no good 'hard' institutions without good 'soft' institutions.[18] Explanations for variables are in Appendix 4.

4.3.1 FACTOR-BASED APPROACH

The standard regression-based approach in economics uses variable selection and model specification informed by theory. By contrast, factor analysis selects variables not by using theory, but by reducing a large number of variables into a set of clusters (Jöreskog, 2007). Intuitively, factor analysis asks which variables belong together in a group. This method is close to objectively making indexes comprising of various variables. Factor analysis takes account of the statistically 'correct' way of creating such indexes by using information on the underlying correlations among variables and their proper weight (Velicer and Jackson, 1990; Wall and Amemiya, 2007). Instead of taking up a specific variable implied by theory, one hopes to generate a factor close to the theory which includes more information. As factor analysis concentrates variation of a large number of observed variables into (far) fewer aggregated dimensions (Forni et al., 2001; Bernanke et al., 2006), we can exploit a large set of information and still maintain the parsimony of the model.

Factor analysis uncovers patterns of association in the dataset and describes the variation among observed variables in terms of fewer factors, so that a complete set of interdependent relationships is examined. A natural question to ask is under which conditions a factor-based approach may be superior to a hand-picked selection of explanatory variables informed by theory. Clearly, this depends on some trade-offs. The first trade-off is between the efficient use of information and the inaccurate matching of factors to theories. Factor analysis may make better use of information for the following reasons. First, because a large number of variables can be reduced to a small set of factors which account for most variation in the initial dataset, a reduction in the degrees of freedom can be avoided without losing information. Such a feature is especially attractive in small samples. In this case, the classic trade-off between good fit and parsimony means that additional information cannot be freely

[18] This interpretation is supported by La Porta et al. (1999), who show that infrastructural quality is highly correlated to government performance.

exploited by adding variables. Second, the identification problem of using highly correlated variables can be mitigated by only employing orthogonal factors in regressions. Normally, economic indicators are interdependent, causing empirical difficulties to show the individual effect of each single variable. Again, such an identification problem is severe in small samples, for limited information obfuscates the connection between explanatory variables. Third, factor analysis allows for the efficient inclusion of variables that relate to more than one theory. For example, since wage levels give information on both labor costs as well as market demand, taking up wage levels as an explanatory variable does not identify theories that explain the inward FDI. For wage rates may enter as an individual item along with others in a factor 'labor costs' as well as in a factor 'market', in this way such 'undetermined' variables are used efficiently.

However, matching factors to theories may be less accurate than matching hand-picked variables to theories. As factors summarize information of all observed variables, generated factors contain variation that may be distant from the theory to which it is (subjectively) matched. Indeed, the generated factors only make sense when we can attach economic meaning to them and link them to theory. The benefits of the factor-based approach outweigh the costs when rival theories are tested for which a large number of variables is needed, but where the sample is small. For example, it is impossible to include 50 highly correlated variables into a single regression if we only have 200 observations. Clearly, a limited sample also restricts the application of the factor-based methodology.[19] To be precise, the factor-based approach is efficient when the sample size is large enough to provide a stable correlation matrix for factor analysis, but is too small to efficiently run regressions with a large number of highly correlated observed variables.

The second trade-off is between reducing some errors while creating some others. Factor analysis reduces three types of errors which hamper finding causal relations in regressions. First, selection bias is smaller because the factor-based approach takes up many variables within factors, so as to be more likely to also include variables which cause selection bias when left out, or which are correlated to

[19] Though strict theoretical rules with respect to the sample size in factor analysis are still missing, some practical suggestions either on the absolute sample size or functions of sample size are available in shaping stable patterns. Comrey and Lee (1992) view a sample size of 100 to be poor, 200 to be fair, 300 to be good, 500 to be very good, and 1000 or more as excellent. Other guidance provides minimum ratio of the sample size to the number of observed variables. It ranges from 2:1 to 20:1 and 10:1 is commonly used as a rule of thumb.

unobserved variables. This is closely related to endogeneity issues in making causal inferences due to the omitted variables problem, especially in small samples where the general-to-specific modeling approach cannot fully overcome selection bias (Sala-I-Martin, 1997). Second, imprecise representation of general economic concepts by specific variables may lead to weak predictive power of theories. For instance, the choice of a specific data series for the concept economic activity is often arbitrary to some degree (Bernanke et al., 2006). By summing up information among a large number of observable variables, factor analysis identifies groups of inter-related variables and covers 'un-measurable' or latent dimensions which single variables cannot capture (Jöreskog, 2007). Last, the factor-based approach mitigates measurement errors ex post, as clustering of variables smoothes out such errors in individual variables. Especially, when both dependent and independent variables suffer from measurement errors, spurious regressions may result. Hence, when measurement errors are prevalent but randomly distributed, the diffusion property of aggregated factors attributes to the reduction of measurement biases and identification of causal relations.

However, the factor-based approach constructs two new errors. The first one is a 'generated error' when factors are created, since factors are estimated results based on correlation matrices of observed variables and factor loadings. The second one is a new specification bias since only a limited number of factors are retained by choice. Since we are agnostic about the true number of factors, improper determination of factors may yield model selection bias. Therefore, the factor-based approach can be a better way to identify causality in the situation where traditional errors are more predominant than the new errors. Specifically, in the case of a relatively small sample, selection bias may be large because the process of from general to specific is hard to be realized given limited observations and highly correlated variables; representation bias is hard to be solved by including all relevant variables; measurement errors are severe due to the lack of sufficient variations.

Reviewing these trade-offs, the case of regional distribution of FDI in China fits well into the framework of factor-based approach. First, the large number of hypotheses on FDI determinants results in a hassle in model specification and efficiency conservation. Second, many observed variables are highly correlated (e.g. gross regional products GRP and wage rates) and cover different rival theories, which cause identification problems. Third, representation errors are nontrivial as some

potentially important FDI determinants are theoretically defined and hard to be captured by a specific single variable. Fourth, both dependent and independent variables are subject to measurement errors, because of different quality in provincial accounting practices, revisions and redefinitions, and the mismatch between national and international statistical rules. All these problems are especially serious in our small sample. Moreover, the costs of the factor-based approach seem not to be severe in our study. First, although with around 300 observations and 42 highly correlated variables it is hard to get reliable regression results, such a sample size suffices for factor analysis. Second, as we will see, variables load rather straightforward to various factors and as such we can attach meaningful economic interpretations while we link the endogenous factors to theory. Finally, in our study it seems that retaining correct number of factors is not a big worry, since the first four factors explain around 70 percent of all variation in the dataset.

4.3.2 ESTIMATION METHODS

After obtaining a reduced number of high-powered explanatory factors from the factor analysis, we follow conventional panel regression methods. We first apply fixed and random effects estimators to control for province-specific effects. Given potential reverse causality, we then employ IV estimation to alleviate the problem of endogeneity. One example of reverse causality is that foreign investment may raise labor costs. In that case, the simple fixed effects estimation is likely to underestimate the impact of labor costs on FDI. Assuming that the explanatory variables are weakly exogenous, we use the internal instrumental variables based on the forward orthogonal deviation transformation (Arellano, 2003). This transformation eliminates the fixed effects by subtracting from each observation only the mean of future values (rather than the mean of all observations in the standard fixed effects time demeaning model). Hence, the lagged values of weakly exogenous variables are not correlated with the transformed errors and can be used as instruments. We choose the forward orthogonal deviations estimator over the first differencing estimator because the former is more efficient than the latter in our sample with relatively large N (compared to T) and zero serial correlation in the errors. Moreover, to account for dynamic patterns, we use the Arellano-Bond GMM model in which the lagged dependent variables are consistently estimated by using the lags of the level variables

as instruments in the first-differenced model. With the assumption that current regional characteristics are not affected by future innovations in FDI, other explanatory variables are treated as predetermined and internally instrumented by the lagged values.

Finally, we perform various robustness checks by studying sub-samples for Eastern and Western China, forcing different factors, using the observed variables as direct measures, and generating new factors with some key items as controls. As we use an unbalanced panel dataset with randomly missing observations, most panel estimators can be modified for the unbalanced case. However, since not all provinces have observations for all years, using the first difference transformation and internal instruments may cause additional efficiency loss.

4.4 RESULTS

We first test sampling adequacy using the Kaiser-Meyer-Olkin (KMO) measure. We find that the KMO measure is 0.859 in our case, greater than the critical value 0.5 for a satisfactory factor analysis to proceed. Table 4.2 reports the rotated factor loadings based on principle components.[20] We apply an orthogonal varimax rotation to maximize the variance of the squared loadings within factors to obtain independent factors. In this table the higher the loading, the stronger is the correlation between the item and the underlying factor. Regarding loadings lower than 0.4 as 'low' correlations as suggested by Hair et al. (1998), we obtain a factor structure close to a 'simple factor structure' with most main loadings greater than 0.6 and few cross-loadings. In this factor structure, four factors are retained based on a scree test showing the plot of the eigenvalues (Jennrich, 2007). The proportion of variation explained is 42 percent (factor 1), 17 percent (factor 2), 10 percent (factor 3), and 7 percent (factor 4), respectively.

Although labeling of a specific factor is subjective, in our case the variables load rather straightforward to various factors. Bear in mind, we are 'lucky' that these factors closely match theory. Factor 1 - which explains the largest part of regional heterogeneity - consists of infrastructure (transportation and communication) and governance indices, so we interpret factor 1 as provincial 'institutional quality'.

[20] We also apply the maximum-likelihood method to derive latent factors using the same dataset. This method assumes multivariate normal observations and maximizes the determinant of the partial correlation matrix. Results indicate that different methods of factor analysis yield similar latent factors.

Table 4.2: Rotated factor loadings

Variables	Factor1	Factor2	Factor3	Factor4	Uniqueness
Capital	**0.843**	0.270	0.046	0.181	0.085
City road length	**0.728**	**0.364**	0.038	0.164	0.149
City road area	**0.830**	0.319	0.030	0.125	0.098
Civil vehicle	**0.896**	0.300	-0.066	0.205	0.054
freight	**0.649**	**0.497**	-0.109	0.034	0.223
Gov Expenditure	**0.924**	0.147	0.046	0.219	0.040
Private vehicle	**0.900**	0.183	-0.073	0.174	0.092
Ways (train, water, highway)	**0.533**	**0.420**	0.044	-0.302	0.263
Exports	**0.867**	0.011	0.179	0.107	0.057
Imports	**0.801**	-0.034	0.123	**0.355**	0.071
Long telephone	**0.919**	0.222	0.157	0.011	0.074
Local telephone	**0.901**	0.283	0.074	0.044	0.045
Mobile	**0.965**	0.085	0.090	0.051	0.042
Cable	**0.627**	0.185	-0.085	-0.341	0.180
Patent registered	**0.888**	0.092	0.147	0.186	0.068
Higher education enrolment	**0.750**	0.243	-0.006	0.133	0.061
Higher education institutions	**0.647**	**0.463**	0.031	0.267	0.096
Senior enrolment	**0.648**	**0.530**	0.043	-0.079	0.062
Senior high school	**0.441**	**0.801**	0.167	-0.036	0.084
Junior enrolment	0.338	**0.857**	0.121	-0.127	0.091
Junior high school	0.145	**0.936**	0.053	-0.143	0.056
Primary enrolment	0.189	**0.911**	0.223	-0.138	0.054
Primary school	-0.152	**0.887**	0.052	-0.142	0.108
Population	0.339	**0.895**	0.176	-0.072	0.030
Workers	0.342	**0.780**	-0.038	0.123	0.074
Humidity	-0.029	0.162	**0.903**	-0.052	0.132
Sunshine	-0.078	-0.335	**-0.784**	-0.031	0.221
Temperature	0.179	0.192	**0.871**	0.076	0.151
Area	-0.074	-0.143	**-0.401**	-0.255	0.219
Precipitation	0.201	0.131	**0.840**	-0.079	0.216
Natural resource	-0.002	0.107	**-0.565**	-0.116	0.202
Preferential Policy Index	**0.403**	-0.264	**0.461**	0.153	0.246
Index government intervention	-0.180	-0.097	**0.491**	0.073	0.234
Index contract enforcement	-0.061	-0.029	0.144	0.055	0.223
Index corruption	-0.106	-0.079	0.029	-0.112	0.255
Index property protection	**0.378**	-0.178	0.076	**0.576**	0.152
NERI institutions index	**0.698**	-0.039	**0.358**	**0.400**	0.110
GRP per capita	**0.512**	-0.323	0.035	**0.709**	0.067
Wage	**0.645**	**-0.361**	0.022	**0.530**	0.082
Consumption household	**0.521**	-0.332	0.075	**0.698**	0.087
Tech market transaction	0.324	-0.061	-0.071	**0.866**	0.118
Minority population	-0.070	-0.043	0.015	-0.281	0.390

Note: No. of observations is 309. Loadings with absolute values larger than 0.35 are marked as bold.

Table 4.3: Cronbach's alpha for factor consistency

Variables	Factor1	Factor2	Factor3	Factor4	Overall
Capital	0.692	0.512	0.681	0.603	0.729
City road length	0.692	0.512	0.681	0.603	0.729
City road area	0.691	0.512	0.681	0.602	0.729
Civil vehicle	0.692	0.512	0.681	0.603	0.729
freight	0.691	0.510	0.677	0.602	0.728
Gov Expenditure	**0.583**	**0.450**	**0.575**	**0.557**	0.659
Private vehicle	0.692	0.512	0.681	0.603	0.729
Ways (train, water, highway)	0.691	0.511	0.680	0.601	0.728
Exports	**0.605**	**0.450**	**0.595**	**0.481**	0.655
Imports	**0.571**	0.505	**0.606**	**0.466**	0.662
Long telephone	0.673	0.504	0.671	0.577	0.718
Local telephone	0.692	0.512	0.681	0.603	0.729
Mobile	0.692	0.512	0.681	0.602	0.729
Cable	0.691	0.511	0.681	0.602	0.729
Patent registered	0.691	0.512	0.681	0.602	0.729
Higher education enrolment	0.692	0.512	0.681	0.603	0.729
Higher education institutions	0.688	0.506	0.673	0.602	0.720
Senior enrolment	0.692	0.512	0.681	0.603	0.729
Senior high school	0.688	0.506	0.678	0.592	0.715
Junior enrolment	0.692	0.512	0.681	0.603	0.729
Junior high school	0.684	**0.296**	0.672	0.595	0.698
Primary enrolment	0.692	0.511	0.681	0.603	0.729
Primary school	0.681	0.569	0.682	0.597	0.720
Population	0.692	0.509	0.681	0.603	0.729
Workers	0.692	0.511	0.681	0.603	0.729
Humidity	0.692	0.512	0.681	0.603	0.729
Sunshine	0.692	0.512	0.681	0.603	0.729
Temperature	0.692	0.512	0.681	0.603	0.729
Area	0.692	0.512	0.681	0.603	0.729
Precipitation	0.690	0.510	0.670	0.599	0.724
Natural resource	0.692	0.512	0.681	0.603	0.728
Preferential Policy Index	0.691	0.511	0.680	0.602	0.729
Index government intervention	0.691	0.511	0.681	0.602	0.729
Index contract enforcement	0.691	0.511	0.680	0.602	0.728
Index corruption	0.691	0.511	0.680	0.602	0.728
Index property protection	0.691	0.511	0.680	0.602	0.728
NERI institutions index	0.691	0.511	0.680	0.602	0.728
GRP per capita	0.692	0.512	0.681	0.601	0.729
Wage	0.692	0.512	0.681	0.602	0.729
Consumption household	0.692	0.512	0.681	0.602	0.729
Tech market transaction	0.679	0.514	0.664	0.591	0.720
Minority population	0.692	0.512	0.681	0.603	0.729
Cronbach's alpha	0.691	0.511	0.680	0.602	0.728

Factor 2 shows items related to 'labor costs', such as wage rates, education variables, and labor endowment variables. Factor 3 captures 'first nature' geography such as

local climate conditions and natural resource. Factor 4 includes variables common in economic geography that relate to 'market size'. Using the Cronbach's alpha, we find that the derived factors are internally consistent. We then test the reliability of factors by applying Cronbach's alpha which shows how well a set of variables measures the same underlying construct. Table 4.3 illustrates whether to delete a single item can get a higher alpha value for each factor. Across panels we find no significant contribution of eliminating any item. The test scale results reveal acceptable factor reliability with average Cronbach's alpha above 0.7.[21] This indicates that the variables clustered to each category have relatively high inter-item correlations and therefore the factors obtained are consistent. We also identify some important variables (e.g. government expenditure and import) as removing these items would result in significantly lower values of alpha. We later leave these variables out of the factor generation process and use them as control variables in robustness checks.

