THREE ESSAYS ON COUNTRY RISK, PRODUCTIVITY, AND OUTWARD DIRECT INVESTMENT FROM DEVELOPING ECONOMIES

by

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ABSTRACT

During the last decade, the growth rate of outward foreign direct investment (FDI) from developing and transition economies has been outpacing that from developed economies. Their investment in other developing countries represents a burgeoning instance of South-South cooperation. The three essays in this dissertation examine the key issues and potential challenges of South-South FDI.

The first chapter observes the growing importance of South-South FDI flows. With the drying up of outward FDI flows from developed countries since the financial crisis, the importance of investment from other developing countries increased and accounted for an estimated 34% of the world's outward FDI in 2010, compared with 25% in 2007. A large share of outward FDI stock from developing and transition economies is concentrated in the services sector. The nature of multinational companies (MNCs) is also changing with an increasing number of countries in developing and transition economies hosting such companies. When Southern MNCs invest abroad, they rarely have access to proprietary assets such as technology, financial capital, brands, and technical know-how. They are able to catch up with Northern MNCs through strategic and organizational innovations. They have greater access to network capital suitable for developing country markets. This network capital might include information on supply lines, local financing, local tastes, bureaucratic procedures, minimizing transaction costs, and other local idiosyncracies. The establishment size of Southern MNCs tends to be on average much smaller than the establishment size of Northern MNCs. Southern establishments are also comparatively less productive and tend to pay lower wages than Northern establishments.

Until recently, the parsimonious explanation for the scarcity of capital flows to developing countries ranged from human capital to institutional risk. Although the expected return on investment might be high in many developing countries, it does not flow there because of the high level of uncertainty associated with those expected returns. The second chapter sheds light on the question to what extent the alternative explanations of Lucas

paradox holds particularly for South-South FDI. Using a bilateral panel data set, I estimate an augmented gravity model using the Poisson pseudo-likelihood estimator. The empirical evidence suggests that per capita income, human capital, and average institutional quality are not important variables explaining South-South FDI. Asymmetric information as proxied by the weighted distance variable is highly significant. Southern MNCs underinvest in markets that are remote and where access to network capital and accurate and timely local information is difficult. Southern MNCs require network capital and local host country information to overcome their disadvantage in proprietary assets. Therefore, information asymmetry may be a greater concern to Southern MNCs than human capital or institutional risk. Lastly, South-South FDI is also more sensitive to natural resource endowments and regional free trade agreements than North-South FDI.

Recently policymakers in developing countries have encouraged South FDI as a means to encourage productivity growth and technology transfer. However, Southern MNCs seldom have proprietary assets that foster positive externalities and contribute to productivity spillovers. Chapter 3 investigates the contribution of Southern FDI in enhancing efficiency in Rwanda. Based on a sample of 6,707 private sector firms, the quantile regression technique is employed. By estimating quantile regressions, I am able to test for differences in productivity and productivity spillovers by North and South FDI across the productivity conditional distribution. The results suggest that productivity in Rwanda is improved with the entry of both North and South FDI. However, the effect North FDI on productivity is stronger than that of South FDI. Moreover, productivity spillovers stemming from South FDI are limited to low productivity local firms, which suggests that any efforts to attract South FDI should take into account the policy objectives of an economy as well as the firm productivity distribution involved.

For my parents, Iffat and Wajahat. And my lovely wife, Gulfishan.

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CHAPTER 1

THE ANATOMY OF FOREIGN DIRECT INVESTMENT FROM THE SOUTH

1.1 Introduction

Foreign direct investment (FDI) serves as one of the main vectors of globalization that has grown in importance over the past decade (Jones, 2005). The growth of FDI has overshadowed that of trade flows in the globalization period. FDI remains the largest component of gross capital inflows. The surge in FDI over the years has not been matched by a corresponding surge in portfolio equity or debt flows (see **Figure 1.1**). [1] Multinational corporations (MNCs) have played a major role in the economic transformation of developing countries over the past two decades. FDI has provided developing countries with a substantial infusion of capital, technical know-how, and new technology from abroad. FDI creates a more competitive goods market and forces domestic capital markets to function with greater efficiency (Calvo & Frenkel, 1991). In terms of macroeconomic stabilization, the inflow of capital generated by FDI improves the balance of payments position of the host country and expedites debt repayment (McMillan, 1993).[2]

Moreover, the inflow of FDI may prevent a "brain drain" from low-income countries, as greater levels of physical capital enable these countries to utilize their relatively high level of human capital more efficiently. The increases in FDI have contributed to positive externalities leading to spillovers benefiting developing country firms. In this process, developing country firms have amassed the necessary capital, knowledge, and know-how to invest in other developing countries. This rise of South-South FDI from developing

[1] There was a broad decline in gross capital inflows across asset types during the 2010–15 slowdown. However, gross outflows across all asset types increased, except for the sharp reversal in 2015. Changes in gross capital inflows and outflows were more pronounced for debt-generating flows than for equity-like flows.

[2] In the short and medium run, FDI subsidiaries often import equipment from the parent company, which may result in trade deficits until the subsidiaries begin exporting.

countries to other developing countries represents a significant reversal from the one-way flow of foreign capital from North to South. South-South FDI has grown five times faster than conventional North-South investment (Margolis, 2006). In 2013, there were 9 developing country MNCs among the 100 largest MNCs in the world as measured by foreign assets (UNCTAD, 2014; see **Table 1.1**).

The earliest sources of South FDI dates back to the pioneering experience of Argentine firms operating in neighboring countries as early as in 1910 (Kosacoff, 2001). There were also about 100 pre-World War II Chinese firms operating abroad (Aykut & Goldstein, 2006). It is only since the late 1980s that an increasing number of developing countries and transition economies, including China, India, Brazil, South Korea, Malaysia, and Turkey have become significant sources of outward FDI. Since the early 2000s, the growth rate of outward FDI from the South has outpaced the growth from the North. South FDI accounts for 34% of global outward FDI in 2014, up from 16% in 2008 (UNCTAD, 2014; see **Figure 1.2**). The surge in South-South FDI has motivated low-income countries to increase efforts to attract foreign investors. FDI from the South presents an opportunity to take advantage of new wealth and investment within the countries of the South, to mobilize it for further benefit of low-income countries, and in the process to further bolster Southern solidarity, empowerment, and development.

For a long time, South-South investment has remained a peripheral issue in the FDI literature. Since the earliest studies of Lecraw (1977) and Wells (1983), South FDI attracted interest from only a few academics or policymakers. Insofar as South FDI has become a permanent and sizeable feature of the global economy, it can no longer be ignored. The purpose of this chapter is to provide an introduction to some of the key issues regarding South-South FDI. We begin by examining the size, nature, and trends in South-South FDI. I pay particular attention to potential pitfalls of estimating South-South FDI flows. Then I explore the conceptual motivations and framework of South-South FDI. Lastly, I examine the establishment level differences between South-South FDI and the conventional North-South FDI.

An important purpose of this chapter is to provide a comprehensive overview of South-South investment flows. The findings highlight that the trend of South FDI will continue in the years ahead. Developing countries in Asia are the largest contributor to South FDI.

Conventional wisdom argues that a significant part of growth of FDI from the South has recently been driven by investment in natural resources. Interestingly, a large share of outward FDI stock from developing and transition economies is concentrated in the services sector. Moreover, prima facie evidence indicates that Southern MNCs are fundamentally dissimilar to Northern MNCs. Southern MNCs face a disadvantage in access to resources and proprietary assets. However, they have greater familiarity with business practices suitable for developing country markets. This familiarity gives them some advantage over Northern MNCs when investing in a developing country. Lastly, Southern MNCs are much smaller than Northern MNCs. They tend to have fewer employees and lower productivity. They also have a lower capital-labor ratio than Northern MNCs.

Understanding the role of the South as a source of FDI is useful for several reasons. First, the growing importance of South-South FDI flows indicates that developing countries are more financially integrated with one another than previously believed. Second, South-South FDI may follow cycles different from the ones followed by North-South FDI. For example, the relative resilience of the FDI flows to sub-Saharan Africa region is partly supported by the rise of South-South investment particularly from Asian countries such as China, Malaysia, and India. Southern MNCs have lower overhead costs and possess more expertise in dealing with imperfect institutions (Dixit, 2012; Wells, 1983). Finally, the expansion of South-South FDI may require countries to implement investment promotion policies that target MNCs from the South.