The results in Table 4.2 imply that factor analysis allows for the efficient inclusion of variables that can be related to more than one theory, so that we are better able to investigate the complementarity of theories. For example, education enters as an individual item along with others in a factor 'labor costs' as well as in a factor 'institutional quality'. Factor analysis corrects for the interdependence of theories by loading such 'undetermined' variables into more than one factor, so that theoretical constructs remain orthogonal. Hence, the interaction effects between two uncorrelated factors show the proper complementarity of these theories. Meanwhile, factor analysis creates broader measures for general economic concepts like 'institutional quality'. The term 'institutions' involves various dimensions in politics, economics, and culture, which cannot be captured by only including a single variable like 'government efficiency' or 'rule of law'. It is important to note that factor 1 covers infrastructure ('hard' institutions) as well as quality of government and rule of law ('soft' institutions). This is not a modeling choice: factor analysis is neutral in determining the composition of each factor, leaving us no room at this point to split 'hard'- and 'soft' institutions as the loadings of observed variables cluster them into a single

[21] The widely-accepted social science cut-off value for alpha is 0.7 (some use 0.6). We admit that our factor 2 is not satisfactory in this sense. Yet the standard of reliability required varies between different fields. For example, a value of 0.8 or higher is appropriate for psychology. Hence, it is not surprising to obtain relatively low alpha values as we study a loose geo-economic structure. Results not reported here show that if we exclude primary and junior high school enrolment the alpha value for factor 2 goes up to 0.6031, close to the cut-off value. We therefore reconstruct factors by dropping these items in robustness checks.

factor. The interesting interpretation is that there are no good 'hard' institutions without good 'soft' institutions.[22] Appendix 4 provides explanations of variables.

Table 4.4 presents the results of the fixed effects, random effects, fixed effects IV (for the forward orthogonal deviation model), and Arellano-Bond dynamic panel GMM estimations. In Column (1), the fixed effects results indicate that only provincial 'market size' has a positive effect on the number of foreign funded firms, while other factors like 'labor costs', 'geography' and 'institutional quality' are insignificant. Reading the random effects results in Columns (2) and (8), we find that all factors are correlated with FDI in the expected way, except for 'labor costs'. Overall, the fixed effects estimates have smaller magnitudes and much lower significance levels compared to the random effects estimates. One explanation for the considerable differences between the results of these two methods is that the fixed effects estimator concentrates on the relatively small variation in the 'within' dimension of our data, while the random effects estimator mainly exploits large disparity 'between' provinces. More importantly, the fixed effects results are very likely to be underestimated due to reverse causality. For example, not only labor costs can affect FDI, the location choice of foreign firms may also influence local labor costs. Without controlling for this, using the endogenous 'labor costs' factor gives biased results. Hence, we have to take the results of the non-instrumented fixed and random effects models with caution.

We then take care of endogeneity by using the lagged two years variables as internal instruments based on the forward orthogonal deviation transformation. In Columns (3) and (9), the significant negative impact of the 'labor costs' factor and positive impact of the 'market size' factor provide evidence for the coexistence of vertical and horizontal FDI in China. Moreover, we find that provinces with higher 'institutional quality' attract more FDI firms, yet this factor by itself has no effect on the amount of FDI. In addition, there is no evidence that the 'geography' factor shapes FDI inflows.[23] The magnitudes of coefficients indicate that the 'labor costs' factor is the most important determinant of FDI across China – note that the factors are standardized. So, the conclusion is that, since low 'labor costs' wins the first round of

[22] This interpretation is supported by La Porta et al. (1999), who show that infrastructural quality is highly correlated to government performance.
[23] One has to keep in mind that the factors (clusters of variables) change over time, although some of the variables are rather static.

the horse race among the factors, it is suggestive that vertical FDI is the most important to China.[24]

Further, as captured by the interaction terms, the partial effects of the factors 'market size' and 'labor costs' depend on the magnitude of the 'institutional quality' factor. In Columns (4) and (10), the small but significant interaction effects imply that good 'institutions' magnify the effects of low 'labor costs' and large 'market size' on FDI. First, the comparative advantage in labor costs across Chinese provinces relies on infrastructure that enables transportation and communication. As vertical FDI requires low wage rates and logistics, better local infrastructure may cause a larger effect of cheap labor on FDI. Second, good 'institutions' provide certain preconditions for foreign investors to explore market opportunities in China. Specifically, 'hard' institutions are crucial for distribution of goods in the local market, and 'soft' institutions such as rule of law help to secure the property rights of local production.

Clearly, path dependence in FDI may be an important issue, especially if agglomeration effects are at work. To account for panel dynamics, we apply Arellano-Bond dynamic panel GMM estimation. With some good will, we can interpret the coefficients of the lagged dependent variables in Columns (5), (6), (11), and (12) as agglomeration effects. The positive lagged dependent variables imply that multinationals tend to invest in provinces that have attracted other foreign firms in the past. When we control for agglomeration, the effects of other factors on the number of firms engaged in FDI remain similar to the IV results of static models in size and significance. But for the level of FDI, including agglomeration effects reduces the significance of all factors. Hence, the factors concerned have an impact on attracting new firms, but these factors do not significantly affect the overall level of FDI when agglomeration is included. One reason is that FDI levels in the past are determined by the lags of the factors, so that these effects to some extent are included in the lagged dependent variable. This in turn reduces the significance of the present levels of the explanatory factors. In a more qualitative way, when local conditions improve, it is relatively easy to establish a new firm. However, it takes time for these firms to grow, so as to significantly change the overall level of FDI in a province.

[24] As evidence for the prevalence of vertical FDI in China, according to the National Bureau of Statistics of China, exports by foreign funded enterprises (FFE) take around 60 percent in total exports from China in 2006, with an increasing trend over the past 15 years.

Table 4.4: Basic estimation results

	Number of FFE (log)						*Amount of FFE investment (log)*					
Variable	(1) FE	(2) RE	(3) IV	(4) IV	(5) A-B	(6) A-B	(7) FE	(8) RE	(9) IV	(10) IV	(11) A-B	(12) A-B
Dependent$_{t-1}$					0.167**	0.144**					0.231**	0.248***
					(0.080)	(0.092)					(0.100)	(0.097)
'Institution' factor	0.130	0.301***	0.087***	0.134***	0.080*	0.158***	0.015	0.202***	-0.081	-0.073	-0.024	-0.003
	(0.081)	(0.042)	(0.029)	(0.046)	(0.046)	(0.059)	(0.107)	(0.053)	(0.065)	(0.075)	(0.065)	(0.086)
'Labor costs' factor	-0.312	0.054	-0.999***	-0.771***	-0.808**	-0.555**	-0.328	0.076	-1.229***	-1.160***	-0.350	-0.352
	(0.302)	(0.095)	(0.211)	(0.279)	(0.334)	(0.284)	(0.396)	(0.114)	(0.479)	(0.447)	(0.345)	(0.249)
'Market' factor	0.148*	0.176***	0.278***	0.181***	0.257***	0.123	0.102	0.133***	0.218***	0.146	0.085	0.051
	(0.077)	(0.033)	(0.037)	(0.063)	(0.063)	(0.083)	(0.095)	(0.035)	(0.086)	(0.099)	(0.065)	(0.088)
*Inst*Costs*				-0.033**		-0.035				-0.081***		-0.027
				(0.017)		(0.039)				(0.031)		(0.044)
*Inst*Market*				0.031**		0.045**				0.019		0.019
				(0.014)		(0.020)				(0.023)		(0.027)
'Geography' factor	-0.016	0.341***	-0.046	-0.048	-0.082	-0.028	0.172	0.466***	0.002	-0.015	0.154	0.165
	(0.130)	(0.093)	(0.074)	(0.074)	(0.111)	(0.114)	(0.201)	(0.108)	(0.127)	(0.113)	(0.155)	(0.163)
Hausman p-value		0.000						0.000				
Exogeneity p-value			0.037	0.077					0.000	0.000		
Joint significance				'Institution':S 'Labor':S 'Market':S		'Institution':S 'Labor':S 'Market':S				'Institution':S 'Labor':S 'Market':S		'Institution':I 'Labor':I 'Market':I
No. of instruments					113	147					113	147
AR(2) p-value					0.460	0.377					0.533	0.661
Sargan test p-value					0.877	0.747					0.852	0.792
No. of observations	309	309	241	241	242	242	309	309	241	241	242	242

Note: In parentheses are robust standard errors adjusted for clusters. *** Statistically significant at the 1% level; ** statistically significant at the 5% level; * statistically significant at the 10% level. 'A-B' represents for Arellano-Bond dynamic panel-data estimation. In the joint significance test 'S' denotes for 'significant' and 'I' denotes for 'insignificant'.

4.5 ROBUSTNESS

There are several potential worries with respect to the main results presented in the previous section. First, there are large differences between FDI flows towards the Eastern and Western provinces. Hence, we should test whether the drivers of FDI play the same role in the East and West of China. We further check province sensitivity by excluding the municipalities directly administrated by the central government. Second, unforced principal components result in clustering 'hard'- and 'soft' institutions into a single factor. We are interested to see what happens when we force a split, so as to say more on the connection between political institutions (soft) and FDI. Third, using some hand-picked variables as direct measures in benchmark models, we show whether estimation results differ significantly by using the estimated factors and the observed variables. Last, since some variables are relatively important in obtaining reliable factors, dropping these variables may change the effects of factors in regressions. We generate new factor structures by kicking out some key variables and estimate the effects of the new factors using these important items as control variables. Notice that all regressions apply internal instruments to deal with reverse causality.

4.5.1 PROVINCE SENSITIVITY

We group 29 Chinese provinces into the East and the West. Since there are no data for Chongqing before 1998 and no FDI inflows data for Tibet throughout the sample period, our sample excludes Chongqing and Tibet. The Eastern provinces are Beijing, Fujian, Guangdong, Hainan, Hebei, Heilongjiang, Jiangsu, Jilin, Liaoning, Shandong, Shanghai, Tianjin, and Zhejiang. Table 4.5 indicates that the 'labor costs' factor is the most important FDI determinant for both regions, restating the overall importance of vertical FDI in China. Yet, there are different reasons for investing in the East and West. The factors 'institutional quality' and 'market size' significantly affect FDI distribution across the Eastern provinces. By contrast, on top of labor costs, the factor 'first nature' geography plays by far the most important role in explaining the variation of FDI across the Western provinces. This may imply that FDI in the West is to generate natural resource inputs for (export) production in the Eastern provinces. An interesting finding is the significant negative effect of the 'institutional quality'

factor on the amount of investment in Column (3). One explanation for this may be that FDI is a substitute for the absence of sufficient local public goods.

Table 4.5: IV results for the East and West

	Number of FFE (log)		*Amount of FFE investment (log)*	
Variable	(1) East	(2) West	(3) East	(4) West
'Institution' factor	0.481***	0.001	-0.179***	-0.023
	(0.115)	(0.057)	(0.065)	(0.076)
'Labor costs' factor	-1.267***	-0.933**	-1.798***	-1.022***
	(0.232)	(0.428)	(0.319)	(0.383)
'Market' factor	0.400***	0.102	0.365***	0.626**
	(0.064)	(0.241)	(0.091)	(0.275)
'Geography' factor	-0.008	-0.376***	0.192	-0.693***
	(0.087)	(0.112)	(0.133)	(0.164)

Note: Number of observations is 111 for the East and 130 for the West. In parentheses are robust standard errors. *** Statistically significant at the 1% level; ** statistically significant at the 5% level; * statistically significant at the 10% level.

Table 4.6: Results without the municipalities

	IV estimation		Arellano-Bond dynamic	
Variable	*(1) Number FFE*	*(2) FFE investment*	*(3) Number FFE*	*(4) FFE investment*
Dependent$_{t-1}$			0.169**	0.236**
			(0.080)	(0.099)
'Institution' factor	0.235**	0.151	0.051	-0.011
	(0.108)	(0.134)	(0.123)	(0.169)
'Labor costs' factor	-0.794**	-1.073***	-0.858**	-0.498
	(0.346)	(0.415)	(0.348)	(0.319)
'Market' factor	0.624***	0.811***	0.202	0.182
	(0.194)	(0.271)	(0.291)	(0.385)
'Geography' factor	0.022	0.139	-0.122	0.141
	(0.097)	(0.139)	(0.128)	(0.168)
No. of instruments			113	113
AR(2) p-value			0.473	0.603
Sargan test p-value			0.930	0.930
No. of obs.	216	216	217	217

Note: In parentheses are robust standard errors. *** Statistically significant at the 1% level; ** statistically significant at the 5% level; * statistically significant at the 10% level. Dependent variables are in log form.

We then drop the direct-controlled municipalities in our sample – Beijing, Shanghai, and Tianjin. As the highest-ranked cities, these municipalities are treated as provinces but differ from other provinces in many aspects like population, government expenditure, and policy. Though we control for such disparities in our factor analysis, a sub-sample study could show a clearer picture on this issue. Table 4.6 presents the IV estimation and dynamic panel estimation results for the other provinces. Comparing with the IV results in Table 4.4, we find that in Columns (1) and (2) the static effects of the 'institutional quality' and 'market size' factors on attracting FDI

(both the number of firms and investment amount) are larger for the rest provinces than for the municipalities. The differences may result from the relatively well-developed institutions and limited market size in provincial-level cities. Also it is not surprising to see a smaller impact of the 'labor costs' factor after excluding the municipalities, which have high wage rates. However, once we account for the past FDI, only the 'labor costs' factor matters for increasing the number of foreign funded enterprises in Column (3), except for the lagged dependent variable. This implies that local conditions for institutional quality and market size in these provinces improve slower than in the municipalities which are directed authorized by the central government, so that the lagged dependent variable captures the significance of these two factors.

Table 4.7: Specified 'Institutional quality'

Variables	Factor 1 ('Infrastructure')	Factor 2 ('Governance')	Uniqueness
City road length	0.846	0.224	0.234
City road area	0.915		0.133
Freight	0.789		0.364
Ways	0.674	-0.529	0.266
Long telephone	0.927		0.140
Local telephone	0.966		0.063
Mobile	0.937		0.122
Cable	0.685	-0.520	0.259
Patent	0.851	0.267	0.205
NERI index	0.728	0.488	0.232
Index property protection	0.322	0.806	0.247
Index government intervention		-0.203	0.947
Index corruption		-0.362	0.838
Index contract enforcement		-0.328	0.892
Preferential Policy Index	0.360	0.558	0.559
Minority population		-0.666	0.543

Note: Blanks represent loadings with absolute values below 0.2; Number of observations is 309.

4.5.2 'HARD' AND 'SOFT' INSTITUTIONS

To separate 'hard'- and 'soft' institutions, we run a factor analysis only for the variables strongly correlated with the overall factor 'institutional quality', which provides us two sub-factors: 'infrastructure' ('hard' institutions) and 'governance' ('soft' institutions), see Table 4.7 for rotated factor loadings. Table 4.8 reports the IV regression results for using these two sub-factors. Again we capture the interdependence among factors by estimating the interaction effects. With respect to

FDI location choice (the number of FFEs), due to the vertical nature of FDI, foreign investors are mainly concerned with quality of transportation and communication. Once the investment location has been chosen, in Column (4) 'soft' institutions, such as property rights protection, matter for the amount of investments. A negative interaction between the 'market size' and 'governance' factors suggests that when market has insufficient power to tackle the hassles in contracts, the importance of external enforcement is reinforced.

Table 4.8: IV estimation results of using sub-factors of 'institutions'

	Number of FFE (log)		*Amount of FFE investment (log)*	
Variable	(1) Basic	(2) Interactions	(3) Basic	(4) Interactions
'Infrastructure' factor	0.157***	0.210**	-0.061	0.131
	(0.048)	(0.103)	(0.077)	(0.135)
'Governance' factor	0.137	-0.028	0.238	0.219
	(0.156)	(0.309)	(0.246)	(0.369)
'Labor costs' factor	-0.934***	-0.794**	-1.189***	-1.182***
	(0.231)	(0.324)	(0.348)	(0.407)
'Market' factor	0.244***	0.434**	0.161*	0.588**
	(0.056)	(0.193)	(0.094)	(0.253)
*Infra*Costs*		-0.123*		-0.125
		(0.074)		(0.087)
*Gov*Costs*		-0.200		-0.112
		(0.171)		(0.204)
*Infra*Market*		0.009		-0.011
		(0.023)		(0.034)
*Gov*Market*		-0.099		-0.208***
		(0.064)		(0.077)
'Geography' factor	-0.056	0.019	-0.036	0.053
	(0.092)	(0.126)	(0.138)	(0.159)
Joint significance		'Infrastructure' yes		'Governance' yes

Note: Number of observations is 241. In parentheses are robust standard errors. *** Statistically significant at the 1% level; ** statistically significant at the 5% level; * statistically significant at the 10% level.

4.5.3 BENCHMARK MODELS

To compare the factor-based approach and the conventional regression-based approach, we report the static IV estimation results of using some selected observed variables as direct measures for infrastructure (*government expenditure* and/or *ways*), labor costs (*wage* and/or *GRP per capita*), market size (*GRP* and/or *household consumption*), and 'first nature' geography (*natural resource*) in Table 4.9. We also incorporate *primary school enrolment*, *higher education enrolment*, *NERI marketization index*, as well as *preferential policy index* to capture human capital and 'soft' institutions. Across panels, the estimation results are highly sensitive to model

specification. For example, in Column (4) once we substitute *GRP per capita* for *wage* to measure labor costs, the government expenditure variable loses significance shown in Column (2). The same puzzle appears if we measure infrastructure by local transportation condition in Column (3) rather than the overall government expenditure in Column (2). The mixed results of these benchmark models imply that the hand-picked variables may be highly interrelated and therefore 'steal' each others' significance. Also, the omitted variable problem may cause biased results in the benchmark regressions.

Table 4.9: Benchmark IV results (dependent Variable: *log Number of FFE*)

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Government expenditure (log)	-2.893*	-3.556		-4.021	-3.782	-1.548
	(1.626)	(2.309)		(3.406)	(3.290)	(2.731)
Ways (log)			-0.070			0.021
			(0.513)			(1.132)
Wage (log)	6.159*	5.558	2.334		7.262	-5.066
	(3.449)	(3.497)	(1.990)		(4.777)	(6.581)
GRP per capita (log)				15.174*		13.657
				(8.847)		(11.791)
GRP (log)	0.851	0.828	0.255	-9.140		-12.415
	(0.922)	(0.993)	(0.883)	(6.190)		(11.818)
Consumption household (log)					-0.008	5.722
					(1.145)	(6.642)
Natural resource	0.006	0.014	-0.000*	0.031	0.011	-0.005
	(0.007)	(0.012)	(0.000)	(0.024)	(0.013)	(0.012)
Primary school enrolment (log)		0.071	-0.127	1.652	0.187	2.143
		(0.319)	(0.266)	(1.188)	(0.333)	(2.322)
Higher education enrolment (log)		0.342	-0.013	-1.639	0.316	-2.141
		(0.288)	(0.197)	(1.253)	(0.357)	(2.079)
NERI index		0.201*	0.096	0.483*	0.217	0.324
		(0.109)	(0.085)	(0.261)	(0.142)	(0.278)
Preferential policy index		0.286	-0.015	0.404	0.285	0.100
		(0.230)	(0.091)	(0.389)	(0.311)	(0.213)
No. of obs.	302	302	280	302	308	274

Note: In parentheses are robust standard errors. *** Statistically significant at the 1% level; ** statistically significant at the 5% level; * statistically significant at the 10% level.

4.5.4 ROBUSTNESS OF THE FACTORS

To check the reliability of our main results, we create a number of adjusted factors. For example, we demonstrate that four items (*government expenditure*, *imports*, *exports*, and *junior high school enrolment*) are key items to get a high internal consistency of the factors based on the Cronbach's alpha. There could be worries whether factor analysis still provides us with informative factors once we leave these items out. We also notice that alpha of the 'labor costs' factor increases to the cut-off

Table 4.10: IV results of using new factors and controls (dependent Variable: *log Number of FFE*)

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
'Institution' factor (new)	0.119***	0.105***	0.065**	0.064**	0.073**	0.057*	0.080**	0.068**	0.082**	0.080*
	(0.021)	(0.020)	(0.033)	(0.032)	(0.036)	(0.036)	(0.031)	(0.031)	(0.040)	(0.047)
'Labor costs' factor (new)	-0.872***	-0.990***	-0.609***	-0.516***	-0.455***	-0.432***	-0.711***	-0.341**	-0.716***	-0.624**
	(0.137)	(0.152)	(0.146)	(0.139)	(0.137)	(0.144)	(0.199)	(0.164)	(0.168)	(0.277)
'Market' factor (new)	0.273***	0.286***	0.229***	0.203***	0.245***	0.220***	0.203***	0.093*	0.374***	0.316***
	(0.035)	(0.036)	(0.039)	(0.038)	(0.049)	(0.048)	(0.045)	(0.055)	(0.050)	(0.074)
'Geography' factor (new)	-0.024	-0.006	-0.111	-0.109*	-0.119*	-0.110	-0.158**	-0.236***	-0.064	-0.061
	(0.076)	(0.077)	(0.070)	(0.065)	(0.072)	(0.070)	(0.068)	(0.054)	(0.083)	(0.078)
Government exp (log)		0.545***				0.318**				
		(0.185)				(0.167)				
Exports (log)				0.129		0.132				
				(0.098)		(0.096)				
Imports (log)				0.086		0.081				
				(0.068)		(0.067)				
Preferential policy								0.082*		
								(0.050)		
NERI index								0.150***		
								(0.050)		
Institutional index 2000								0.764***		
								(0.120)		
Primary enrolment (log)										-0.016
										(0.137)
Junior high enrolment (log)						-0.291*				-0.295*
						(0.154)				(0.153)
No. of obs.	241	238	233	233	233	230	247	233	241	241

Note: In parentheses are robust standard errors. *** Statistically significant at the 1% level; ** statistically significant at the 5% level; * statistically significant at the 10% level. *Institutional index 2000* is an aggregated factor based on *Index government intervention*, *Index contract enforcement*, *Index anti-corruption*, and *Index property protection* using the principal-component method.

value 0.6 once we drop variables on primary and junior high school enrolment. Therefore, we first eliminate the variables in question and construct new factors with a smaller number of items. We then report in Table 4.10 the effects of these adjusted factors on the number of foreign funded firms, with dropped variables as controls. We proceed by keeping out *government expenditure* in Columns (1) and (2), international trade in Columns (3) and (4), four important items together in Columns (5) and (6), the key variables on 'soft' institutions in Columns (7) and (8), as well as two schooling variables in the last two columns. Though for each pair we use a new list of factors, the resulted factor structures are similar to that in Table 4.2. Across panels, the estimation results of these adjusted factors are comparable to our basic findings in magnitude and significance level. All control variables are significant with the expected signs (*exports* and *imports* jointly significant; schooling jointly significant with factor 2).

4.6 CONCLUDING REMARKS

In this chapter we have analyzed recent FDI inflows in China at the provincial level. Our approach is eclectic as we combine factor analysis with panel regression methods. Informed by a large literature that stresses many variables which are correlated with FDI flows, we first run a factor analysis to establish latent regressors for which Chinese provinces differ. Broadly speaking, on top of geographical fixed factors, regions differ in labor costs, market size, as well as hard- and 'soft' institutions. Using panel estimation methods, we then perform a 'horse race' among these factors to see which ones matter most. We show that for the period 1995-2006, labor costs and infrastructure (and especially when combined) are the key for attracting FDI. In addition, our Arellano-Bond dynamic panel GMM estimation results indicate strong agglomeration effects in FDI distribution across Chinese provinces.

We focus on a time frame where the Chinese government has changed course to advocate a transfer of FDI towards the West. After setting up the export processing zones, the Chinese government in the 1990s has made great strides to diffuse FDI. Our results fit against a background of FDI diffusion away from the Pearl River Delta to other Eastern provinces. For instance, increasingly the Pan-Bohai Rim is able to capture a large share of FDI by effectively tapping into cheap labor from the inner provinces. On top of that, our empirical findings are consistent with a trend of shifting

FDI towards inner provinces. For multinationals, especially firms from Taiwan and Hong Kong, cost advantages are important assets in competitive world markets, so that they shift to cheaper Western location when local infrastructure is ready.

Can we draw lessons for the ongoing policy debate on the relative importance of geography, 'big push' development, and institutions? Clearly, we have to be cautious here. However, from our analysis it becomes clear that geography is not all important if 'big push' efforts in infrastructure are made. In addition, in China 'soft' institutions (such as rule of law and property rights protection) tend to go together with 'hard' institutions such as infrastructural improvements. This calls into question to what extent institutional reform alone in China as well as in other parts of the world is able to create FDI flows.

However, the analysis may also point to a more critical observation, one that is shared in much of the management literature on investing in China. In the data, there is the suggestion that labor costs and logistics remain the most important driving for foreigners to invest in China. This may also be because higher value added activities are still seen as too risky. The obvious reason is a lack of property rights protection, so that assembly based on higher skills (and, hence, higher labor costs and more schooling) remains unprofitable for foreign firms in the long run. A second reason is a lack of local management skills to perform integrated system production processes. Lastly, there is an often heard complaint that in joint ventures, ailing domestic firms are pushed by local politicians for inclusion in joint venture production. All these issues suggest that the dominant strategy for foreign firms still is to make use of cheap and disciplined labor, so that the next step towards high value added production is yet to come.

APPENDIX 4

Variable	*Explanation*
Number of FFE	Number of Foreign Funded Enterprises (unit)
Amount of FFE investment	Total Investment by Foreign Funded Enterprises (100 million Yuan)
FDI inflows	Actually utilized FDI (10 000 Yuan) (till 2003)
Capital FFE	Registered capital of Foreign Funded Enterprises (100 million Yuan)
Employees FFE	Number of Employed person in Foreign Funded units (10 000 persons)
Exports	Total Exports (10 000 Yuan)
Imports	Total Imports (10 000 Yuan)
Ways (train, water, highway)	Length of Railways in operation (km); Length of Navigable Inland waterways (km); Total Length of Highways (km)
Capital	Gross Capital Formation (100 million Yuan)
City road length and area	Length of Paved Roads (capital city year-end) (km) Area of Paved Roads (capital city year-end) (10 000 sq.m)
Civil vehicle	Possession Civil Vehicle (10 000 units)
Private vehicle	Possession of Private vehicles (10 000 units)
Electricity consumption	Electricity Consumption (100 million kwh)
Freight (train, water, highway)	Freight Railways (10 000 tons); Freight Highways (10 000 tons); Freight Waterways (10 000 tons)
Long telephone	Capacity of Long-distance Telephone Exchanges (circuit)
Local telephone	Capacity of Local Office Telephone Exchanges (10 000 line)
Mobile	Capacity of Mobile Telephone Exchanges (10 000 subscribers)
Cable	Length of Long Distance Optical Cable Lines (km)
Gov expenditure	Government Total Expenditure (10 000 Yuan)
NERI index	NERI index of marketization (0-10) (Fan et al., 2007) NERI index dimension: government and market; development of non-state enterprises; development of commodity market; development of factor market; development of market intermediaries and legal environment
Patent	Number of Patent Application Granted (Piece)
Gross regional product	Gross Regional Production (100 million Yuan)
Higher education institutions	Number of Higher Education School (units)
Senior high enrolment	Total enrolment of Senior High (person)

APPENDIX 4 continued

Variable	*Explanation*
Senior high school	Number of Senior High School (unit)
Junior high enrolment	Number of Junior High School (unit)
Junior high school	Total Enrolment of Junior High School (person)
Primary enrolment	Total enrolments Primary School (person)
Primary school	Number of Primary School (unit)
Workers	Total Number of Staff and Workers (10 000 persons)
Population	Total Population (10 000 persons)
GRP per capita	Per capita Gross Regional Product (Yuan)
Consumption household	Household consumption expenditure (Yuan)
Tech market transaction	Transaction Value in Technical Market (10 000 Yuan)
Wage	Average wage (yearly Yuan)
Natural resource	petroleum (10 000 tons), natural Gas (100 million cu.m), coal (100 million tons), iron (Ore, 100 million tons)
Area	Area size of province (square kilometres)
Sunshine	Annual Total Sunshine hours of capital cities (hours)
Temperature	Annual Average Temperature of capital cities (C)
Humidity	Annual average relative humidity (capital city %)
Precipitation	Annual Total Precipitation of capital city (mm)
Institution index 2000	Institution Index 2000 (Du et al., 2008a and 2008b): intellectual property rights protection, government intervention in business operation, government anti-corruption, contract enforcement
PPI (Preferential Policy Index)	Index of Provincial Preferential Policy (0-4) 4: Special Economic Zone and Shanghai Pudong New Area 3: National Free Trade Zones 2: Economic and Technological Development Zone and Border Economic Cooperation Zone 1: Coastal Open City, Coastal Open Economic Zone, Open Coastal Belt, major city on Yangtze bonded area, and capital city of inland province or autonomous region 0: No open zone

Note: All monetary values are in constant (2005) RMB Yuan prices. The deflator used is the consumer price index (CPI) of each region.

CHAPTER 5
UNRAVELLING THE COMPLEX MOTIVATIONS BEHIND CHINA'S OUTWARD FDI[25]

5.1 INTRODUCTION

Following its success in attracting massive amounts of foreign direct investment (FDI), China has also become a major source of outward FDI in recent years. By the end of 2008, China's outward FDI stocks had amounted to 1,839.9 billion US dollars (*Statistical Bulletin of China's Outward Foreign Direct Investment 2008*). Of these stocks, 5.3 percent are in manufacturing, 16.2 percent in wholesale and retail trade, 29.7 percent in commercial services, and 19.9 percent in financial services. More importantly, FDI from China presents dramatic structural changes over time. For example, in the 1990s, the level of China's outward FDI is low with minor fluctuations. This is followed by a consistent and striking jump of FDI outflows in recent years.[26] Moreover, though many of the Chinese multinationals are publicly owned, limited liability firms from mainland China are increasingly engaged in outward FDI (UNCTAD, 2003, 2004, 2006).

Traditionally, the literature has focused on the so called horizontal market seeking FDI across developed countries and vertical efficiency seeking FDI towards developing economies. Only a limited number of *empirical* studies look into the determinants of FDI from emerging markets. Explanations for this gap may be that developing countries are a heterogeneous group in which most countries are small players in cross-border investment, and that firms in developing countries are small so that the internationalization strategy is of limited importance to them. Or, that data on FDI from developing countries are not readily available. However, with the meteoric rise of large emerging markets and the expansive attitude of firms from these countries, academic interest has grown as well. The frontrunner clearly is China, as this country has rapidly become an important global investor. Hence, by studying China's FDI, we may hope to provide insights into a more general topic on what drives developing countries' overseas investments.