The chapter proceeds as follows. Section 1.2 operationalizes the definition of the "South" and describes data limitations. Section 2.3 describes the trends in South-South FDI. Section 2.4 examines the motivations and strategies that Southern MNCs have pursued. Section 2.5 presents the establishment-level characteristics of Southern MNCs. Section 2.6 concludes.

1.2 Definition and some notes on data

Before I proceed, a few caveats that have a bearing on the analyses and how they will be addressed are in order. The caveats relate to definitional and measurement issues, terminology used, and systematic bias.

1.2.1 Definition of the "South"

It is difficult to operationalize the definition of "South." There is no single definition of "North" and "South." The terms "North" and "South" have been used casually in the literature to denote the developed countries and the developing countries, respectively. The definition of North used in this dissertation follows the UNCTAD (2005) country classification. The donor countries belonging to the Development Assistance Committee (DAC) plus Greece and Ireland are classified here as being in the North. Conversely, UNCTAD (2005) included Hong Kong (China), the Republic of Korea, and Singapore in the South, even though they are now net contributors to the World Bank Group and are no longer eligible for loans. The definition of South follows the UNCTAD (2005) country classification, which includes both developing countries and economies in transition. It is important to bear in mind these differences in composition.

1.2.2 Underreporting of FDI

Outward FDI from developing and transition economies may be underreported. Some developing countries do not identify outward FDI flows in their balance of payments statistics. Moreover, underreporting of outward FDI flows is pervasive, in particular, when MNCs attempt to avoid capital and exchange controls or evade taxes on the investment income. These problems stem from lax accounting standards and weak tax administration. There may be conceptual problems in identifying outward FDI. A foreign investor requires a 10% or more of equity ownership to qualify as foreign direct investor. It may be easier for a host country to determine whether a particular equity investment meets this criterion. As a result, the criterion may cause underreporting of outward FDI flows in the source country.

Inward FDI flows are also often underreported by host countries. Until recently, many countries did not observe the standard definition of FDI proposed by the International Monetary Fund (IMF) in the Balance of Payments Manual. For example, India's FDI statistics excluded reinvested earnings, intracompany loans from the parent companies to foreign affiliates, and investments by offshore and equity funds set up by foreigners (Unit, 2002). As the government of India adopted the IMF's definition of FDI, in 2003, it revised its inward FDI statistics upwards by more than $1 trillion. Indonesia's inward

FDI may also be underreported. Indonesia excluded reinvested earnings as FDI inflows. Over the course of 1998 to 2001, Indonesia's inward FDI flows were underreported and disinvestments (negative FDI flows) overreported.

1.2.3 Round-tripping of FDI

Many countries have embarked upon a series of policies aimed at attracting FDI. Some of these policies provide monetary incentives for foreign investors, including special and preferential treatment in taxation and a lax regulatory environment. The preferential treatment provides domestic investors the incentive to take capital across the boder and bring it back as inward FDI. For example, capital may exit the country in the form of bank deposits and return as FDI inflows. If round-tripping involves another developing country, then such flows would be included in estimates of South-South FDI, even though there is no net inflow into the developing country concerned. Most countries do not have consistent reporting on round-tripping, in which case it can affect the estimation of South-South FDI.

Let us consider the case of round-tripping between China and Hong Kong (SAR). Chinese FDI inflows surged during the 1990s in response to market reforms and incentives for FDI. The incentives included tax concessions, sovereign guarantees, and special arrangements on exchange controls. The preferential treatment is believed to have encouraged Chinese firms to move money offshore and bring it back to China disguised as FDI (Lardy, 1995; Sicular, 1998). For example, Chinese FDI inflows from Hong Kong (SAR) constituted nearly half of total FDI flows in 1996. The share declined to less than 40% by 2000 as Hong Kong (SAR) was repatriated to China. However, the decline was offset by a proportionate increase in FDI inflows from the British Virgin Islands. Some earlier studies have provided evidence that the FDI inflows from Hong Kong (SAR) and British Virgin Islands are highly correlated with outflows from China - mostly bank deposits held abroad by Chinese residents and errors and omissions in China's balance of payments.

1.2.4 Routing FDI through offshore financial centers

Capital outflows from offshore financial centers may be underreported in UNCTAD's World Investment Reports. Consider the US FDI statistics that distinguish between the two criteria: (a) residence of the firm and (b) the residence of the owners of a firm. For example, US FDI inflows from Switzerland were $56 billion in 2001. However, when the

residence of the owners was considered, FDI from Switzerland was close to zero. A large proportion of the investments reported as FDI from Switzerland actually originated in a third country and was channeled through Switzerland. Offshore financial centers may likely distort South-South FDI flows. An identical issue faced by the South-South FDI is when the North FDI is routed through locations in the South. Consider a case in which a US affiliate located in China undertakes FDI in Vietnam. It is difficult to separate this effect in the estimates of South-South FDI.

1.3 What are the trends?

South's outward FDI stock has grown rapidly in the past 15 years (UNCTAD, 2006). The outward FDI stock from the South grew from $147 billion in 1990 to over $5 trillion in 2014 (for details, see **Figure 1.1**),. The increase in outward FDI flows has followed a similar trajectory. South's average outward FDI flows was a little above $41 billion per year over the 1990s. It grew to $166 billion per year over the following decade. Developing and transition economies together accounted for 21% of the world's outward FDI stock in 2014, compared with 6% in 1990. Hong Kong (SAR), China, and Brazil had the largest outward FDI stock in 2014 (see **Table 1.1**). Most of these investments went to other developing countries. The outward FDI from transition economies has been languishing. Firms headquartered in transition economies have only recently become outward investors, though their presence has increased in Western Europe ever since the May 2004 EU enlargement. Among developing and transition economies, those in Asia remain by far the largest source of South FDI. Asia accounts for more than two-thirds of the South's outward FDI stock. The trend is primarily driven by China, Hong Kong (SAR), and Singapore.

The recent global financial crisis had reduced developing countries' outward investment in 2009, when FDI declined by 28% to $149 billion following a record $207 billion in 2008. Despite its severity, that decline was significantly below the 45% drop in FDI flows from developed countries. These sharp declines may reflect MNCs reliance on international debt markets to finance their overseas expansions and the drying up of international capital markets. Outward FDI from developed countries did not expand as rapidly as FDI from developing countries and as a result the share of developing country in global FDI outflows reached 18%, almost double the 10% average of the previous 3 years.

Outward FDI flows as a percentage of gross fixed capital formation (GFCF) are considerably higher than the world average for such economies as Hong Kong (SAR), Taiwan (SAR), the Russian Federation, and Singapore. A large proportion of the FDI inflows into developing countries originated from regional countries.[3] Many Southern MNCs invest regionally and in other developing countries before they invest beyond their immediate region. They have a tendency to invest close to their home country and in countries where they have a certain familiarity through trade, or ethnic and cultural ties. Intraregional FDI accounts for almost half of the total flows to Asia. MNCs from India and China have been particularly active in other Asian countries. Turkey has also been actively investing regionally, particularly in West and Central Asia. Intra-ASEAN FDI inflows are the second largest source of FDI in the subregion. Of the $136 billion FDI inflows in ASEAN, Intra-ASEAN FDI accounted for $24 billion, equivalent to a share of 18%. ASEAN has accounted for about 17% on average of the region's total FDI inflows from 2008 to 2014.

Latin America is also a significant source of intraregional FDI. MNCs from Chile, Brazil, and Argentina have expanded their operations mainly in other developing countries in the region. Among African countries, South Africa is responsible for well over 40% of the total inward FDI of many sub-Saharan African countries. South African investments in other developing countries are almost completely in the southern part of Africa. South Africa has a significant FDI footprint in Botswana, the Democratic Republic of the Congo, Lesotho, Malawi, and Swaziland. The Russian investments abroad have primarily been in the countries of the former Soviet Union. The interregional FDI goes primarily from Asia to Africa. China, India, and Malaysia are among the top 10 contributors to inward FDI in Africa (UNCTAD, 2011). The second largest interregional FDI flow is from Latin America to Asia. FDI flows between Asia and Latin America have remained modest over the years. In recent years, Arab MNCs have also contributed to outward FDI flows. Most of their investment is in sub-Saharan Africa and South Asia.