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[25] This chapter is an adapted version of Zhang (2009).

[26] According to the Ministry of Commerce of China, China's FDI outflows from 1990 to 2008 are: 9, 10, 40, 43, 20, 20, 21, 26, 27, 19, 10, 69, 27, 28.5, 55, 122.7, 211.6, 265.1, and 559.1 billon US dollars. Statistics for 1990-2002 are the approved outward FDI flows.

The aim of this chapter is to empirically investigate the *causal* effects of the locational determinants of China's outward FDI *over time* by using panel estimation techniques. In general, there are two complementary lines of thinking in this literature on the dynamics of FDI from developing countries. First, outward FDI may follow a specific development path, increasing with the level of national income (Dunning, 1981; Dunning et al., 1998). The second, and the approach we adopt in this chapter, is that the dominant motives for outward FDI change over time, which is reflected in the geographical distribution of FDI outflows. Our main conclusion is that between 1994 and 2000 China's outward FDI is driven by its competitive advantages in low value added production. However, during the period 2001-2008, the host country's imports from China, market size, market potential, natural resource endowment, FDI towards China, as well as institutional quality have gained relative importance as determinants of Chinese overseas investment. In particular, transaction-enforcing has become the most dominant motivation for China's outward FDI in recent years.

In the present section, we limit our discussion to three other studies on China's outward FDI. Liu et al. (2005) is part of the large empirical literature that analyzes the investment development path (IDP) of developing countries. The authors examine how China's outward FDI is related to its internal economic development. They show that FDI follows exports as a later stage of China's economic development. This and other papers (for a review of this literature see: Bajo-Rubio and Montero-Muñoz, 2001) adopt a time-series methodology in which the total outward FDI depends on the development of home country factors. In contrast to these papers which focus on the 'push' determinants of FDI in the home country, our study explores the 'pull' factors in the host country. By using a network approach, Yang (2005) argues that Chinese firms try to build foreign networks to sell their products. He emphasizes the links between China's FDI and the host country characteristics, as we do in this chapter. Nevertheless, his analysis is theoretical and descriptive. Overall, our empirical results are supportive to his findings in that we show a relationship running from exports to FDI. Buckley et al. (2007) empirically investigate the determinants of China's FDI by incorporating China-specific factors into the general FDI theory. They provide interesting correlations for a broad set of host country characteristics, and discuss the motives that drive FDI for separate historical eras. However, their paper fails to account for endogeneity issues, thereby having limited power to identify causality.

Besides, the authors focus on a relatively old sample period (1984-2001) during which China's outward FDI shows little variation.

The remainder of the chapter is set up as follows. In section 5.2, we discuss the related literature and derive several hypotheses to explain the rise of FDI from China. Section 5.3 introduces the data and discusses the empirical issues. Section 5.4 presents the results of panel data estimation with special attention to the causal effects of FDI determinants over time. Section 5.5 concludes.

5.2 THEORIES AND HYPOTHESES

Based on the experience of multinationals from developed countries, Dunning (1977, 1993, 2000) proposes the ownership, location, and internalization (OLI) framework to study the determinants of FDI. He states that market seeking, efficiency seeking, and resource seeking are the main motives for transnational investments. Beginning with the seminal work of Lecraw (1977) and Wells (1983), there is a large and growing *theoretical* literature on the locational determinants of FDI from emerging markets. The early contributions focus on explaining what makes FDI from developing countries different than that from developed countries. They argue that multinationals from emerging markets may have unique ownership advantages, such as ethnic and culture relations, flexibility, and networking skills, which gain them competitiveness in foreign markets. From this literature, we derive several hypotheses on potential explanations for China's outward FDI.

The first view is based on the early work by Hymer (1960) and that of the Uppsala School (e.g. Johanson and Vahlne, 1977). Here the idea is that FDI incrementally follows exports at the early stage of the establishment chain: foreign investments are often **transaction-enforcing** to support existing exports before multinationals can begin manufacturing in the foreign market. This may explain why Chinese firms mainly export manufacturing goods while invest in service sectors (OECD, 2008). Previous studies show that Chinese multinationals establish foreign subsidiaries to provide Chinese exporters with local customer services, transportation and logistics, as well as credit and financial support (Zhan, 1995; Wu and Sia, 2002). For example, Zhang and Van Den Bulcke (1996) find that one of the top motives for Chinese firms investing abroad is to advance exports. In a questionnaire by the Ministry of Foreign Trade and Economic Cooperation (MOFTEC), when asked why

they to engage in FDI, 47 percent of Chinese executives indicate that the primary purpose is to expand overseas markets (Li, 2000). UNCTAD (2003) also notes that buying local distribution channels to facilitate exports is a major reason for Chinese firms investing in mature markets. Furthermore, the pattern that FDI follows exports is consistent with the linkage, leverage, and learning (LLL) framework proposed by Mathews (2002): firms from developing countries are first connected into global value chains by external linkages such as relations with foreign buyers, through which they then leverage their resources and cost advantages, learn about foreign markets and technology, and finally create their own competitive advantages for overseas production. Therefore, we post our first hypothesis:

H5.1: China's outward FDI increases with exports to the host country.

In line with Dunning's theory, Markusen (1984, 1995) argues that firms have certain ownership advantages that can be extended to foreign markets by engaging in cross-border investment. The broad implication for FDI strategies is that firms choose to locate their production in countries where they can sell the differentiated products or internalize markets for intermediate inputs and knowledge. These are typically countries with large local markets and high-income consumers. From the general FDI theory, market seeking is known as an attractive strategy for multinationals from developed economies, which have abundant knowledge assets such as patents, brands, and management systems. However, with China's rapid economic growth, there is an increase in **horizontal** FDI from China towards large overseas markets (Zhang, 2003; Deng, 2004).

Furthermore, according to the new economic geography literature (Krugman, 1991), multinationals have strong incentives to invest in a member country of an integrated economic union to get access to the regional market (Motta and Norman, 1996; Neary, 2002). Ekholm et al. (2005) claim that exports may not be consumed in the host country only, as many countries serve as a platform for re-exportation. For instance, this may explain the large exports from China to Peru. Thus:

H5.2a: China's outward FDI is positively affected by host market size.

H5.2b: China's outward FDI is positively associated with a host country's accessibility to other markets.

Comparative advantage theory implies that firms from developing countries may strategically acquire information and knowledge through outward FDI. Therefore, Chinese multinationals are induced to shift skill intensive activities (such as design, R&D, and marketing) to developed countries where there are more high-skilled employees, advanced technology, and strategic assets (Deng, 2003; Zhang, 2003; Warner et al., 2004). Moreover, many Chinese firms specialize in mass production which involves natural resource intensive processes. This pattern leads to a need to use external resource to support domestic economic growth, so that China's FDI is aimed at securing natural resource such as energy, petroleum, and minerals (Cai, 1999; Wu and Sia, 2002). Hence, we test the following **resource seeking** hypotheses:

H5.3a: China's outward FDI is strategic asset seeking.

H5.3b: China's outward FDI is driven by the demand for natural resources.

Helpman (1984, 1987) emphasizes the importance of cost reduction in vertical disintegration of supply chains. Given China's relatively low labor costs, efficiency seeking motivation is disregarded in many other studies on China's outward FDI (e.g. Buckley et al. 2007). However, we argue that low wage rates in the host country are important to attract FDI from China for three possible reasons. First, Chinese overseas operations may concentrate in low value added production which Chinese firms own competitive advantages. Especially, as Chinese government intends to accelerate industrialization process, firms are encouraged to produce higher value added goods at home and leave labor intensive production abroad. According to OECD (2008), since the late 1990s, there has been a growing trend for Chinese firms establishing assembly plants in other Asian developing countries. Second, over time Chinese wage rates are increasing with economic development. It may become profitable for Chinese multinationals to transfer some tasks to economies with even cheaper labor, such as Vietnam and Laos (Fung et al. 2007). Third, because of domestic cheap labor, Chinese firms may be more sensitive to high wage rates than their peers in developed countries. Thus, the **efficiency seeking** FDI hypothesis is formalized as:

H5.4: China's outward FDI is directed towards other low-income countries.

In international business studies, **psychic distance** is described as factors disturbing communication between multinational suppliers and foreign customers. Accordingly, it is argued that firms from developing countries invest in neighboring markets to exploit the commonality in ethnicity and culture (Dunning et al., 1998; Yin and Choi, 2005). Cultural proximity has drawn special attention in explaining the pattern of China's FDI outflows. For example, ethnic connections help Chinese multinationals to explore market opportunities (Zhan, 1995), establish economic and social networks (Luo, 1997), and reduce transaction costs (Shu and Zeng, 2006).

More recently, the business network view argues that internationalization can be achieved by forming reciprocal economic relationships (Johanson and Vahlne, 2009). In line with the LLL theory, many Chinese multinational firms start as subcontractors providing the intermediate inputs and services to foreign firms operating in China. Getting access to the world market via outsourcing and inward FDI, Chinese firms grow their capabilities over time and later establish foreign subsidiaries (Luo and Tung, 2007). These new global players choose to invest in countries from which China receives investments, so as to take advantage of customer relations and external knowledge embedded in inward FDI. In summary, the relation between internationalization and psychic distance is shown as:

> ***H5.5a***: China's outward FDI goes to economies with more ethnic Chinese.
> ***H5.5b***: China's outward FDI goes to economies from which China receives large amounts of inward FDI.

The new **institutional** economics literature indicates that weak rule of law and political risk in the host country may deter the international expansion of Chinese multinationals that seek foreign markets and external resource. For example, as China moves up the value chain, higher value added Chinese exports depend on good local institutions to protect intellectual property rights. Further, projects invested by state-owned Chinese firms in the natural resource sectors involve massive fixed costs. Therefore, they are to a large extent influenced by political stability which secures the property rights. Some may argue that FDI from China goes to risky locations such as some African countries for natural resource. However, the positive relation between

FDI and political stability discussed here is based on a *ceteris paribus* assumption, which is realized by controlling for the variables of market size and natural resource.

Moreover, institutional environment in the home country also determines internationalization strategies of multinationals. Due to the large share of public firms in Chinese multinationals and the strict official approval procedures for outward FDI, domestic institutional improvements may give rise to **dynamic** patterns and structural changes in China's FDI outflows. For instance, the role of Chinese government has been considered to transit from 'market supplanting' to 'market fostering' (Wang and Vinod, 1993), especially after China entered the World Trade Organization (WTO) in 2001. Since then, capital flows and transfers have been relaxed under the 'go global' policy by simplifying and gradually abolishing the approval system. Hence, in line with a series of policy development over the last three decades, we would expect that the relative importance of the FDI determinants changes over time (Dunning, 2000). In particular, along with China's marketization process, seeking and securing foreign markets may have become a priority for Chinese firms. To capture the impact of host and home country institutions, we propose:

> ***H5.6a***: China's outward FDI increases with host institutional quality.
> ***H5.6b***: The relative importance of China's outward FDI motivations changes over time.

5.3 DATA AND METHODOLOGY

Our main sample covers China's 95 outward FDI destinations over 12 years (1994-2005). We use the approved FDI outflows (*AFDO*), taken from the annual *China Commerce Yearbook* published by the Ministry of Commerce of China, as the main dependent variable. Up to 2003, China has only issued data on its FDI approved by the government authorities (till 2005). Although such data are widely regarded to underestimate the actual or realized outward FDI, empirical application is justified by China's strict capital control. To check the robustness of this measure, we employ an alternative dependent variable, Chinese FDI outflows (*FDO*), for the period 2003-

2008.[27] The data source is the annual *Statistical Bulletin of China's Outward Foreign Direct Investment*, published by the Ministry of Commerce of China.

We test the transaction-enforcing hypothesis by analyzing exports (*EXPORTS)* to China's FDI destinations. The bilateral investment relation is represented by the FDI inflows to China from its host country (*IFDI*). These data are collected from the National Bureau of Statistics of China. We incorporate two horizontal FDI related variables, market size of the host economy measured by its own gross domestic product (*GDP*) and the country's market potential (*MP*) defined as the sum of distance-weighted GDP of all other host economies in the sample.

Table 5.1: Summary and correlations
Sample 1994-2005

VARIABLE	Obs.	Mean	Std. Dev.	Min.	Max.
AFDO (ln)	503	5.493	2.217	-2.996	14.176
EXPORTS (ln)	503	11.524	2.107	4.127	16.606
GDP (ln)	503	25.173	1.993	19.339	30.024
MP (ln)	503	22.531	0.507	21.595	24.092
HIGHTECH	503	13.630	15.647	0	74.1414
RESOURCE	503	22.351	27.008	0.001	99.669
GDPPC (ln)	503	8.275	1.572	5.129	10.832
ETHNICITY	503	0.083	0.277	0	1
IFDI (ln)	503	7.592	3.240	0.693	14.583
INST	503	0.287	0.971	-2.185	2.073
DISTANCE (ln)	503	8.794	0.679	6.862	9.868
CONTIGENT	503	0.137	0.344	0	1

VARIABLE	*AFDO*	*EXP~*	*GDP*	*MP*	*HIGH~*	*RES~*	*GDPPC*	*ETH~*	*IFDI*
AFDO (ln)	1.000								
EXPORTS (ln)	0.338	1.000							
GDP (ln)	0.158	0.753	1.000						
MP (ln)	0.107	0.090	0.119	1.000					
HIGHTECH	0.040	0.395	0.376	-0.028	1.000				
RESOURCE	0.037	-0.174	-0.179	0.081	-0.319	1.000			
GDPPC (ln)	0.032	0.532	0.632	0.152	0.384	-0.235	1.000		
ETHNICITY	0.141	0.268	-0.032	-0.021	0.427	-0.181	0.247	1.000	
IFDI (ln)	0.245	0.714	0.626	0.048	0.573	-0.380	0.708	0.421	1.000
INST	0.026	0.402	0.479	0.086	0.430	-0.431	0.834	0.236	0.673

Skill intensity is measured by the share of high-tech exports in total exports (*HIGHTECH*). The variable *RESOURCE* accounts for the host economy's share of fuel, ore and minerals exports in the total merchandise exports. As standard in the

[27] Since 2003, this new dataset on the outward FDI flows and stocks has started to replace the approval data to meet the OECD and IMF standards. We use the FDI outflows as the dependent variable to be comparable to the main FDI measure. Results are robust to using the outward FDI stocks.

literature (e.g. Helpman, 1987; Brainard, 1997), we use GDP per capita (*GDPPC*) as a proxy for wage rates in the host economy. The data source of these series is the World Bank Development Indicators 2009.[28] We then use principal component analysis to construct a standardized index of institutional quality (*INST*), based on six governance variables – voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption (Kaufmann et al., 2009). Further, we include some other variables which have been previously found to influence FDI: ethnicity measured by a dummy variable having the value of one if Chinese is spoken by at least 9 percent of the population in the host country (*ETHNICITY*), the distance between the capital of the FDI destination and that of China (*DISTANCE*), and a dummy on whether the host country is contingent to China (*CONTINGENT*) (all taken from the Centre d'Etudes Prospectives et d'Informations Internationales, CEPII). Table 5.1 provides the data description.

Table 5.1 continued:
Sample 2003-2008

VARIABLE	Obs.	Mean	Std. Dev.	Min.	Max.
FDO (ln)	323	1.513	2.509	-4.605	9.528
EXPORTS (ln)	323	11.997	2.250	3.761	16.963
GDP (ln)	323	24.989	2.029	20.208	30.073
MP (ln)	323	22.663	0.486	21.792	24.050
HIGHTECH	323	11.936	14.391	0	73.602
RESOURCE	323	26.731	29.440	0.008	98.888
GDPPC (ln)	323	8.493	1.576	5.421	11.543
ETHNICITY	323	0.040	0.197	0	1
IFDI (ln)	323	7.507	2.913	1.386	14.834
INST	323	0.229	0.986	-1.859	2.032
DISTANCE (ln)	323	8.875	0.639	6.845	9.857
CONTIGENT	323	0.102	0.303	0	1

VARIABLE	*FDO*	*EXP~*	*GDP*	*MP*	*HIGH~*	*RES~*	*GDPPC*	*ETH~*	*IFDI*
FDO (ln)	1.000								
EXPORTS (ln)	0.529	1.000							
GDP (ln)	0.334	0.744	1.000						
MP (ln)	0.044	0.101	0.146	1.000					
HIGHTECH	0.106	0.262	0.315	-0.004	1.000				
RESOURCE	0.211	-0.094	-0.134	0.003	-0.260	1.000			
GDPPC (ln)	0.186	0.391	0.611	0.237	0.333	-0.190	1.000		
ETHNICITY	0.304	0.251	0.039	-0.003	0.345	-0.135	0.173	1.000	
IFDI (ln)	0.437	0.589	0.653	0.140	0.467	-0.321	0.664	0.365	1.000
INST	0.111	0.274	0.463	0.204	0.354	-0.420	0.814	0.224	0.642

[28] Exports, FDI, GDP, and GDP per capita are measured in US dollars at constant 2005 prices and exchange rates.

Using these variables, we analyze the determinants of China's outward FDI based on the econometric model specified below:

$$\begin{aligned}\ln AFDO_{it} = {} & \alpha + \beta_1 \ln EXPORTS_{it} + \beta_2 \ln GDP_{it} + \beta_3 \ln MP_{it} + \beta_4 HIGHTECH_{it} + \beta_5 RESOURCE_{it} \\ & + \beta_6 \ln GDPPC_{it} + \beta_7 ETHNICITY_i + \beta_8 \ln IFDI_{it} + \beta_9 INST_{it} + \beta_{10} \ln DISTANCE_i \\ & + \beta_{11} CONTINGENT_i + \delta_1 YEAR_t + \delta_2 COUNTRY_i + \varepsilon_{it}\end{aligned} \quad . \quad (5.1)$$

In this model, we control for time trend (*YEAR*) and time-invariant country-specific characteristics (*COUNTRY*). To alleviate heteroskedasticity and obtain standardized regression coefficients, we take logarithm transformation for continuous variables. In the next section, we first apply the random effects estimation to eliminate unobserved country-specific factors. We choose this approach over the fixed effects estimation so as to better explore the between-country variations in the geographical distribution of China's FDI.[29] To capture the dynamics of FDI motivations, we generate interaction terms between the main explanatory variables and a time dummy *P2001*. This time dummy variable takes on the value one for years 2001-2005 and zero for years before. We select year 2001 as the cut-off point because in that year China entered the WTO, an event which may have changed China's overseas investment strategies. By doing so, we hope to show the time-changing effects of FDI determinants without losing efficiency in contrast to using sub-samples.

From the static panel estimation, a picture emerges that the motivations behind China's outward FDI have changed over time. However, according to previous analyses focused on long-term series (Bajo-Rubio and Montero-Muñoz, 2001) and Chinese inward FDI (Liu et al., 2001; Zhang and Felmingham, 2001; Zhang and Song, 2001), various interdependent relations between FDI and its explanatory variables may make it difficult to identify the causal effects. To tackle endogeneity due to reverse causality, we apply the Arellano-Bover GMM estimation to get consistent parameter estimates for dynamic panel models. This method uses the lags of the level variables to be instruments in the first-differenced model as well as the lags of the first-differenced variables to instrument the levels. First differencing eliminates constant country-specific heterogeneity and yields stationary series. Compared to

[29] We first test panel unit roots and panel cointegration. All the series are I (1) but cointegrated. We do not report the test results for two reasons. First, the samples cover maximum 12 years, which is too short to obtain valid test results. Second, first differencing provides a stable cointegrated framework. The random effects estimation keeps efficiency when the Hausman test is passed. Although not reported, we have conducted the fixed effects estimation, of which the results are quantitatively the same at a lower level of significance.

other techniques such as the Arellano-Bond estimation, the Arellano-Bover GMM approach has improved precision and better finite-sample properties, especially in keeping time-invariant explanatory variables. Other than the lagged dependent variable, main explanatory variables (*EXPORTS*, *GDP*, *MP*, *HIGHTECH*, *RESOURCE*, *GDPPC*, *IFDI*, *INST*, and their corresponding interactions) are assumed to be predetermined and instrumented with the lagged values.

So far, our baseline regressions may not allow us to explore the interrelations among hypotheses. For example, *EXPORTS* may well be endogenous to market size (*GDP*) and market potential (*MP*), since exports to some extent are indication of local and regional demand. By including interaction terms, we are able to shed more light on which of these variables is more important. The same problem holds for *EXPORTS* and *GDPPC*. It may well be that FDI goes towards low-wage countries because poor countries prefer cheap products from China (so the transaction-enforcing motivation is important). However, it may also be that firms from China set up new production facilities in low-wage countries to take advantage of low labor costs. Again, adding an interaction term clarifies the results and helps to separate the arguments. Finally, we perform a series of robustness checks using sub-region samples and an alternative dependent variable for the period 2003-2008.[30]

5.4 PANEL ESTIMATION RESULTS

Table 5.2 reports the random effects estimates for the sample 1994-2005. We first present the results of the basic model in Column (1). To clarify the dynamic relation between each individual explanatory variable and FDI from China, we then include interaction terms *EXPORTS*P2001*, *GDP*P2001*, *MP*P2001*, *HIGHTECH*P2001*, *RESOURCE*P2001*, *GDPPC*P2001*, *IFDI*P2001*, and *INST*P2001* in Columns (2) to (9), respectively.

In Column (1), we find that China's outward FDI is positively correlated with the host country's imports from China (*EXPORTS*), market size (*GDP*), natural resource endowment (*RESOURCE*), and FDI to China (*IFDI*). As expected, wage rates (*GDPPC*) in the host country have a significant negative impact on attracting FDI from China. Hence, the random effects results present the first evidence that

[30] We also include an additional explanatory variable of China's imports from its outward FDI destinations. The main results of Arellano-Bover estimation are robust to this specification. We do not report these results because of the problem of multicollinearity and the insignificant imports variable across panels.

China's FDI is driven by transaction-enforcing (*H5.1*), market seeking (*H5.2a*), natural resource seeking (*H5.3b*), and efficiency seeking (*H5.4*) motivations. We find no support for the knowledge seeking motive given the insignificant variable of the host country's share of high-tech exports (*HIGHTECH*).

Table 5.2: Random effects estimation results (Dependent variable *lnAFDO*)

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
EXPORTS (ln)	0.177**	-0.102	0.180**	0.183**	0.176**	0.176**	0.207**	0.203**	0.211**
	(0.082)	(0.108)	(0.083)	(0.081)	(0.082)	(0.082)	(0.085)	(0.082)	(0.084)
GDP (ln)	0.268**	0.289**	0.158	0.269**	0.269**	0.269**	0.245**	0.182	0.235*
	(0.119)	(0.126)	(0.141)	(0.120)	(0.121)	(0.120)	(0.122)	(0.125)	(0.121)
MP (ln)	0.205	0.212	0.201	-0.078	0.203	0.203	0.179	0.207	0.191
	(0.264)	(0.266)	(0.262)	(0.339)	(0.266)	(0.266)	(0.265)	(0.266)	(0.266)
HIGHTECH	-0.014	-0.013	-0.014	-0.014	-0.015	-0.014	-0.014	-0.012	-0.013
	(0.010)	(0.010)	(0.010)	(0.010)	(0.012)	(0.010)	(0.010)	(0.010)	(0.010)
RESOURCE	0.009*	0.008	0.008*	0.009*	0.009*	0.009	0.009*	0.009*	0.009*
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.005)
GDPPC (ln)	-0.571***	-0.520***	-0.551***	-0.570***	-0.570***	-0.569***	-0.764***	-0.530***	-0.549***
	(0.167)	(0.168)	(0.168)	(0.169)	(0.168)	(0.168)	(0.182)	(0.166)	(0.164)
ETHNICITY	0.943	0.909	0.869	0.955	0.950	0.948	0.934	0.794	0.870
	(0.658)	(0.665)	(0.666)	(0.670)	(0.665)	(0.663)	(0.655)	(0.671)	(0.658)
IFDI (ln)	0.130*	0.151*	0.124	0.124	0.129*	0.129*	0.138*	0.027	0.144*
	(0.075)	(0.077)	(0.076)	(0.076)	(0.077)	(0.076)	(0.077)	(0.081)	(0.076)
INST	0.350	0.303	0.338	0.344	0.349	0.348	0.293	0.246	-0.037
	(0.252)	(0.251)	(0.252)	(0.255)	(0.254)	(0.253)	(0.256)	(0.252)	(0.257)
*EXPORTS*P2001 (ln)*		0.327***							
		(0.079)							
*GDP*P2001 (ln)*			0.172**						
			(0.082)						
*MP*P2001 (ln)*				0.456					
				(0.344)					
*HIGHTECH*P2001*					0.001				
					(0.009)				
*RESOURCE*P2001*						0.000			
						(0.006)			
*GDPPC*P2001 (ln)*							0.341***		
							(0.096)		
*IFDI*P2001 (ln)*								0.247***	
								(0.050)	
*INST *P2001*									0.498***
									(0.158)
DISTANCE (ln)	-0.750*	-0.768*	-0.743*	-0.774*	-0.753*	-0.753*	-0.710	-0.621	-0.682
	(0.451)	(0.453)	(0.450)	(0.452)	(0.455)	(0.454)	(0.452)	(0.446)	(0.452)
CONTINGENT	0.908*	0.963*	0.921*	0.917*	0.904*	0.905*	0.892*	0.906*	0.883*
	(0.498)	(0.501)	(0.498)	(0.507)	(0.502)	(0.501)	(0.510)	(0.504)	(0.512)
F-test (p-value)		0.000	0.005	0.326	0.354	0.183	0.000	0.000	0.004
Hausman (p-value)	0.168	0.178	0.173	0.163	0.216	0.186	0.190	0.256	0.265

Note: Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.10. Number of observations: 503. Number of economies: 95. Year dummies are included but not reported. Null hypothesis of the Hausman test: random effects estimation is consistent.

Therefore, though acquiring advanced technology has been recognized as an important reason for outward FDI, the majority of China's 'first-time' FDI outflows is still related to market elements and natural resource (Dunning, 1999). Moreover, instead of a significant impact of the share of Chinese speaking population (*ETHNICITY*), there is a pattern that Chinese enterprises invest in economies which have large amounts of FDI flows towards China (*H5.5b*). One explanation is that mutual investment relationships may have a more direct effect on building business networks than cultural connections (Johanson and Vahlne, 2009). In addition, the negative effect of geographic distance (*DISTANCE*) and positive effect of being contingent to China (*CONTINGENT*) show that neighboring countries are important recipients of China's FDI.

Reading results throughout the rest columns with interaction terms, we find that China's outward FDI is motivated by different reasons in the 1990s and in recent years (*H5.6b*). In each column, when the time dummy *P2001* equals to zero, the coefficient of the interested individual variable represents its impact on FDI during the period 1994-2000. The sum of the coefficients on this variable and its interaction shows the corresponding effect for the period 2001-2005 (*P2001* equals to one). We use the F-test to determine whether an independent variable is significant during the entire sample period. Moreover, this explanatory variable is an important determinant of China's outward FDI only for 1994-2000 if the individual variable rather than the interaction is statistically significant. By contrast, when the interaction term is significant but the individual variable is not, we interpret this as evidence of a growing importance of the related FDI motivation over time. Hence, the results in Columns (2), (3), (8), and (9) indicate that exports from China (*EXPORTS*), the host country's market size (*GDP*), FDI towards China (*IFDI*), and local institutions (*INST*) are not important until 2001. Across panels, only the variable *GDPPC* has a significant individual effect, so that between 1994-2000 China's outward FDI is mainly affected by low wage rates in the host country. Nevertheless, in Column (7), the significant positive interaction (*GDPPC*P2001*) implies that the marginal effect of low labor costs on attracting FDI from China is decreasing over time. Finally, in Columns (4), (5), and (6), we find that other independent variables (*MP*, *HIGHTECH*, and *RESOURCE*) are not sensitive to different time periods.

Table 5.3: Arellano-Bover dynamic results (Dependent variable *lnAFDO*)

VARIABLE	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$AFDO_{t-1}$ (ln)	0.073	0.059	0.072	0.073	0.073	0.076	0.068	0.047	0.070
	(0.128)	(0.133)	(0.130)	(0.123)	(0.128)	(0.130)	(0.130)	(0.132)	(0.129)
EXPORTS (ln)	0.362***	0.080	0.377***	0.364***	0.366***	0.406***	0.404***	0.441***	0.391***
	(0.095)	(0.137)	(0.104)	(0.097)	(0.100)	(0.118)	(0.112)	(0.119)	(0.099)
GDP (ln)	0.117	0.033	-0.018	0.106	0.104	0.058	0.030	-0.114	0.064
	(0.218)	(0.215)	(0.246)	(0.209)	(0.236)	(0.219)	(0.206)	(0.224)	(0.208)
MP (ln)	0.768**	0.788**	0.788**	0.605	0.782**	0.700**	0.763**	0.805**	0.811**
	(0.368)	(0.343)	(0.356)	(0.488)	(0.366)	(0.344)	(0.357)	(0.354)	(0.365)
HIGHTECH	-0.012	-0.002	-0.007	-0.009	-0.016	-0.015	-0.009	-0.006	-0.010
	(0.020)	(0.018)	(0.018)	(0.018)	(0.020)	(0.020)	(0.018)	(0.019)	(0.019)
RESOURCE	0.021**	0.018**	0.019**	0.020**	0.021**	0.014	0.020**	0.021**	0.020**
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)	(0.010)	(0.008)	(0.008)	(0.008)
GDPPC (ln)	-0.463	-0.323	-0.391	-0.455*	-0.467	-0.472*	-0.545*	-0.348	-0.388
	(0.291)	(0.280)	(0.283)	(0.270)	(0.287)	(0.281)	(0.296)	(0.287)	(0.284)
ETHNICITY	0.978	0.333	0.628	0.925	0.968	0.906	0.770	0.434	0.841
	(0.959)	(0.896)	(0.878)	(0.899)	(0.956)	(0.948)	(0.880)	(0.974)	(0.965)
IFDI (ln)	-0.033	0.029	-0.025	-0.030	-0.030	-0.029	-0.009	-0.082	-0.015
	(0.148)	(0.152)	(0.151)	(0.150)	(0.154)	(0.148)	(0.151)	(0.150)	(0.147)
INST	1.143**	0.915**	1.015**	1.092**	1.164**	1.059**	1.031**	0.907**	0.770
	(0.471)	(0.422)	(0.448)	(0.450)	(0.469)	(0.436)	(0.427)	(0.432)	(0.515)
*EXPORTS*P2001 (ln)*		0.376***							
		(0.109)							
*GDP*P2001 (ln)*			0.137						
			(0.127)						
*MP*P2001 (ln)*				0.271					
				(0.641)					
*HIGHTECH*P2001*					0.004				
					(0.017)				
*RESOURCE*P2001*						-0.003			
						(0.012)			
*GDPPC*P2001 (ln)*							0.224		
							(0.146)		
*IFDI*P2001 (ln)*								0.246***	
								(0.073)	
*INST*P2001*									0.290
									(0.244)
DISTANCE (ln)	-0.358	-0.252	-0.267	-0.281	-0.337	-0.284	-0.242	0.032	-0.275
	(0.718)	(0.694)	(0.705)	(0.704)	(0.778)	(0.731)	(0.695)	(0.695)	(0.714)
CONTINGENT	1.638**	1.968***	1.844**	1.686**	1.601**	1.577**	1.733**	1.648**	1.636**
	(0.727)	(0.725)	(0.732)	(0.706)	(0.724)	(0.685)	(0.697)	(0.668)	(0.704)
F-test (p-value)		0.000	0.478	0.064	0.727	0.272	0.046	0.003	0.043
AR(2) (p-value)	0.123	0.132	0.128	0.122	0.122	0.123	0.153	0.111	0.135
Sargan test (p-value)	0.209	0.257	0.217	0.230	0.229	0.153	0.240	0.302	0.226

Note: Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.10. Number of observations: 353. Number of economies: 75. Year dummies are included but not reported.