Data on South-South FDI by sector are problematic. There is a large discrepancy between approved and realized FDI. Data on FDI projects depend on the nature of the FDI regulatory regime. For example, in Thailand there is no requirement for foreign

[3]Not many developing countries provide a geographical breakdown of destinations of FDI outflows. Data limitations prevent a precise calculation of the magnitude of such flows.

investors to go through any government screening process to invest in the country. As a result, official records grossly understate FDI in Thailand. With these caveats, a sectoral breakdown of South-South FDI shows that investment flows are highly concentrated in the services sector (UNCTAD, 2006). The services sector accounts more than one half of South's outward FDI stock. South FDI is particularly high in trade, business activities, construction, and ICT. In the primary sector, South FDI is concentrated in agriculture and the extractive industries. However, the share of FDI in the primary sector may decrease in response to China's demand shortfall and a corresponding collapse of commodity prices. Within the manufacturing sector, the shares of Southern countries in the global outward FDI stock are particularly high in electronics, nonmetallic mineral products, and rubber and plastic products.

1.4 What are the motivations?

Section 1.3 demonstrated the recent trends in South-South FDI. Outward FDI from developing and transition economies has increased rapidly in the past two decades and represents a sizeable share of global FDI flows. The expansion of South-South FDI is caused by the rising wealth in some developing countries that has led to capital accumulation combined with capital account liberalization in other developing countries.

Several *push* factors motivate outward FDI. First, the objective of profit-maximizing Southern firms is to pursue higher yields and lower risks through portfolio diversification. However, market liberalization has eroded their protection at home, as local firms face increased competition and limited growth opportunities. Time to market is reduced and production runs must increase continuously to control costs. As a result, many Southern firms have internationalized and invested in market-seeking activities in other developing countries. Currency appreciation and increased competition have also made it difficult for firms to maintain external competitiveness and defend their export markets (Wells, 1983). This imbalance has driven many Southern firms to invest in efficiency-and-asset-seeking activities overseas following an erosion of their export competitiveness (Lall, 1983; Mirza, 2000). Trade policies can also affect the incentives for Southern firms in many ways. High tariffs and nontariff barriers may induce tariff-jumping FDI to serve the foreign market.

Moreover, as of late, many Southern firms have internationalized with the objective

to procure the elastic supply of key raw materials and resources (Buckley, Clegg, Cross, & Liu, 2007). The rising wealth in developing countries is concomitant with the increased demand for raw materials. Several MNCs from the South have invested in critical intermediary inputs in other developing countries. As an example, consider the entry of Chinese MNCs in pulp projects in Chile and Russia, iron ore and steel mills in Peru, and crude oil in Angola and Sudan (Chhabra, 2001). Malaysia's Petronas also has investments in the extractive industries in South Africa, Vietnam, Cambodia, and Laos. Lastly, some source country governments offer fiscal and monetary incentives to encourage outward FDI. For example, China's "going global" strategy promotes outward FDI by providing preferential loans, tax rebate, and investment insurance. Malaysia has also encouraged South-South FDI through special deals signed with countries such as the Philippines, Vietnam, India, and Tanzania. A large number of Southern firms have responded to these institutional incentives and ventured abroad (Mirza, 2000; UNCTAD, 2002).

The major *pull* factor for South-South FDI includes the host country's low production costs and easy access to domestic and foreign markets. Other pull factors involve familiarity with local investment climate, geographic proximity, and ethnic and cultural linkages. It is difficult for firms to obtain accurate and timely information from abroad. Therefore, Southern MNCs tend to invest in countries in geographical proximity, where they may have strong cultural or ethnic ties (Bhinda, Griffith-Jones, Leape, & Martin, 1999; Padayachee & Valodia, 1999). More recently, Southern firms have invested abroad to achieve political objectives rather than profit maximization (Cuervo-Cazurra, Inkpen, Musacchio, & Ramaswamy, 2014). For example, China's investment in Latin America and Africa seeks to assert its presence in countries critical to China's long-term strategic interests (Peters, 2015).

1.5 How do Southern firms internationalize?

The internationalization of firms in the South has become a permanent and growing feature of the global economy. Southern MNCs are very different in size and capacity. *Forbes Magazine* first released its list of the world's largest 2000 MNCs in 2003. The list was dominated by companies from the United States, Japan, and Great Britain. However, in the most recent "Global 2000" list, MNCs from China and other developing countries

feature prominently. In 2014, 674 companies came from Asia, compared with 629 from North America and 506 from Europe. The world's three biggest state-owned MNCs and 5 of the top 10 MNCs are Chinese. The major MNCs from developing countries include Vale (Brazil) in mining; SABIC (Saudi Arabia) in chemicals; Sinopec (China), Petrobras (Brazil), Petronas (Malaysia), and Indian Oil (India) in petroleum refining; Cemex (Mexico) in cement; Hyundai and Kia (Republic of Korea) in motor vehicles; Samsung and LG (Republic of Korea) in electronics; China Mobile (Hong Kong SAR) and MTN (South Africa) in telecom; DP World (UAE) and Hutchison Whampoa (Singapore) in port logistics; Teva Pharmaceuticals (Israel) in pharmaceuticals; and CITIC (China), SK (Republic of Korea), Tata (India) and, Orascom (Egypt) across diverse set of industries.

There are several reasons firms internationalize and become MNCs. The reasons can be wide ranging but often include a small home market, competitive pressures, and government incentives aimed at encouraging foreign expansion. Over the past few decades, two major schools of thought have emerged to explain the internationalization of firms. Both schools diverged from the Heckscher-Ohlin-Samuelson theory of trade (Markusen, 2004). One school of thought that remained close to neoclassical economics introduced general equilibrium models with restrictive assumptions to explain the emergence of MNCs. This stream of research has moved away from perfect competition and constant returns to models incorporating imperfect competition and economies of scale, but its focus remains on explaining the patterns of production, consumption, and trade at the country level rather than the firm level. The other school of thought was a departure from neoclassical economics and introduced partial equilibrium models based on more relaxed underlying assumptions. This stream of research is mainly interested in explaining the firm's strategic motivation to choose FDI over other entry modes when internationalizing. John Dunning's eclectic paradigm offers a widely accepted framework of this school of thought (Dunning, 1981).

Dunning (1981) explains that firms invest abroad because they enjoy certain *a priori* microeconomic advantages widely associated with ownership, localization, and internalization. Ownership advantage is an endogenous firm-specific characteristic. It is typically derived from proprietary assets, such as strong brand names, superior technology, or returns to scale, as well as by superior managerial capabilities to control and coordinate

transactions. The proprietary assets are transferable between different units of an MNC around the world. Location advantage is an exogenous country-specific characteristic. It normally takes the form of immobile factor endowments that are combined with the ownership advantages to encourage firms to produce abroad. Location advantage represents the comparative cost of intermediary inputs (e.g., raw materials, labor, and natural resources) accessible by firms operating within that country's borders, or by trading costs among countries, which may include transportation costs, tariffs, and nontariff barriers. Internalization advantages accrue when market transactions are replaced by extending internal operation. The reason from internalization stems from the fact that proprietary assets become a private good once transferred outside the boundaries of the firm. Internalizing advantage applies to the case in which the firm prefers to exploit its ownership advantage internally, rather than by licensing or joint venture, in order to minimize the transaction costs associated with the interfirm transfer of proprietary assets.

The eclectic paradigm is a prominent framework that has gained significant recognition, but it is predominantly based on the experience of developed-country MNCs. Northern MNCs have the proprietary assets and capabilities to expand overseas. Meanwhile, Southern MNCs rarely have proprietary assets when they internationalize in new conditions (Cuervo-Cazurra & Genc, 2008). Most Southern MNCs expand overseas with the purpose of building advantages and proprietary assets. This proposition is reinforced by a recent study of acquisitions in the US (W. Chen, 2011). Based on propensity score matching, W. Chen (2011) reveals that acquisitions by MNCs from developed countries experienced greater labor productivity relative to acquisitions by developing country MNCs. The productivity margin suggests that investing MNCs from developed countries likely invest to exploit their proprietary assets, whereas developing country MNCs invest to pursue proprietary assets abroad. Mathews (2006) refers to this as the new linkage, leverage, and learning (LLL) paradigm. The LLL paradigm was originally introduced to explain the internationalization strategies of the MNCs from the Asia Pacific region. It was an alternative and complementary paradigm to the dominant OLI. Southern MNCs have leveraged their way into new markets through partnerships and joint ventures. Their accelerated internationalization is based on latecomer advantages that lead to various kinds of strategic and organizational innovations. They have mastered the manufacturing

processes by accessing strategic assets and deploying low-cost engineers in innovative ways. For example, South African commercial banks have extended mzansi accounts, which were aimed at local low-income users, to their operations in other African countries (Goldstein & Pritchard, 2006). Mathews (2006) argues it is the innovative features that these MNCs share that complement the emerging global economy.