Table 5.3 shows the Arellano-Bover GMM dynamic panel estimation results for the basic model in Column (1) and for models with the time dummy interactions in Columns (2) to (9). Results of the autocorrelation test support the null hypothesis of zero second-order serial correlation, and those of the Sargan test reject the overidentifying restrictions. Comparing the results in Tables 5.2 and 5.3, we notice

some substantial differences. First, probably due to reverse causality, the random effects estimate of *EXPORTS* is smaller in Column (1) of Table 5.2 (0.177) than the GMM estimate in that of Table 5.3 (0.362). This provides some evidence for the establishment chain that China's outward FDI first follows exports to secure foreign markets and then becomes a substitute for trade. Second, the domestic market size of a host economy loses its significance to the country's market potential. Therefore, FDI from China flows to certain countries for their export-platform function (*H5.2b*). Third, with a better control of endogeneity, the GMM estimation presents a significant positive impact of local institutions on China's outward FDI.

Using the GMM methodology, we find that the locational determinants of China's FDI have different effects in different time periods (*H5.6b*). In Columns (2) and (8), the significant interaction terms *EXPORTS*P2001* and *IFDI*P2001* emphasize the transaction-enforcing motivation (*H5.1*) and the importance of economic networks (*H5.5b*) during 2001-2005. As for 1994-2000 (*P2001* equals to zero), there is a significant negative individual effect of wage rates (*GDPPC*) in Column (7). This suggests that in the 1990s low labor costs considerably affect the geographical distribution of China's outward FDI (*H5.4*). Furthermore, the results of the F-test in Columns (4) and (9) show that in both time periods Chinese firms invest in countries with large regional market size and good institutions. Yet, the marginal effects of the variables *MP* and *INST* are larger in the recent period (0.876 and 1.060 respectively) than in the period 1994-2000 (0.605 and 0.770). In Columns (3), (5), and (6), we do not find evidence for significant dynamics of market size (*GDP*), high technology (*HIGHTECH*), and natural resource (*RESOURCE*). Finally, the finding that the lagged dependent variable is not significant may well imply the discontinuous nature of the approved FDI measure.

We then take into account the interdependence of four host country factors: exports from China (*EXPORTS*), market size (*GDP*), market potential (*MP*), and wage rates (*GDPPC*). Table 5.4 illustrates the random effects and Arellano-Bover GMM estimates. First, the results of the F-test show that only the exports variable (*EXPORTS*) is statistically significant with a positive marginal effect on China's outward FDI in all columns. This provides some evidence that transaction-enforcing motivation dominates the market-seeking and efficiency-seeking motives, especially when we control for reverse causality in Columns (4) to (6). Second, the coefficients of interaction terms (*EXPORTS*GDP*, *EXPORTS*MP*, and *EXPORTS*GDPPC*) are

positive across panels. Hence, the transaction-enforcing effect of exports on FDI is larger if the host economy has larger (domestic and regional) markets and consumers with higher wage rates.

Table 5.4: Estimation results of using interactions (Dependent variable *lnAFDO*)

VARIABLE	(1) RE	(2) RE	(3) RE	(4) A-B	(5) A-B	(6) A-B
$AFDO_{t-1}$ (ln)				0.073	0.070	0.072
				(0.126)	(0.048)	(0.125)
EXPORTS (ln)	-1.093*	-4.423**	-0.791**	-1.091	-2.271	-0.322
	(0.608)	(2.219)	(0.308)	(0.825)	(3.289)	(0.449)
GDP (ln)	-0.274	0.258**	0.306**	-0.391	0.108	0.092
	(0.292)	(0.121)	(0.120)	(0.423)	(0.209)	(0.228)
MP (ln)	0.145	-2.093*	0.176	0.769**	-0.768	0.749**
	(0.264)	(1.146)	(0.259)	(0.338)	(1.747)	(0.342)
GDPPC (ln)	-0.562***	-0.570***	-1.640***	-0.391	-0.553**	-1.241**
	(0.166)	(0.166)	(0.379)	(0.284)	(0.254)	(0.562)
*EXPORTS*GDP (ln)*	0.050**			0.057*		
	(0.024)			(0.033)		
*EXPORTS*MP (ln)*		0.203**			0.115	
		(0.098)			(0.145)	
*EXPORTS*GDPPC (ln)*			0.103***			0.072*
			(0.031)			(0.042)
HIGHTECH	-0.016*	-0.011	-0.011	-0.011	-0.013	-0.011
	(0.010)	(0.010)	(0.010)	(0.019)	(0.017)	(0.018)
RESOURCE	0.009*	0.009*	0.009*	0.021***	0.021***	0.023***
	(0.005)	(0.005)	(0.005)	(0.008)	(0.007)	(0.008)
ETHNICITY	1.178*	0.858	0.677	1.178	1.122	0.760
	(0.667)	(0.662)	(0.632)	(0.987)	(0.983)	(0.890)
IFDI (ln)	0.116	0.131*	0.124*	-0.026	-0.031	-0.009
	(0.076)	(0.075)	(0.075)	(0.145)	(0.086)	(0.145)
INST	0.310	0.381	0.255	0.853**	1.186***	1.069***
	(0.249)	(0.255)	(0.246)	(0.397)	(0.369)	(0.406)
DISTANCE (ln)	-0.695	-0.682	-0.691	-0.317	-0.628	-0.458
	(0.452)	(0.446)	(0.438)	(0.660)	(0.661)	(0.682)
CONTINGENT	0.914*	1.029**	1.207**	1.705**	1.560**	1.365**
	(0.501)	(0.498)	(0.497)	(0.780)	(0.722)	(0.660)
F-test (p-value)	*EXP*:	*EXP*:	*EXP*:	*EXP*:	*EXP*:	*EXP*:
	0.005	0.022	0.000	0.006	0.001	0.000
	GDP:	*MP*:	*GDPPC*:	*GDP*:	*MP*:	*GDPPC*:
	0.005	0.085	0.000	0.139	0.226	0.102
Hausman (p-value)	0.162	0.091	0.137			
AR(2) (p-value)				0.120	0.117	0.114
Sargan test (p-value)				0.168	0.278	0.221
No. of observations	503	503	503	353	353	353
No. of economies	95	95	95	75	75	75

Note: Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.10. Year dummies are included but not reported. 'RE' and 'A-B' represent the random effects estimation and Arellano-Bover estimation, respectively.

A related finding is the significant negative individual effect of *EXPORTS* in Columns (1) to (3). This implies that in countries with small market size and poor consumers, FDI and exports can be substitute for each other. Third, in Columns (3) and (6), the

marginal effect of wage rates on FDI is an aggregation of the labor costs impact represented by the individual variable *GDPPC* (negative) and a consumption impact captured by the interaction term *EXPORTS*GDPPC* (positive). For the latter, increasing wage rates attracts FDI from China if the host country is an important market for Chinese exports. In addition, results for other explanatory variables are comparable to those in baseline models.

Table 5.5: Arellano-Bover results for different regions (Dependent variable *lnAFDO*)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLE	Less advance	Advance	Asia	Africa	EU&NA	Non HK&MA	No tax havens	Tax havens
AFDO$_{t-1}$ (ln)	0.066	-0.014	0.101*	0.059	-0.010	0.075	0.076	0.466***
	(0.166)	(0.059)	(0.060)	(0.066)	(0.077)	(0.132)	(0.135)	(0.063)
EXPORTS (ln)	0.498**	0.199**	1.054***	0.986***	0.118	0.362***	0.366***	-0.009
	(0.246)	(0.093)	(0.405)	(0.235)	(0.117)	(0.104)	(0.098)	(0.105)
GDP (ln)	-0.188	0.187	-0.291	-0.775	0.704	-0.019	-0.244	
	(0.268)	(0.579)	(0.184)	(0.519)	(0.646)	(0.214)	(0.228)	
MP (ln)	1.181***	0.719	0.583	0.161	-0.176	0.733**	0.807**	
	(0.451)	(0.805)	(0.362)	(0.321)	(1.007)	(0.355)	(0.367)	
HIGHTECH	-0.010	-0.032	-0.035**	0.025	-0.029	-0.008	0.004	
	(0.022)	(0.042)	(0.014)	(0.037)	(0.047)	(0.021)	(0.023)	
RESOURCE	0.021**	0.025	-0.005	0.021***	0.039	0.019**	0.013	
	(0.010)	(0.028)	(0.012)	(0.006)	(0.066)	(0.008)	(0.008)	
GDPPC (ln)	0.176	-2.671**	-0.442	0.376	-1.765***	-0.567*	-0.342	
	(0.353)	(1.156)	(0.365)	(0.255)	(0.476)	(0.322)	(0.332)	
ETHNICITY	-0.333	-0.765	-0.363			0.551	-0.577	
	(1.138)	(3.188)	(0.958)			(0.867)	(0.988)	
IFDI (ln)	0.005	0.978**	-0.177	-0.096	0.703***	0.023	0.058	0.509***
	(0.153)	(0.451)	(0.203)	(0.086)	(0.196)	(0.149)	(0.157)	(0.138)
INST	-0.283	0.791	1.204***	-0.065	0.309	0.962**	0.725*	
	(0.607)	(0.721)	(0.391)	(0.291)	(0.359)	(0.415)	(0.413)	
DISTANCE (ln)	-3.774***	2.451	-0.455	-4.329***	0.340	0.139	0.330	
	(1.280)	(1.798)	(0.499)	(1.006)	(5.439)	(0.333)	(0.307)	
CONTINGENT	0.243	1.930	0.455			1.064	1.338**	
	(0.673)	(2.062)	(1.040)			(0.656)	(0.627)	
AR(2) (p-value)	0.155	0.814	0.587	0.175	0.980	0.213	0.264	0.122
Sargan (p-value)	0.677	0.780	0.884	0.985	0.869	0.106	0.155	0.403
No. of obs.	240	113	148	67	88	335	314	55
No. of economies	55	20	23	21	20	73	69	10

Note: Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.10. In Columns (4) and (5), the variables *ETHNICITY* and *CONTINGENT* dropped because of collinearity. Year dummies are included but not reported. Across panels 'Less advance', 'Advance', 'Asia', 'Africa' 'EU&NA' represent samples of less advanced, advanced, Asian, African, as well as European and North American economies, respectively. 'Non HK&MA' represents a sample excluding Hong Kong and Macao. 'No tax havens' represents the sample without some tax free economies.

Given the diversification of Chinese FDI destinations, we further run sensitivity check for different regions. Table 5.5 reports the Arellano-Bover GMM results for less advanced and advanced economies (categorized according to International Monetary

Fund) in Columns (1) and (2), Asia in Column (3), Africa in Column (4), Europe and North America in Column (5), the sample excluding Hong Kong and Macao in Column (6), the sample without the tax haven countries in Column (7), and a group of tax free economies in the last column. We find that China's outward FDI towards different regions is driven by different motivations. Broadly speaking, Chinese firms invest in developing countries to support exports (*EXPORTS*), explore regional markets (*MP*), and secure natural resource (*RESOURCE*). By contrast, other than the exports variable, wage rates (*GDPPC*) and inward FDI (*IFDI*) are significant determinants of China's FDI towards advanced countries.

More in detail, Chinese firms invest in Asian economies to support exports. Due to geographic proximity, it is not surprising to find a large transaction-enforcing effect of exports on FDI in this region. The significant negative impact of the host country's technology intensity (*HIGHTECH*) is consistent with our expectation that Chinese firms shift low technology intensive manufacturing to secondary countries while upgrading industrial structure. This also suggests that Chinese multinationals may have comparative advantage in technology compared to most local firms in other Asian developing countries. Therefore, products from China are relatively higher valued added and depend on local institutions (significant positive *INST*), such as intellectual property rights protection. In addition, the lagged dependent variable is significant and positive, which shows agglomeration effects in Asian markets.

In line with empirics, China's outward FDI goes to Africa for natural resource. Over time, Chinese multinationals have invested in large projects to exploit oil in countries such as Algeria, Angola, Kenya, Nigeria, and Sudan; copper in Congo and Zambia; fisheries in Ghana, as well as iron-ore in Gabon. Furthermore, we find a significant positive effect of exports (*EXPORTS*) and a negative effect of the geographic distance (*DISTANCE*). It is plausible that Chinese cheap products have a large market share in these poor countries, so that FDI from China follows exports. In addition, given a large number of trade agreements between African countries and developed countries, for example the African Growth and Opportunity Act offered by the USA, Chinese multinationals may set up local factories in this region to facilitate exports to third countries.

In Europe and North America, the bilateral FDI relationship (*IFDI*) is important for Chinese firms to build subsidiaries. Consistent with the LLL theory, firms from emerging markets invest in developed countries to explore the linkage,

leverage, and learning mechanisms. Also, given the prevalent high wage rates across these rich countries, competitive labor costs are crucial to attract FDI from China. This may explain an increasing trend of Chinese FDI towards East Europe.

In Columns (6) and (7), we find that the results in Column (1) of Table 5.3 are robust to using samples excluding some outliers. Finally, in economies with low tax rate and developed financial infrastructure, outward FDI from China is strongly associated with inward FDI and previous FDI outflows.[31] On the one hand, Chinese multinationals may learn from foreign investors the benefits of locating in low tax economies, and later establish their own local financial operations to facilitate international transactions. On the other hand, a relatively novel explanation relates this part of Chinese outward FDI to a so called 'round tripping' issue. In order to raise capital restricted in domestic markets and get tax preferential treatments, Chinese firms, especially private businesses, may use investment in tax havens as a getaway instrument. Specifically, capital first flows to these financial centers and comes back disguised as foreign investment. Unfortunately, the present chapter fails to distinguish between these two mechanisms without detailed firm-level information.

In Table 5.6, we report the random effects and Arellano-Bover estimation results using an alternative dataset for years 2003 to 2008. Columns (1) and (3) present the results of the basic model. In Columns (2) and (4), we include three interaction terms (*EXPORTS*GDP*, *EXPORTS*MP*, and *EXPORTS*GDPPC*). Across panels, exports (*EXPORTS*), natural resource (*RESOURCE*), and the distance between China and the host country (*DISTANCE*) are statistically significant. Hence, transaction-enforcing is the most dominant motivation for China's FDI during this period (*H5.1*) and natural resource seeking motivation becomes more and more important over time (*H5.3b*). In the first two columns, there is some evidence for the link between psychic distance and FDI: Chinese firms invest more in countries with larger Chinese speaking population (*H5.5a*) and more FDI towards China (*H5.5b*). The variable *GDP* is insignificant in Column (1), but significant in Column (2) accounting for the interdependence between exports and market size. This implies that market seeking motivation is important in Chinese export destinations. Using the GMM methodology in Columns (3) and (4), we find significant positive effects of the

[31] Tax havens include: Antigua, Belize, Bermuda, Brunei, Cayman Island, Dominica, Hong Kong, Macao, Malta, Mauritius, Panama, Palau, Samoa, Singapore, Tonga, and British Virgin Island. Due to data availability, only exports, inward FDI, and year dummies are incorporated in the last column to keep efficiency.

host country's market size (*GDP*), market potential (*MP*), and institutions (*INST*). Finally, the negative effect of wage rates (*GDPPC*) is smaller in recent years, probably because the gap on labor costs between China and other economies has been narrowed down and because meanwhile the role of wage rates in increasing consumption power has been reinforced.

Table 5.6: Results using an alternative dataset (Dependent variable *lnFDO*)

VARIABLE	(1) RE	(2) RE Interaction	(3) A-B	(4) A-B Interaction
FDO_{t-1} (ln)			0.039	0.056
			(0.066)	(0.062)
EXPORTS (ln)	0.258***	-0.224	0.213**	0.532
	(0.085)	(2.775)	(0.087)	(4.429)
GDP (ln)	0.207	-0.687	0.332*	1.481*
	(0.144)	(0.522)	(0.196)	(0.792)
MP (ln)	-0.119	0.206	0.810*	0.224
	(0.347)	(1.586)	(0.472)	(2.251)
GDPPC (ln)	-0.219	0.488	-0.505	-2.365***
	(0.211)	(0.794)	(0.406)	(0.915)
*EXPORTS*GDP (ln)*		0.076*		-0.083
		(0.041)		(0.063)
*EXPORTS*MP (ln)*		-0.033		0.010
		(0.128)		(0.173)
*EXPORTS*GDPPC (ln)*		-0.069		0.162*
		(0.067)		(0.084)
HIGHTECH	-0.012	-0.015	0.010	0.002
	(0.014)	(0.013)	(0.017)	(0.016)
RESOURCE	0.028***	0.030***	0.041***	0.045***
	(0.006)	(0.006)	(0.009)	(0.008)
ETHNICITY	1.609**	2.155**	0.943	1.861
	(0.797)	(0.923)	(2.076)	(2.220)
IFDI (ln)	0.226**	0.206**	0.028	-0.010
	(0.097)	(0.096)	(0.106)	(0.101)
INST	0.031	0.129	0.464	0.776*
	(0.316)	(0.313)	(0.546)	(0.449)
DISTANCE (ln)	-1.280**	-1.122**	-3.626***	-3.898***
	(0.503)	(0.522)	(0.836)	(0.845)
CONTINGENT	1.324*	1.032	1.099	1.150
	(0.715)	(0.741)	(1.041)	(0.939)
F-test (p-value)		*EXP*: 0.014		*EXP*: 0.006
		GDP: 0.046		*GDP*: 0.004
		MP: 0.832		*MP*: 0.494
		GDPPC: 0.225		*GDPPC*: 0.006
Hausman (p-value)	0.134	0.171		
AR(2) (p-value)			0.195	0.142
Sargan test (p-value)			0.849	0.933
No. of observations	323	323	221	221
No. of economies	92	92	77	77

Note: Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.10. Year dummies are included but not reported. 'RE' and 'A-B' represent the random effects estimation and Arellano-Bover estimation, respectively. The F-test checks the joint significance.

5.5 CONCLUSION

This chapter provides empirical evidence for the motivations behind China's outward FDI from 1994 to 2008. Based on panel data, we disentangle causal effects by using the GMM methodology and some interesting interactions. We find that the relative importance of host country characteristics in attracting FDI from China has changed over time. First, cheap labor has a smaller impact on China's FDI in recent years than in the 1990s. This suggests a trend of Chinese investment towards higher value added production. Second, since 2001 transaction-enforcing has become the most significant motivation driving Chinese firms going abroad. The results show that Chinese firms engage in FDI to facilitate Chinese exports and enlarge market shares in host countries. Third, horizontal FDI hypotheses on local and regional market size fit better into the recent period. One explanation is that the proportion of state-owned firms, not only driven by profit maximization, in total Chinese outward investors is declining.[32] Fourth, natural resource seeking motive has become more and more important as China's growth has more and more come to rely on the stable supply of energy and minerals (UNCTAD, 2006). Fifth, after a period in which Chinese multinationals followed the government's instructions to choose FDI destinations, they have started building bilateral FDI networks of their own. Sixth, institutional quality in the host country has become increasingly important for catching China's FDI. This finding to some degree contradicts to the point of some popular press that FDI from China 'buys' political support in developing countries. Last, we find no significant link between host technology intensity and China's outward FDI, so that there is no evidence in our data for the emergence of the strategic asset seeking motive.

Hence, it is implied that China is on the following investment development path. The first stage for Chinese firms being integrated into the international economy begins with exports and inward FDI in labor intensive production. Such external linkages provide firms in these sectors, mainly government-owned, opportunities to leverage their competitive advantages and become the first foreign investors. To benefit from their ownership advantages, in this phase Chinese multinationals target other developing countries or countries of lower stages of development. In the second stage, to deepen commitment in foreign markets, Chinese firms invest in important

[32] According to the annual *Statistical Bulletin of China's Outward Foreign Direct Investment*, the proportion of state-owned corporations decreases from 43 percent in 2003 to 16 percent at the end of 2008.

export destinations to facilitate trade. Meanwhile, outward FDI goes to the source countries of China's inward FDI (mostly developed countries) to strengthen and expand foreign linkages. From these early investment experiences, Chinese firms then are able to enhance their capabilities and enter a new stage of foreign investments. This is a period when Chinese investors start local manufacturing to reduce various trade barriers, seek strategic assets to increase ownership advantages, and further leverage competitive advantages with a stable supply of natural resources.

Five observations are offered regarding the limitations of this study and suggestions for further research. First, our research is to a large extent restricted by data availability. The main measure of China's outward FDI for 1994-2005 only represents FDI outflows approved by the government authorities. Critics therefore might argue that the approved FDI may be distorted by the political process and not driven by market forces alone. This leads us to interpret the results with caution. However, we hope to stress that in China the role of the state is large and restrictions on cross-border capital movements are severe. Hence, our study offers valuable information on FDI determinants in a large number of host countries for a long period of time. Furthermore, since there are no data disaggregated both by country and by industry, hypothesis testing for different FDI motivations across sectors mainly depends on country studies and is not emphasized in this chapter. Based on the overall trend of China's FDI drawn here, one may dig deeper into industry heterogeneity in future research.

Second, we are not able to present more details for some special host economies. It can be argued that China's FDI in Hong Kong, Macao, and Taiwan is of a different nature than other Chinese investments. For example, FDI towards these economies focus much more on services and rely more intensively on ethnic connections. For future research, using updated sector-level or firm-level series we may obtain a more complete understanding of Chinese investment after the return of Hong Kong and Macao.

Third, we have tested the hypothesis on ethnic connections using a dummy variable of Chinese speaking population in the host country. However, there is another important dynamic channel through which Chinese firms can establish global business networks. Overseas investments are usually accompanied by migration outflows, which sequentially generate more outward FDI in the future. In addition to a direct impact on income, international labor migration has important externality

effects on cross-border investments. Skilled migrants may start their own businesses in the host country, in which their development is not restricted by highly controlled economic and political system at home. Moreover, Chinese migrants promote FDI from China because they build networks to lower communication barriers, obtain information and knowledge, and reduce transaction costs. With more detailed data on emigrants, one promising future research project is to investigate the link between migration and outward FDI from developing countries.

Fourth, this chapter and some previous empirical studies (e.g. Buckley et al., 2007) do not find evidence for significant technology variables. Nonetheless, it is too soon to jump to the conclusion that Chinese multinationals have not been motivated to seek strategic assets. The acquisition of proprietary knowledge might take place in a more complicated way than expected. It depends on many other related factors, such as institutional quality in the host country and absorbability capacity in the home country. In addition, most knowledge seeking FDI is in the form of M&A, which is not well captured by the aggregate data. Hence, it would be worthwhile to take a further look at this issue with improved models and firm-level information.

Last, we have focused on the locational determinants of FDI, thereby degrading a large literature that deals with the internal dynamics of foreign investment (for surveys see: Dunning, 1981; Riemens, 1989). In this respect, FDI follows a specific path that can be linked to stages of a country's economic development. As mentioned earlier, Liu et al. (2005) investigate the internal determinants of FDI for China. They conclude that the country is following an investment pattern that is highly influenced by its rising GDP. We implicitly cover this issue in this study by analyzing the dynamics of FDI motivations. However, as we move forward with our research on this topic, it may be of interest to consider more possibilities of merging the strand of literature on host country determinants with an updated analysis of home country 'push' factors.

SUMMARY AND CONCLUSIONS

I have started this thesis by raising three questions concerning the development of emerging markets. First, what is the causal linkage among institutions, external trade and foreign investment, and economic development? Second, given a limited number of emerging economies, how can we use regional differences within these countries to test theories of FDI? Third, what can we add to the FDI literature with discussion on a changing of the tides, in which an increasing share in global FDI originates *from* the developing world? Using country-level and region-level panel data, this thesis empirically investigates the interaction between institutions and foreign investments, so as to reveal a relatively complete picture of recent international trade and investment patterns. In this concluding chapter, I first list the results of the study, then move to how these findings can be used to give guidance on the three issues, and finally explore new research direction that should enhance our knowledge on trade, investment, and growth of emerging markets.

After the introduction to the thesis and background theory, Chapter 2 empirically investigates the relation between institutional quality and outsourcing to developing economies. To examine the within-country time trend, in contrast to previous cross-sectional studies, this chapter constructs a time-varying industry-based outsourcing proxy for 89 countries over 25 years (1980-2004). The resulting panel data allow us to identify the causal relationship by controlling for the fixed effects and dynamic factors. I find a significant positive effect of local institutional improvements on outsourcing within lower-middle income countries. In low, upper-middle, and high income developing countries, institutional quality is not an important determinant of international outsourcing.

The factors which cause the endogeneity of institutions are further explored in Chapter 3. I argue that good institutions are supplied by government, for which proper incentives should be provided. With the help of a theoretical model, I analyze the relation between rent sharing in an international equity joint venture and local public goods provision. In the model, the local government faces a commitment problem to provide public services ex post to the set-up of the firm. I show that to overcome such a dual agency problem, the multinational leaves more rents to the local partner than in the first-best, so as to provide stronger incentives for the local government to supply

public goods. However, when multiple foreign firms enter in joint production arrangement with local firms, there arises a double moral hazard problem which causes under-provision of local rents and under-provision of public goods. In this case, stringent local content requirements may internalize the common pool problem and alleviate the negative externality. Applying dynamic panel data estimation, I test the trade-off between local public goods and ownership shares across Chinese provinces to find support for our mechanism. There is some evidence that the endogenous institutions are partly explained by regional disparities in FDI flows and the behavior of foreign firms.

Again using regional data, Chapter 4 uncovers what underlying factors cause the uneven regional distribution of FDI across Chinese provinces from 1995 to 2006. To analyze which theories perform best in explaining FDI patterns in emerging markets, I first perform a factor analysis to summarize information embodied in around forty variables and derive four FDI determinants: 'institutional quality', 'labor costs', 'market size', and 'geography'. Applying these estimated factors, I then employ IV estimation to account for endogeneity. In line with theoretical predictions, I find that foreign firms invest in provinces with good institutions, low labor costs, and large market size. The Arellano-Bond dynamic panel GMM results show strong agglomeration effects that multinationals tend to invest in provinces which attract other foreign firms, consistent with the economic geography literature. Several robustness tests indicate that low labor costs combined with improvements in institutions are the key for attracting FDI in China.

Chapter 5 empirically investigates the motivations behind China's outward foreign direct investment (FDI) from 1994 to 2008. Based on the literature review, I test several hypotheses: transaction-enforcing FDI to complement exports, horizontal market seeking FDI, resource seeking FDI, efficiency seeking FDI, psychic distance linked FDI, and the relation between institutions and FDI from China. Using the random effects estimation and Arellano-Bover GMM dynamic panel estimation, I account for endogeneity issues due to unobserved country-specific factors and reverse causality. I find that in the 1990s low wage rates are important to attract China's FDI. However, transaction-enforcing has become the dominant motivation in recent years. Furthermore, over time Chinese multinationals invest more in countries with larger domestic and regional markets, larger natural resource endowments, higher volumes of FDI flows towards China, as well as better institutions.

Although this thesis offers a large spectrum of empirical results, what are the main conclusions when the dust settles? With respect to the issue of institutions as a deeper cause of economic development through trade, some skepticism is in place. I find that competitiveness in low labor costs and 'hard' institutions such as infrastructure are important preconditions to attract FDI. However, when countries upgrade to activities which have higher value added, 'soft' institutions such as the rule of law and containment of corruption start to matter more. Further, this thesis provides evidence that improvements in institutions are caused by incentives offered by foreign firms. The overall picture is that foreign companies enter developing countries for cost motives, which improves first 'hard'- and then 'soft' institutions, and in turn allows some countries to upgrade to higher value added activities through outsourcing more and more complex tasks to them.

In line with the cross country study, such trade and investment patterns are also found at the regional level within emerging markets. In this thesis, I have mainly focused on China, as the large variety in regional characteristics across Chinese provinces has enabled me to analyze the distribution of inward FDI in more detail. In the chapters that deal with regional disparities, I find that initially low labor costs are of prime importance to attract FDI. This may partly explain why more and more inland regions are explored by foreign investors in search of cheap labor. To efficiently exploit low labor costs, local transportation and communication infrastructure then becomes important FDI determinant. For the more advanced regions, I find that institutional quality, such as rule of law and contract enforcement, has been increasingly crucial to attract FDI. In the future, it would be interesting to investigate whether these results can be extended to other large emerging markets that have more recently jumped to a high growth path, such as Brazil, India, and Russia.

Moreover, in spite of some unique FDI characteristics, following the thesis the investment development path in emerging markets may bear some resemblance to the above investment pattern for firms from advanced economies. When focused on China, my analysis supports the following dynamics of external orientation of emerging markets. In a first stage, inward FDI and domestic production concentrates in labor intensive production which mainly results in exports. When export and the economy start growing, the first wave of outward foreign direct investments comes from the companies that are linked to the world economy as the 'suppliers' of these export industries. In particular, these multinationals are often public firms which have

comparative advantages in natural resource and low value added manufacturing. In the next phase, outward FDI follows exports to serve customers in important foreign markets. Global linkages and networks then leverage emerging firms to create their own competitive advantages, so as to move to more knowledge intensive production. Therefore, it would be expected that in a later stage new markets for higher value added products and 'soft' institutions are becoming more and more important.

To summarize, the global trade and investment patterns are to a large extent determined by the process of upgrading to high value added production in emerging markets. Specifically, comparative advantages in cheap labor and resource are crucial for mass manufacturing, while institutions (first 'hard' infrastructure and then 'soft' governance) are the key to attract higher value added deals. Hence, rather than have completely different patterns, emerging and advanced economies are at different stages of similar investment paths, given different types of products in which they specialize. However, there is a unique feature of the investment development pattern for firms from emerging markets: they can be leveraged by external linkages (via inward FDI and trade) and learn to build up their own ownership advantages. Regarding the development of emerging markets, at the current stage local infrastructure is the main determinant of FDI and therefore the level of income. As firms upgrade to the high end of the production lines, 'soft' institutional quality is becoming a new source of comparative advantage across emerging economies. Clearly, these findings in themselves may come as no surprise, it is the systematic evidence provided in this thesis that stands out.

Can traditional theory based on advanced economies' experience explain new trade and FDI patterns in emerging markets? The answer, concluded from this thesis, is 'no' in the absence of theoretical modifications and empirical innovations. First, motivations for international trade and foreign investments have been changing over time. With rapid economic growth and industrialization process, emerging markets are capable of developing new comparative advantages other than low labor costs to attract higher value added deals. Especially, institutional quality such as government performance, property rights protection, rule of law, and control of corruption, which drew relatively little attention in previous studies, needs to be emphasized. Second, local characteristics are essential to verify general international economic models. Though share some common properties like enlarged domestic demand, emerging economies differ dramatically in terms of geographic location, culture, and

government policies. Such heterogeneities therefore require sufficient local knowledge to develop country-specific models. Third, multinationals from emerging markets may be driven by different motives compared to firms from developed countries. For example, still at the stage of much more FDI inflows than outflows, emerging economies may establish strong FDI bilateral relations. Also, dynamic institutional changes in these transitional countries may give rise to structural breaks in their outward investment patterns. Fourth, poor data availability and lack of measurement in emerging economies make it difficult to validly test trade and FDI theories. In particular, given limited industry or firm-level panel data, how to efficiently exploit aggregate data is of special importance in hypothesis testing.