1.6 Institutional advantage of Southern multinationals

A more recent set of explanations that focuses on the institutional characteristics of Southern MNCs has been proposed by Avinash (Dixit, 2012). He posits that Southern MNCs have internationalized by turning initial difficulties into sources of advantage. Managing a difficult regulatory and governance environment is an area in which Southern MNCs have developed a relative advantage. The experience of operating under difficult conditions at home has equipped Southern MNCs to cope with similar conditions elsewhere. The experience has given them an organizational advantage when investing in other countries with similar conditions and institutions. First, Southern MNCs can better manage uncertain supply chains, unreliable power supplies, and a low-skilled workforce. They also have experience managing regulatory bottlenecks and weak contract enforcement. Second, Southern MNCs exploit ethnic and linguistic networks much more effectively overseas than Northern MNCs. The importance of Chinese ethnic networks for inward FDI to China from East and Southeast Asia is well documented (Rauch, 2001). Chinese MNCs such as Huawei and TCL have leveraged political relations with Russia and Vietnam and cultural affinity in Southeast Asia (E. Chen & Lin, 2008). Lastly, Southern MNCs are not constrained by the source country laws. They are able to get around restrictions through informal networks. Northern MNCs are often subject to the souce country laws and pressure from nongovernmental organizations. They face similar pressure to pay fair wages to their workers abroad.

Dixit (2012) presents a minimalist model that formalizes internationalization of Southern firms based on their institutional advantage. Consider a firm contemplating investing overseas in a country with institutional quality expressed by an inverted measure r. A higher r corresponds to worse institutional quality. Assume that the firm has access to superior proprietary assets over local rivals. Let l denote the ownership advantage. The

firm faces three alternative operation modes: (a) domestic production for exports and local consumption is denoted as Z; (b) establishment of a wholly owned subsidiary is denoted as V; and (c) entering a joint venture with a local firm is denoted as J.

The firm faces extra costs besides production. These costs stem from coping with imperfect institutions (c) and adapting the technology to the local conditions (a). They are an increasing function of r and t. A local partner's access to timely and accurate local information can reduce these costs. For convenience, Dixit (2012) assumes a simple functional form of these costs under the two modes V and J:

$$\Gamma_V = c_v r + a_v t,\ \Gamma_J = c_j r + a_j t$$

where $c_v > c_j$ and $a_v > a_j$.

The poor institutional quality may lead to the risk that the local partner imitates the technology and then uses it to compete with its MNC partner. The leakage cost (L) is likely zero if the host country has strong institutions ($r = 0$) or the MNC's technology is perfectly adapted to the host country's conditions ($t = 0$). A simple form for the leakage cost is as follows:

$$L_J = \phi r t$$

Let's suppose the MNC's profit is R_V for a wholly owned subsidiary and R_J for a joint-venture. We expect $R_V > R_J$ since under a joint venture, the local partner must be given a profit share. Then the overall profits (Π) under the two modes are:

$$\Pi_V = R_V - c_v r - a_v t,\ \Pi_J = R_J - c_j r - a_j t$$

For each (r, t) combination, the MNC will choose the entry mode that yields the highest profit. For convenience, Dixit (2012) focuses on the case where $\frac{R_V}{c_v} > \frac{R_V - R_J}{c_v - c_j} > \frac{a_v - a_j}{\phi}$. **Figure 1.3** illustrates the results. The curves $\Pi_V = 0$, $\Pi_J = 0$ and $\Pi_V = \Pi_J$ divide the (r, t) space into regions. Π_V is positive to the left of the curve and negative to its right. Π_J is positive below the curve and negative above it. Lastly, $\Pi_V > \Pi_J$ above the curve and $\Pi_V < \Pi_J$ below it. The regions in the (r, t) space are separated by curves and labeled with the optimal entry mode. When r and t are sufficiently high, engaging in profitable production is not possible under either entry mode. When r is low, the MNC's optimal entry mode is a wholly owned subsidiary as it avoids the leakage cost. When t is low,

the local partner's ability to better manage imperfect institutions becomes an important consideration.

Based on this framework, Dixit (2012) compares the choices facing a Northern MNC (N) and a Southern MNC (S) contemplating direct investment in the same developing country. Assume that the technology used by a Southern MNC is better adapted to the host country conditions than that of a Northern MNC. Then S will be located vertically below N in **Figure 1.3**. For low r denoting relatively strong institutions in the host country, N may postpone investment, whereas S may enter using V or J; or N may enter using V, whereas S enters using J. For high r denoting relatively weak institutions, N may postpone investment, whereas S may enter using J. These results broadly confirm the observations of Wells (1983) and Lall (1983) that Southern MNCs tend to form joint ventures with local partners.

Dixit (2012) also considers the hypothesis that Southern MNCs are better able to manage imperfect institutions. The experience of operating in difficult institutional conditions at home have equipped Southern MNCs to cope with similar conditions abroad. Therefore, Southern MNCs enjoy lower costs that stem from coping with imperfect institutions (c_v). **Figure 1.4** illustrates these results. A lower c_v shifts the $\Pi_V = 0$ curve to the right and the $\Pi_V = \Pi_V$ curve downward, which expands the region where V is the optimal entry mode. In the region denoted as $J \rightarrow V$, a Northern MNC would enter using mode J, whereas a Southern MNC with its lower c_v would enter using entry mode V. In this case the host country has relatively strong institutions and where firms have access to fairly advanced technology. In the region denoted as $Z \rightarrow V$, a Northern MNC would decide to postpone investment, whereas a Southern MNC would enter using entry mode V. In this case the host country continues to have relatively strong institutions but the MNC's technology is not too advanced for what is appropriate for the host country.

Figure 1.5 illustrates the hypothesis that Southern MNCs have better access to a network of local firms that have the experience operating locally. A lower c_j shifts both curves $\Pi_J = 0$ and $\Pi_V = \Pi_J$ upward. First, in the region denoted as $V \rightarrow J$, a Northern MNC would enter using entry mode V, whereas a Southern MNC with its lower c_j would enter using entry mode J. The host country has relatively strong institutions in this region. Second, in the region denoted as $Z \rightarrow J$, a Northern MNC would decide to postpone

investment, whereas a Southern MNC would enter using entry mode J. The host country has relatively weak institutions in this region. Neverthless, in either case, the MNC's technology is not too advanced for the host country.

Dixit's (2012) framework shows that Southern MNCs advantage abroad tends to stem from joint ventures with local partners. Southern MNCs also rely on their skills to navigate the difficult conditions abroad. However, their advantage may be better explained by having access to local partners that may have access to timely and accurate local information and network capital.

1.7 Plant-level characteristics of South multinationals

South FDI in developing countries takes on different forms and with different purposes. The nature of MNCs is also changing with an increasing number of developing and transition economies hosting such firms. I consider the average establishment sizes from the South and the North. The establishment size is measured as the output per establishment. It is important to bear in mind that the most comprehensive establishment-level statistics available are from the late 1980s and the early 1990s (Ramstetter, 1994, 1999). **Table 1.3** presents the average size of establishments in Hong Kong, China and Singapore in the late 1980s and the early 1990s. As **Table 1.3** shows, establishments with parent companies headquartered in the North are significantly larger than the establishments owned by parents in the South. Northern plants are on average twice as large in terms of output than the Southern plants. The difference in size among most plants has widened over the period, even though the difference among Japanese and Southern plants has declined in Hong Kong and China.

I also make comparison with plant size measured in terms of total employment. The cross-country comparisons are reported in **Table 1.4**. Northern plants in Hong Kong and China are roughly a third larger than those in developing and transition countries. However, the Japanese plants have become progressively smaller. In Singapore, the difference among plants is on average considerably larger than other countries with no signs of decline over time. Ramstetter (1994) makes a similar comparison of manufacturing MNC sizes (as measured by firm sales) in Thailand. He finds that MNCs from developed countries were much larger than those from developing and transition countries.

However, there were a couple exceptions. Southern MNCs tended to be much larger in industries associated with textiles and apparel, rubber and plastics, transport machinery, and precision machinery and miscellaneous manufacturing.

One of the potential benefits of FDI for developing countries that is of particular interest to policymakers is the extent to which these investments contribute to productivity gains. Until now, most of the studies on productivity have focused on foreign-owned and local plants. However, comparisons among investor origin have received scant attention. Takii (2011) is among the few studies that provides a breakdown of labor productivity with respect to investor origin. **Table 1.5** reveals that plants representing North FDI have comparatively higher levels of labor productivity in Indonesia. The gap in labor productivity is narrower in foods, textiles, and wood and furniture industries. These are industries where South FDI is abundant. **Table 1.6** reports differences in labor productivity, as measured by real output per worker, among plants in Hong Kong, China, and Singapore. The plants owned by investors in the North have higher productivity levels in Hong Kong, China, and Singapore. The productivity margin has remained fairly constant over the period.

Ramstetter (1994) reports value-added per worker in manufacturing MNCs in Thailand. As shown in **Table 1.6**, the value-added per work for developed country MNCs is roughly two-thirds the level of MNCs from developing and transition countries. The margins are particularly high in chemicals, nonmetallic minerals, metals and metal products, nonelectric and electric machinery and computers, and motor vehicles. The margins are much lower in foods, beverages and tobacco, wood and paper, and rubber and plastics. Khalifah and Adam (2009) do not distinguish between investors by country origin but include some hints as to productivity differences. They find that foreign-owned firms that are capital-intensive select electronics or machinary industries, whereas labor-intensive firms are concentrated in textiles and apparel. Considering that Southern MNCs lack proprietary assets, they may invest in industries characterized by low wage and productivity.

Lipsey and Sjöholm (2011) make additional comparisons between North and South FDI using Indonesian plant-level data. **Table 1.7** reports firm-specific variables as ratios of North to South. Northern plants are particularly large in high-productivity industries (e.g., paper products), whereas Southern plants are larger in low-productivity industries (e.g., basic metals). Northern plants tend to pay higher blue-collar wages than Southern plants.

However, Southern plants tend to be more export-oriented. **Table 1.8** shows the average figures for individual countries from South. Southern plants from Hong Kong (SAR), China, and the Republic of Korea are larger than plants from Malaysia and Singapore. However, plants from Malaysia and Singapore have on average higher labor productivity and export intensity than plants from other developing countries. White-collar wages are on average higher in plants from Hong Kong (SAR), whereas blue-collar wages are on average higher in plants from Hong Kong (SAR), Malaysia, and Singapore.

1.8 Conclusion

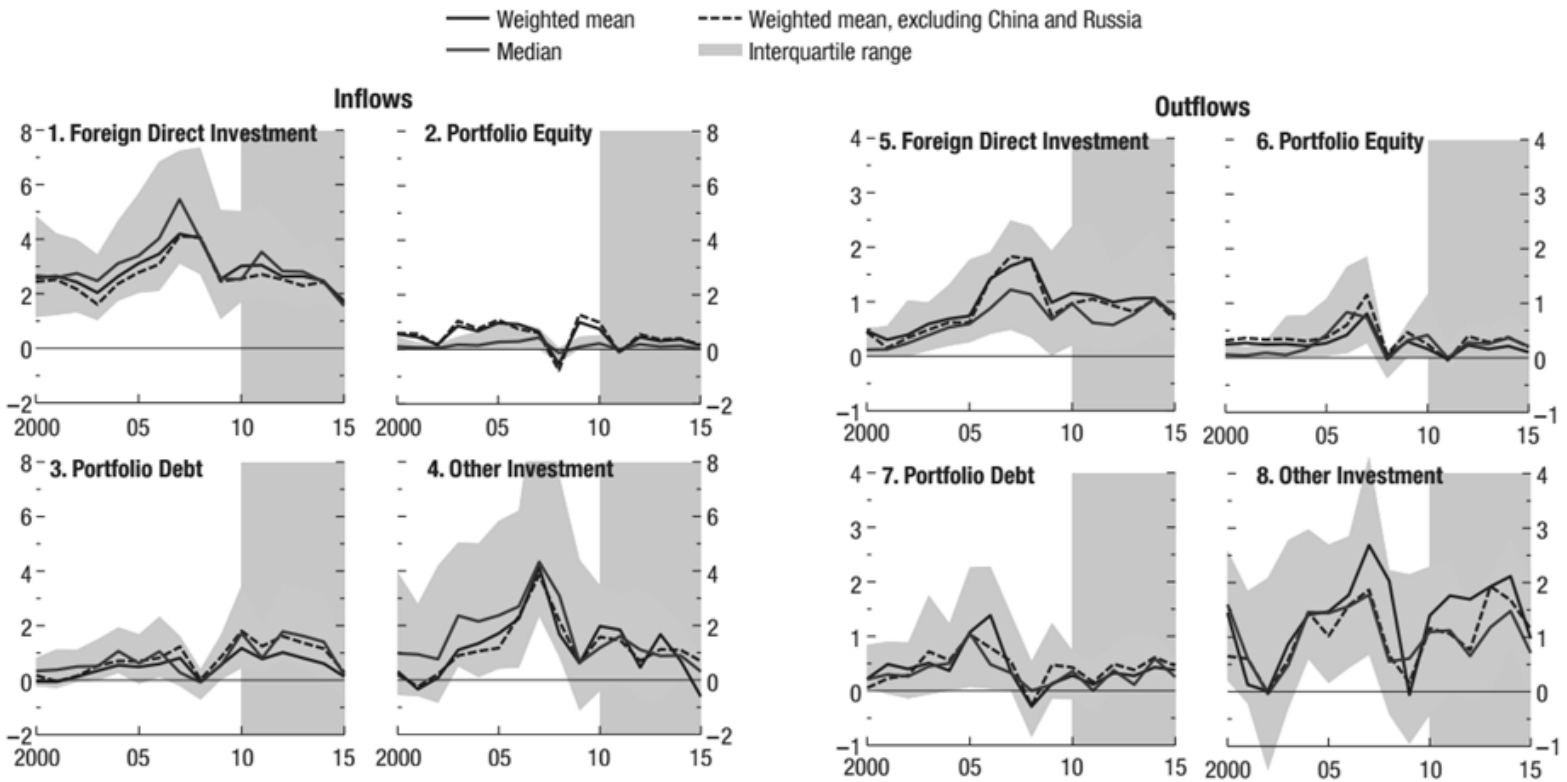
During the past two decades, developing economies have not only attracted more investment, but also become big investors in their own right. According to UNCTAD, about a third of global outward investment flows during 2014 came from developing countries. This change underscores the structural shift taking place in the global economy. The rise in South-South FDI provides new sources of finance and brings new opportunities for developing countries that have traditionally not been amongst the most favored destinations for North FDI. The surge in South-South FDI stems from the rise in wealth in some developing countries accompanied by market liberalization. South-South FDI has remained acyclical in the face of global financial crisis. The bulk of South-South FDI is intraregional in nature. Asia is the largest contributor to intraregional FDI. Moreover, a sectoral breakdown shows that South-South FDI is mainly concentrated in the services sector. However, it continues to grow in trade, business activities, construction, and ICT.

The nature of MNCs is also changing, with an increasing number of countries in developing countries hosting such firms. The existing OLI paradigm can explain only some of the internationalization strategies of Southern MNCs. Southern MNCs lack propietary assets when they internationalize in new conditions. In fact most Southern MNCs expand overseas to build advantages and proprietary assets. They are able to catch up with Northern MNCs through strategic and organizational innovations. The experience of operating in difficult conditions at home has equipped Southern MNCs to cope with similar conditions elsewhere. It gives them an organizational advantage when investing in other countries with similar conditions and institutions. Southern MNCs are willing to take on more risks and work in a poorer political climate. This strategy of internationalization

is very different from the strategy that drove earlier MNC experiences involving export expansion and trade promotion.

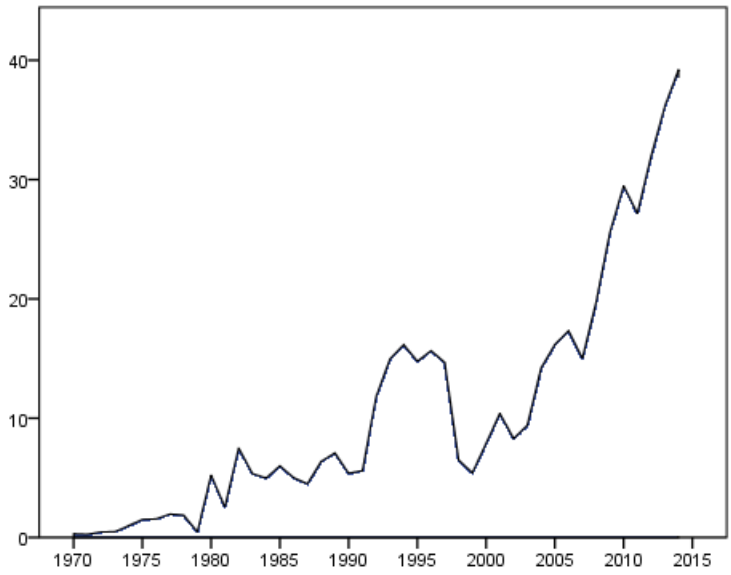
The plant characteristics of Southern MNCs are also very different. Bearing in mind the data limitations, the plant size of Southern MNCs tends to be on average much smaller than the plant size of Northern MNCs. However, the difference in size may vary substantially by industry. Southern plants are also comparatively less productive than Northern plants. The margins are higher when plant size is proxied by output per plant relative to employment per plant. These productivity differences may stem from the lack of propreitary assets owned by Southern MNCs. They tend to have higher productivity in industries characterized by low capital-labor ratios, such as food and beverages, tobacco, textiles and apparel, and wood products. Moreover, wages tend to be lower in plants from the South. However, they are more export-oriented than plants from the North.