This thesis tries to fill in the gap between the existing literature and new facts in globalization. Each of the main chapters is focused on one specific form of international trade and investments – offshore outsourcing in Chapter 2, international contracting in Chapter 3, inward FDI in Chapter 4, and outward FDI from China in Chapter 5. However, it inevitably suffers from some theoretical and empirical limitations. The first missing element is firm heterogeneity. From previous studies (e.g. Melitz, 2003; Grossman and Helpman, 2004; Antràs and Helpman, 2006), we have known that firms with different productivity or in different sectors have different preferences for internalization and outsourcing. Yet, based on regional or country-level data, this thesis is constrained to reveal the impact of industry characteristics on globalization and the sorting patterns of heterogeneous multinationals. Furthermore, for simplicity some interesting factors are assumed away. For example, emphasizing government commitment and moral hazard, Chapter 3 leaves aside another important reason for contract imperfection – uncertainty. To be specific, our mechanism does not cover the probability of occurrence of a certain event and payoffs are not linked to issues like demand volatility, contract enforcement, and renegotiation. In addition, though efforts have been devoted to show empirical evidence for emerging economies, the thesis is disadvantaged by data problems. One weak point is the short dimension of time series. Even though I could justify the selection of certain periods with research purpose and data availability, limited yearly data cast some doubt on the robustness of dynamic patterns identified. Another worry is the quality of data published by local authorities. Since it is a challenge to obtain statistics consistent over time and with international standards, the explanatory power of our empirical results is limited.

Bearing in mind these limitations, a better understanding of the contribution of this thesis is that it adds several missing parts to the existing literature and more importantly opens up some interesting discussions on emerging markets. The first issue which deserves more research attention is industrial organization. Investing in emerging markets requires strategic considerations on the role of local government, as shown in Chapter 3, since most developing countries still lack efficient market mechanisms and usually have strong government interventions. Therefore, improving the institutional and legal framework is crucial to enhance a country's comparative advantage. Illustrations can be found in Chapter 2 on international outsourcing at the country level and Chapter 4 on inward FDI at the region level. However, more questions have been raised rather than answered in this field. For instance, how does the entrance of foreign investors change local competition and performance of domestic firms? What is the relation between the legal system and M&A which rely on regulations and laws? What are the interactions between institutional changes and the structure of markets? What is the influence of institutional improvements on multinationals' decisions over different modes of internationalization? All these problems need to be further addressed in future studies.

Second, as growth is regarded as a cause and meanwhile consequence of foreign trade and investments, we need to be cautious when it comes to the related dynamic and causal relations. With respect to the link between the internal development path and economic globalization, an interesting paradigm in this thesis is that economic growth due to exports and the follow-up multinational investments could push the country's outward FDI to the next level. Further, one may put more efforts to study regional development and urbanization in emerging markets under the integrated economic and financial framework. Take China as an example, the fact that FDI concentrates in coastal provinces raises the question why capital flows to locations with high wage rates. Chapter 4 of this thesis has provided one explanation that poor physical infrastructure in the Western and Central regions hampers FDI inflows. However, the story does not end here and in fact we are faced with more unsolved problems. Government investment in local infrastructure not only changes foreign investment patterns, but also shapes the urbanization patterns. Improving local conditions in transportation, energy consumption, and housing could attract people to the region and sequentially change the labor costs. Therefore, how to deal with

interactions between various economic aspects is a big challenge for policy makers in emerging economies.

Another observation in emerging markets is the role of knowledge and technology. Evidence in Chapter 2 shows that emerging economies (mostly lower middle income countries) have a unique comparative advantage in attracting outsourcing, as institutional quality matters for higher value added or more knowledge intensive transactions. This implies that these fast-growing countries are moving from raw material production to more skill intensive manufacturing, accompanied with a series of social transforms toward marketization. There is no doubt, given the importance of technology innovation in economic development of emerging countries, issues like relations between knowledge and productivity, innovation and internationalization, as well as intellectual property rights protection and international knowledge transfer will receive large amounts of attention.

Generally speaking, what is the right way to go for future research? In my opinion, the foremost step is to formulate meaningful and proper research questions for emerging markets. One needs to distinguish between what matters for developed countries and what are major issues for emerging economies. This requires adequate knowledge on local social environment, institutional framework, policy development, and other factors which shape economics. A macro-perspective is therefore essential to capture the economic landscape and chief structural changes. For example, horizontal FDI may become more significant and the focus of future studies, given the fact that the rapid economic growth makes emerging economies more important as foreign markets rather than parts of the vertical chain of international production, and that market seeking is a critical motive for the increasing outward FDI flows from emerging markets.

Second, country-specific factors raise the importance of comparative study. Commonality among emerging markets is critical to understand the overall trend, as emphasized in this thesis, yet local characteristics are the key to explore the details of current trade and investment patterns. For example, China and India present dramatic differences in the nature of FDI and outsourcing deals: China is competitive in labor intensive manufacturing production, while India has developed into a world IT and business outsourcing centre. Cross-country variation can be very large, so that country studies are crucial to draw policy implications and test whether mechanisms presented

in this study could be applied to other large emerging economies such as Russia, Brazil, and South Africa.

Third, since in many cases research activities are fenced by data availability, to obtain innovative results one needs to effectively use firm-level data collected by the world organizations like the World Bank and be prepared for creating his own dataset at the firm level. In addition, it is necessary to carefully diagnose data before running any regression, especially for statistics published by local authorities. As in Chapter 5, results could be misleading without the correct understanding of the dependent variable which is the FDI outflows approved by the government.

Last, multidisciplinary research could contribute to establishing more comprehensive models and generating more precise measures. A case in point is how to define and proxy institutions. Political theories argue that institutions are built to control assets and determine who is in power, whereas the economic and cultural theories of institutions focus on the economic and social causes. Hence, studies in law, politics, and sociology all help to better investigate the relation between institutional quality and international economics. More importantly, it was time to fully exploit and combine advantages of macro-driven international economics and micro-driven international business studies. One may further explore the link between international economics and other economic fields such as economic geography, macroeconomics like the theory of comparative advantage, and microeconomics like the principal-agent theory. As shown in this thesis, bringing together different research dimensions is a promising direction to proceed.

NEDERLANDSTALIGE SAMENVATTING

Deze dissertatie behandelt drie vragen met betrekking tot de ontwikkeling van opkomende markten. Ten eerste, wat zijn de causale verbanden tussen internationale handel, buitenlandse directe investeringen (FDI) en economische ontwikkeling. Ten tweede, gegeven dat er slechts weinig opkomende markten zijn, op welke wijze kunnen regionale verschillen binnen opkomende markten gebruikt worden voor het empirisch toetsen van theorieën die de relatie tussen FDI en economische ontwikkeling van opkomende markten trachten te verklaren. Ten derde, op welke wijze valt de toenemende stroom van FDI vanuit opkomende markten richting de rest van de wereld te verklaren. Het uiteindelijke doel van de dissertatie is door middel van empirische studie de interactie tussen internationale contractuele handelsstromen (outsourcing), FDI, de opbouw van instituties, en economische ontwikkeling bloot te leggen.

Na een introducerend hoofdstuk behandelt het tweede gedeelte van de dissertatie de samenhang tussen de kwaliteit van lokale instituties en outsourcing van productie. Om gebruik te maken van trends binnen landen wordt eerste een maatstaf voor outsourcing gecreëerd die varieert in de tijd, en wel voor 89 ontwikkelingslanden gedurende 25 jaar (1980-2004). Met als doel de endogeniteit van institutionele ontwikkeling te ondervangen, worden vervolgens paneltechnieken - die controleren voor *fixed effects*, dynamische factoren en gebruik maken van interne instrumenten - aangewend voor het vinden van de causale relaties. De resultaten laten zien dat verbetering van institutionele kwaliteit vooral een positief effect heeft op outsourcing in ontwikkelingslanden met een gemiddeld inkomensniveau. Voor zowel ontwikkelingslanden met een relatief laag als met een relatief hoog inkomensniveau heeft een verbetering van instituties geen effect op het aantrekken van economische activiteit uit het buitenland. De resultaten suggereren dat voor laagwaardige productie zoals assemblage lage lonen belangrijker zijn dan de contractuele omgeving, terwijl voor hoogwaardige outsourcing vooral de ontwikkeling van de beroepsbevolking zelf een rol speelt naast het feit dat ondernemingen uit deze landen reeds een reputatie hebben op te houden. Echter, voor het middensegment van landen leidt verbetering van instituties tot een toename van outsourcingsactiviteit. De suggestie in de data is dat als landen hun pure concurrentiekracht op basis van loonkosten verliezen, dat het

dan belangrijk wordt de institutionele kwaliteit te verbeteren om zo meer hoogwaardige productie aan te trekken.

Hoofdstuk 3 gaat op zoek naar de oorzaken van endogeniteit van lokale instituties. De kern van het betoog is dat instituties worden 'aangeboden' door lokale overheden, die daarvoor de juiste prikkels moeten hebben. Met behulp van een theoretisch model wordt de relatie tussen de manier waarop joint ventures worden opgezet en de prikkels voor lokale overheden blootgelegd. In het model heeft de lokale overheid een probleem zich te commiteren bij het produceren van lokale publieke goederen die de productie van de joint venture ondersteunen. In een dergelijke duale-agent structuur laat de buitenlandse onderneming een grotere winst aan de binnenlandse partner, met als doel een prikkel te geven aan de lokale overheid tot het verbeteren van de lokale publieke ruimte. Echter, als meerdere buitenlandse ondernemingen actief zijn ontstaat een *moral hazard* probleem omdat elk van de buitenlandse ondernemingen zal proberen te free-riden op de prikkels van andere ondernemingen. Dit heeft tot gevolg dat lokale ondernemingen een te laag aandeel in de winst krijgen en de lokale overheid te weinig geprikkeld wordt tot het verbeteren van lokale voorzieningen. In een dergelijke situatie kunnen bijvoorbeeld regels die een minimum aandeel van lokale ondernemingen bij wet vastleggen ook gunstig uitpakken voor buitenlandse investeerders, omdat ze het coördinatieprobleem tussen hen verminderen. In het empirische gedeelte van het hoofdstuk wordt de relatie tussen het aandeel van lokale ondernemingen en het aanbieden van lokale publieke goederen onderzocht in de context van China. De resultaten laten zien dat verschillen in lokale publieke goederen gedeeltelijk kunnen worden verklaard door de verschillen in het aandeel van binnenlandse ondernemingen in de opbrengsten van joint ventures.

Regionale data voor China worden opnieuw gebruikt voor het vinden van de onderliggende factoren die de ongelijke regionale verdeling van buitenlandse investeringen in China kunnen verklaren. Om te onderzoeken welke theorieën deze regionale verdeling van FDI het beste verklaren, wordt eerst een factoranalyse uitgevoerd welke de informatie van 40 variabelen systematisch aggregeert in vier determinanten: institutionele kwaliteit, effectieve arbeidskosten, marktomvang en geografische kenmerken. Hierna wordt een IV schatting gedaan met als doel de endogeniteit in de data te ondervangen. Ook deze schattingen laten zien dat de kwaliteit van instituties, marktomvang en effectieve arbeidskosten van belang zijn voor het aantrekken van buitenlandse investeringen. Verder, de dynamische Arellano-

Bond panelanalyse laat zien dat er sterke agglomeratie-effecten zijn, waarbij nieuwe investeerders zich vooral richten op regio's waar reeds veel andere buitenlandse investeerders zijn gevestigd. De robuustheidanalyse laat zien dat vooral de interactie tussen effectieve arbeidskosten en de kwaliteit van instituties belangrijk is voor het aantrekken van FDI.

Hoofdstuk 5 analyseert de complexe motieven voor buitenlandse investeringen *uit* opkomende markten, met een speciale focus op China. Op basis van een overzicht van de bestaande literatuur wordt in dit hoofdstuk een zestal hypotheses getest. De resultaten laten zien dat de buitenlandse investeringen van Chinese bedrijven in de eerste fase (tot het jaar 2000) zich vooral richten op ontwikkelingslanden en op landen waarnaar Chinese bedrijven veel exporteren. In de loop van de tijd verleggen de investeringsstromen zich richting belangrijke ontwikkelde landen, met als doel die actief te penetreren en naar landen die over veel natuurlijke hulpbronnen beschikken. Recent zijn er enige aanwijzingen dat Chinese investeringen meer gaan naar landen met sterke instituties, wellicht in verband met de hoge innovatiekracht in deze landen en zo het verkrijgen van intellectueel eigendom.

De dissertatie presenteert een breed scala aan empirische resultaten, maar wat is de rode lijn? Met betrekking tot het belang van instituties voor het aantrekken van buitenlandse investeringen en economische ontwikkeling is enige terughoudendheid op zijn plaats. Door de dissertatie ademt dat vooral lage effectieve arbeidskosten en harde instituties zoals infrastructuur van belang zijn voor het aantrekken van buitenlandse investeringen. Echter, willen opkomende markten zich doorontwikkelen naar hoogwaardige productie, pas dan worden zachte instituties zoals het beschermen van eigendomsrechten belangrijk. Daarnaast laat de dissertatie zien dat instituties sterk endogeen zijn en onder andere juist afhankelijk van de prikkels die buitenlandse investeerders met zich meebrengen.

Een soortgelijke conclusie valt ook te trekken als wordt gekeken naar de verschillen in regionale ontwikkeling binnen China. Ook hier wordt gevonden dat vooral effectieve loonkosten initieel belangrijk zijn voor het aantrekken van buitenlandse investeringen. Dit is wellicht ook de drijfveer achter de beweging van buitenlandse ondernemingen om steeds meer in het westen en noorden van China te investeren. Ook hier laten de data zien dat het voor de meer ontwikkelde regio's in de tijd het verbeteren van harde en zachte instituties belangrijker wordt bij het aantrekken van nieuwe buitenlandse investeerders. Uiteraard zou het in de toekomst

interessant zijn te kijken of deze resultaten ook opgaan voor andere opkomende markten als Rusland, India en Brazilië.

Voor uitgaande investeringsstromen van opkomende markten vindt de dissertatie dat er een grote overeenkomst is met de historische ontwikkeling van reeds ontwikkelde landen. In een eerste fase leidt een toename van de instroom van buitenlands kapitaal tot een sterke toename van contractuele export. Uiteraard vooral binnen de buitenlandse ondernemingen die veel in China hebben geïnvesteerd, maar in toenemende mate leidt laagwaardige maar goedkope productie door de Chinese toeleveranciers ook tot export naar ontwikkelingslanden, waarvoor de lage prijzen van Chinese goederen interessant zijn. In de fase daarna wordt het versterken en verdiepen van de committent tot exportmarkten door middel van buitenlandse investeringen van groter belang. In de fase weer daarna worden investeringen strategisch, in de zin dat zij proberen nieuwe markten aan te boren en de toegang tot natuurlijke hulpbronnen trachten te versterken.

De dissertatie laat ook zien dat de huidige theorieën van buitenlandse investeringen - die zich vooral richten op stromen tussen ontwikkelde landen - moeten worden gemodificeerd als ook de stromen van en naar opkomende markten ermee moeten worden verklaard. Ten eerste is in noord-zuid investeringsstromen de diversiteit in arbeidskosten en instituties tussen landen en regio's in het zuiden van groot belang. Ten tweede zijn er grote regionale verschillen binnen opkomende markten terwijl dit binnen ontwikkelde landen minder het geval is. Ten derde kunnen de motieven van ondernemingen uit opkomende markten om over te gaan tot internationalisering verschillen van die uit ontwikkelde landen, vooral als het gaat om zuid-noord investeringen. Dit alles leidt tot de conclusie dat de dissertatie pas één van de eerste stappen is die systematisch het investeringsgedrag van en naar opkomende markten in kaart brengt, zodat er op dit terrein nog veel werk verricht zal worden.

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