For policy implications, I require a more robust analysis of South-South flows. It is not too early to engage in open policy discussion on the following subjects: (a) What are the location-specific determinants of South FDI? Is South FDI less risk-averse than North FDI? (b) What types of product diversification strategies do Southern MNCs follow? Can diversification undertaken by Northern MNCs be generalized to Southern MNCs? (c) What is the extent of spillovers from South FDI and how these differ from spillovers from North FDI? The answer to these questions can address some of the key issues regarding South-South FDI. Since it is a relatively new phenomenon in both scope and magnitude, further investigation will be necessary to refine our knowledge, in order to help developing countries, and particularly the poorest among them, realize the full benefits of the rise of these emerging sources of FDI.



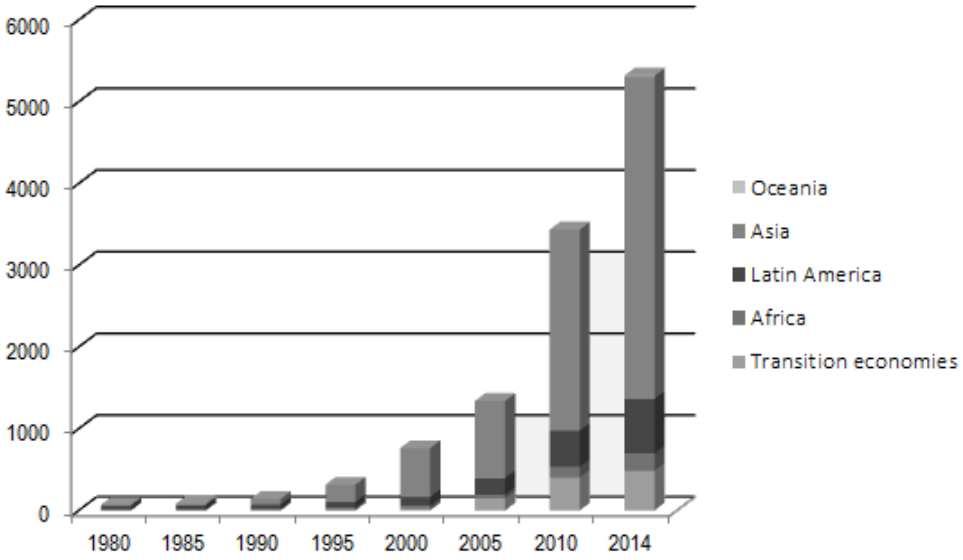
Note: The balanced sample comprises of 45 emerging market economies.
Source: IMF's World Economic Outlook (2016, Annex 2.1)

Figure 1.1. Capital inflows and outflows for emerging market economies by asset type



Source: UNCTADstat (http://unctadstat.unctad.org)

Figure 1.2. South's outward FDI (% of total world)



Source: UNCTADstat (http://unctadstat.unctad.org)

Figure 1.3. Outward FDI stock by developing and transition regions, 1980-2004 (billions of USD)

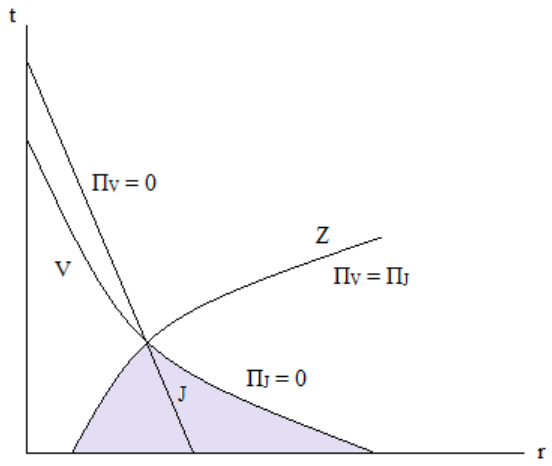


Figure 1.4. Optimal modes of investment

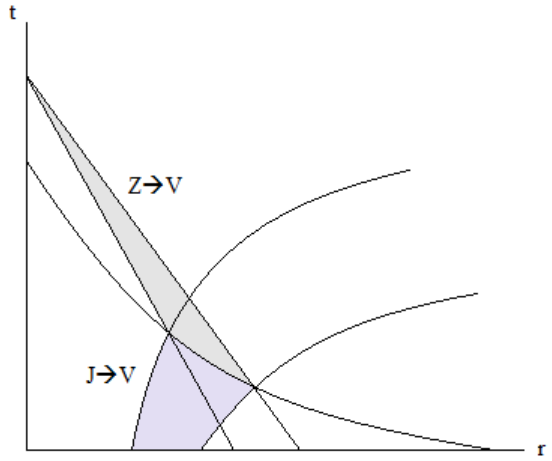


Figure 1.5. Southern MNC's ability to cope with imperfect institutions

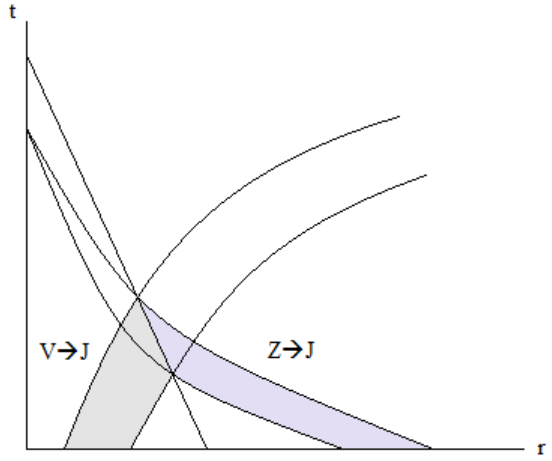


Figure 1.6. Local partner's ability to cope with imperfect institutions

Table 1.1. Largest developing economy investors, 2014 (billions of USD)

Country	Outward FDI stock	Main destinations
Hong Kong (SAR)	1,459	China, United Kingdom, Australia, Singapore, Canada
China	729	Hong Kong (SAR), United States, Singapore, Australia, United Kingdom
Brazil	316	Austria, United States, Netherlands, Spain, Argentina
Republic of Korea	259	China, United States, Hong Kong (SAR), Netherlands, Malaysia
Taiwan (SAR)	258	China, United Kingdom, Australia, Singapore, Canada
Malaysia	135	Singapore, Indonesia, Malaysia United Kingdom, Hong Kong (SAR)
South Africa	133	China, United Kingdom, United States,
Mexico	131	United States, Netherlands, Brazil, Spain, United Kingdom
India	129	Singapore, Mauritius, Netherlands, United States, United Arab Emirates
Chile	90	Brazil, Peru, Argentina, Colombia, Spain

Source: UNCTADstat (http://unctadstat.unctad.org)

Table 1.2. Selected nonfinancial Southern MNCs operating in different industries by total assets, 2014 (billions of USD)

Corporation	Home economy	Industry	Total assets
CITIC Group	China	Diversified	762.8
Sinopec Group	China	Petroleum	359.1
Petrobras	Brazil	Petroleum refining	298.6
Samsung Electronics Co.	Republic of Korea	Electronics	209.6
Petronas	Malaysia	Petroleum	153.7
Hyundai Motor	Republic of Korea	Motor vehicles	133.9
Vale SA	Brazil	Mining and quarrying	116.6
Hutchison Whampoa Limited	Hong Kong (SAR)	Port logistics	113.9
SABIC	Saudi Arabia	Chemicals	90.6
SK Holdings	Republic of Korea	Petroleum refining	84.6
Hon Hai Precision Industries	Taiwan (SAR)	Electronics	77.9
Tata Group	India	Diversified	68.8
China Ocean Shipping Co.	China	Port logistics	57.8
Teva Pharmaceutical Industries	Israel	Pharmaceuticals	47.5
Cemex	Mexico	Cement	37.9
Kia Motors	Republic of Korea	Motor vehicles	37.3
Indian Oil	India	Petroleum refining	37.3
LG Electronics	Republic of Korea	Electronics	33.7
Orascom	Egypt	Diversified	19.8
DP World	United Arab Emirates	Port logistics	16.8

Source: Forbes Global 2000, *Forbes*

Table 1.3. Output per plant[a] in plants from South relative to plants from North in Hong Kong (SAR) and Singapore

Location of plants	1983-1996	1983-1986	1987-1996
Hong Kong (SAR)			
Plants from South[b] relative to			
Plants from			
United States	-52	-65	-45
Europe[c]	-51	-59	-48
Japan	-24	-33	-22

Location of plants	1980-1994	1980-1986	1987-1994
Singapore			
Plants from South[d] relative to			
Plants from			
United States	-92	-90	-92
Europe[c]	-83	-82	-84
Japan	-73	-67	-76

[a] Real value added per plant.
[b] The PRC, Singapore, Taipei, China.
[c] Germany, the Netherlands, Switzerland, the UK.
[d] Hong Kong, China, Malaysia, Thailand.
Source: Ramstetter (1999, Tables 6 and 7)

Table 1.4. Employment per plant[a] in plants from South relative to plants from North in Hong Kong (SAR) and Singapore

Location of plants	1983-1996	1983-1986	1987-1996
Hong Kong (SAR)			
Plants from South[b] relative to			
Plants from			
United States	-48	-65	-37
Europe[c]	-45	-57	-40
Japan	-10	-25	-4

Location of plants	1980-1994	1980-1986	1987-1994
Singapore			
Plants from South[d] relative to			
Plants from			
United States	-79	-75	-81
Europe[c]	-53	-48	-56
Japan	-62	-61	-63

[a] Employees per plant.
[b] The PRC, Singapore, Taipei, China.
[c] Germany, the Netherlands, Switzerland, the UK.
[d] Hong Kong, China, Malaysia, Thailand.
Source: Ramstetter (1999, Tables 6 and 7)

Table 1.5. Firms by sales size in manufacturing plants in Thailand

Industry	Japan	Other Developed Economies	Developing Economies
Food	12.2	42.0	13.8
Beverages, tobacco	0.0	14.1	0.2
Textiles, apparel, etc.	15.2	16.3	18.3
Wood, paper, printing	1.4	4.4	2.9
Chemicals	29.9	22.3	7.1
Rubber, plastics	7.1	4.9	7.8
Nonmetallic minerals	4.1	19.1	0.4
Metal, metal productions	27.3	8.4	5.9
Nonelectric machinery	15.2	1.6	0.6
Electronics	63.2	52.7	8.9
Transport machinery	79.9	0.2	1.1
Precision machinery	3.3	4.7	5.3

Source: Ramstetter (1994, Table 1)

Table 1.6. Productivity in plants[a] from South relative to plants from North in Hong Kong (SAR) and Singapore

Location of plants	1983-1996	1983-1986	1987-1996
Hong Kong (SAR)			
Plants from South[b] relative to			
Plants from			
United States	-17	-6	-20
Europe[c]	-15	-4	-18
Japan	-19	-9	-21

Location of plants	1980-1994	1980-1986	1987-1994
Singapore			
Plants from South[d] relative to			
Plants from			
United States	-59	-59	-59
Europe[c]	-64	-65	-63
Japan	-29	-18	-35

[a] Real value added per employee.
[b] The PRC, Singapore, Taipei, China.
[c] Germany, the Netherlands, Switzerland, the UK.
[d] Hong Kong, China, Malaysia, Thailand.
Source: Ramstetter (1999, Tables 6 and 7)

Table 1.7. Value-added per employee in manufacturing plants in Thailand

Industry	Japan	Other Developed Economies	Developing Economies
Food	251	382	289
Beverages, tobacco	NA	295	1,266
Textiles, apparel, etc.	209	170	203
Wood, paper, printing	278	367	291
Chemicals	944	883	494
Rubber, plastics	470	331	458
Nonmetallic minerals	1,205	1,012	157
Metal, metal productions	777	1,002	386
Nonelectric machinery	760	338	180
Electronics	343	406	132
Transport machinery	1,859	168	111
Precision machinery	144	152	104

Source: Ramstetter (1994, Table 2)

Table 1.8. Characteristics of plants from South relative to North in Indonesia

Characteristics	Korea, Rep. of	China	Singapore	Hong Kong (SAR)	Malaysia
Size	2.4	1.5	1.0	1.5	1.0
Productivity	0.5	0.6	0.8	0.4	0.8
Blue collar wages	0.6	0.7	1.0	1.0	1.0
White collar wages	1.1	0.7	0.7	1.8	0.7
Export intensity	0.6	0.7	0.7	0.5	0.7
Export share	1.5	1.3	1.8	1.2	1.8

Source: Plant-level data included in Lipsey and Sjöholm (2011)

CHAPTER 2

DOES LUCAS PARADOX APPLY TO FDI FROM THE SOUTH?

2.1 Introduction

Decades have passed since Lucas (1990) asked why capital does not flow from rich to poor countries, posing what is widely known as the Lucas paradox. According to the standard neoclassical theory, Lucas paradox is often cited as a parsimonious explanation for the scarcity of capital flows to developing countries (Lucas, 1990; Papaioannou, 2009).[1] The explanations for this paradox range from asymmetric information (Portes & Rey, 2005) to institutional weakness (Alfaro, Kalemli-Ozcan, & Volosovych, 2008). However, foreign direct investment (FDI) flows into developing countries have increased substantially in recent years. Least-developed countries registered a 14% increase in FDI in 2013. A large share of the investment came from other developing countries. In terms of host, detailed cross-border M&A and Greenfield data show that 60% of the outward flows from developing countries went into other developing and least-developed countries. The global South accounts for 32% of global outward FDI in 2013, up from 16% in 2008 (UNCTAD, 2014).

Despite the growing importance of South-South FDI and increased desire of many developing countries to attract FDI from the South, the effect of host country's determinants on South-South FDI has received scant attention. Most of the studies have been done with the focus on the traditional North-South flows. This chapter examines the application of Lucas paradox on South-South FDI.[2] Special attention is paid to the role of institutions and asymmetric information in shaping FDI flows from the South. Using a panel data set on

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[1] For more details, see King and Rebelo (1993), Razin and Yuen (1994), Gomme (1993), and Tornell and Velasco (1992).

[2] It is important to note that Lucas discusses the paradox in the context of North-South flows. It is unclear what the paradox is for South-South FDI. The purpose of this chapter is to test the different explanations that come out of Lucas paradox for South-South FDI.

bilateral FDI, I estimate an augmented gravity model using the Poisson psuedo likelihood estimator.[3] The gravity framework accounts for the Lucas paradox across countries and reduces the return differentials among countries. The data set covers 60 host countries from the South; as well as 110 source countries, of which 30 are from the North. I attempt to shed light on the question to what extent the alternative explanations of Lucas paradox holds particularly for South-South FDI. The results reveal that per capita income, human capital, and average institutional quality are not important variables explaining South-South FDI. However, political stability and absence of violence is significantly related. South-South FDI is also more sensitive to regional free trade agreements and natural resource endowments.

This chapter is closely related to empirical work that examines the effect of institutions on South-South foreign investment. Cuervo-Cazurra (2006) shows that investors from countries with higher levels of corruption select similar countries when they internationalize in order to exploit their previous experience of imperfect institutions. Buckley et al. (2007) show that Chinese multinationals prefer countries with higher political risk, even after controlling for the rate of return. Aleksynska and Havrylchyk (2013) find that large institutional distance has a negative effect on FDI flows from the South. However, this literature has neglected how FDI from the South responds to different aspects of institutional quality. A large share of this literature tells us very little about specific reforms that will impact FDI flows. This chapter aims to advance this literature by examining a much wider range of indicators and understand their relative importance to South-South and North-South FDI flows.

The rest of the chapter is organized as follows. In Section 2.2, I review the literature. Section 2.3 briefly lays out the conceptual framework. Section 2.4 describes the data and provides descriptive statistics. Section 2.5 motivates my econometric approach. Section 2.6 reports the main econometric results and Section 2.7 concludes.

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[3]Obstfeld and Rogoff (1995) argues that the most direct approach would be to compare the FDI's rate of return in different countries. However, the lack of internationally comparable measures of after-tax returns to FDI flows makes this difficult.

2.2 Literature review

Besides Lucas (1990), John Dunning's (1981) ownership, localization, and internalization (OLI) paradigm identifies ownership, internalization, and location advantages as the main reasons why firms invest abroad. Among the factors that influence the decision of a firm to invest in a foreign country, institutional quality is particularly valued, because it guarantees the firm that it will earn its full return on investment (Aguiar et al., 2006; Biglaiser & DeRouen, 2006; Busse & Hefeker, 2007; Egger & Winner, 2005). The early theoretical papers were primarily concerned with the question of how FDI can be sustained if there is a risk of expropriation in the absence of effective private property rights. The seminal paper in this literature is Eaton and Gersovitz (1984), which shows that, among other things, the mere existence of the threat of nationalization can distort international capital flows. Foreign investors are sensitive to governance primarily due to the fear of direct expropriation, such as nationalization of foreign investment projects. This also includes indirect expropriation, such as improper host government interference, restrictions on the conversion and transfer of local-currency, or impairment of contracts.

Empirical analyses by Gastanaga, Nugent, and Pashamova (1998) and Busse and Hefeker (2007) have shown that institutions enabling contract enforcement are critical to cross-border FDI flows. Globerman and Shapiro (2003) employ various aspects of governance structures, including measures of political instability, rule of law, regulatory burden, and government effectiveness to explain FDI flows. The results indicate that the quality of institutional infrastructure is an important determinant of FDI inflows. Using a gravity model approach, Stein and Daude (2002) show that institutional indicators are almost always statistically significant and positive. The result is shown to be robust across different model specifications and estimation techniques. Alfaro et al. (2008) identify misgovernance and institutional weakness as principle factors that influence foreign investors. Multinationals respond to improvement in institutional quality by increasing their investments. Other papers study how institutions affect the firm's investment strategy. The existence of weak institutions may induce the firm to choose an outdated technology. Weak institutions may cause underinvestment (Schnitzer, 1999) or excess capacity (Janeba, 2000). More recent papers have analyzed the sale of shares to locals or joint ventures with local firms as possible ways of mitigating political risk in the host country (Muller & Schnitzer, 2006).

But most of the studies have been done with the focus on the traditional North-South flows. In theory, Southern investors face disadvantages in terms of size, technology, and management techniques relative to their Northern counterparts (Cuervo-Cazurra & Genc, 2008). However, the ability of Southern investors to cope with imperfect institutions overcomes Northern multinationals advantage in R&D and access to credit (Claessens & van Horen, 2008; Dixit, 2012). Cuervo-Cazurra (2006) is one of the earliest empirical attempts to examine the role of institutional quality in shaping capital flows between developing countries. Cuervo-Cazurra (2006) shows that investors from countries with higher levels of corruption select similar countries when they internationalize in order to exploit their previous experience of imperfect institutions. Buckley et al. (2007) show that Chinese multinationals prefer countries with higher political risk, even after controlling for the rate of return. More recently, Aleksynska and Havrylchyk (2013) have analyzed the impact of institutional distance and natural resource endowment in South-South FDI. They distinguish between positive and negative institutional distance if the host country has, respectively, better or worse institutions than the origin country. They find that large institutional distance has a negative effect on FDI flows and additionally point out that for the case of resource-seeking FDI, poor institutions are not seen as a problem and they can even be considered as an advantage to obtain special privileges over the natural resource.

2.3 Conceptual framework

Lucas paradox represents one of the major puzzles in international macroeconomics and finance.[4] The explanations of Lucas paradox range from asymmetric information (Portes & Rey, 2005) to institutional weakness (Alfaro et al., 2008). However, the gravity model employed in this chapter accounts for these explanations across countries and may significantly reduce the return differentials among countries. Neverthless, I review the standard neoclassical model and present the main empirical implications of Lucas paradox.

Consider a small open economy with a Cobb-Douglas production function where out-

[4]Lucas paradox is accompanied by the Feldstein-Horioka puzzle: relatively high covariance between savings and investment in OECD countries; the home-bias puzzle: lack of overseas investment by the home country residents; and the risk sharing puzzle: relatively low correlation among consumption growth across countries.

put Y is produced using capital K and labor L

$$Y_t = A_t F(K_t, L_t) = A_t K_t^{\alpha} L_t^{1-\alpha} \qquad F_K(.) > 0,\ F_L(.) > 0;\ F_{KK}(.) < 0,\ F_{LL}(.) < 0$$

where A denotes the total factor productivity (TFP). Providing that countries have a common technology, perfect capital mobility implies the instantaneous convergence of the interest rates for country i and country j

$$A_t f'(k_{it}) = i_t = A_t f'(k_{jt})$$

where $f(.)$ is the net depreciation production function in per capita terms. The model assumes there are diminishing marginal returns to capital, which implies that the resources will flow to capital scarce countries. However, not enough capital seems to flow to capital scarce countries and implied interest rates fail to converge. The explanations for this paradox ranges from sovereign risk (Reinhart & Rogoff, 2004) and asymmetric information (Portes & Rey, 2005) to institutional weakness (Alfaro et al., 2008).

Institutions represent a society's rules of the game. Institutional quality affects foreign investment through its effect on property rights and risk of expropriation. Generally speaking, weak property rights as a result of poor institutions can lead to lack of productive capacities.[5] Weak institutions create a wedge between expected returns and ex-post returns. These differences can be modeled in the parameter A_t. In addition to TFP, A_t accounts for the differences in overall efficiency in the production across countries. Although technology is available to all countries, weak institutions may be a barrier to adoption of the existing technologies, or lead to differences in the efficient use of the same technology (Rajan & Zingales, 2003).

Moreover, weak instititions may lead to domestic distortions associated with poor macro- and microeconomic stability. Differences across countries in cost of doing business (contract enforcement, permits, access to credit, etc.) can limit capital flows. Moreover, inflation may work as a tax and decrease the return to capital. I model the effect of macro- and microeconomic factors by introducing a government tax on capital at a rate τ, which differs across countries. Thus, for country i and country j, the true return is

[5]It is likely that institutions may account for both weak production and capital market imperfections since, historically, weak institutions might be responsible for historical and current sovereign risk and high probability of default.

$$A_t f'(k_{it})(1-\tau_{it}) = i_t = A_t f'(k_{jt})(1-\tau_{jt})$$

Asymmetric information problems may also explain the scarcity of capital flows to developing countries.[6] Foreign investors tend to underinvest in countries where access to accurate and timely local information is difficult (Gertler & Rogoff, 1990). Local information might include information on supply lines, local financing, local tastes, the underground economy, and other local idiosyncrasies. The access to this local information may impact the investor's cost of doing business or productivity. On the cost side, one might argue that local knowledge allows the investor to produce more cheaply. Alternatively, if local knowledge affects the marginal product of capital, then information is an input to production.

The neoclassical theory also fails to account for omitted factors of production. For example, higher accumulation of human capital is positively associated with returns to capital. Less capital tends to flow to countries with lower levels of human capital. Hence, the production function is given by

$$Y_t = A_t F(K_t, Z_t, L_t) = A_t K_t^{\alpha} Z_t^{\beta} L_t^{1-\alpha-\beta}$$

where Z_t denotes the additional factor of production (e.g., human capital) that affects the production process. Therefore, the true return for countries i and j is

$$A_t f'(k_{it}, z_{it}) = i_t = A_t f'(k_{jt}, z_{jt})$$

2.4 Data and descriptive statistics

2.4.1 Endogenous variable

The dependent variable is bilateral foreign direct investment from a source country s to a host country d at a time t, as calculated in the balance of payments statistics. A foreign firm requires a 10% or more of equity ownership to qualify as foreign direct investor.[7] This

[6] Lucas discusses distortive government policies under capital market imperfections since he combines domestic and international capital market imperfections. In the tradition of Obstfeld and Rogoff (1995), I consider international capital market imperfections only those based on information asymmetries. I include distortive government policies that affect capital's productivity separatively.

[7] When a foreign investor purchases a local firm's securities without exercising control over the firm, that investment is regarded as a portfolio investment; direct investments include greenfield investments and equity participation giving a controlling stake. The International Monetary Fund classifies an investment as direct if

chapter uses a comprehensive data set of bilateral annual data on FDI inflows that cover North-South and South-South investments. I construct a panel of host countries from the South, in which all incoming FDI flows are aggregated into the North and South flows.

The data set covers 60 host countries from developing countries; as well as 110 source countries, of which 30 are developed countries. The empirical work presented in the following section is based on the most comprehensive available data on bilateral FDI flows. The data for developed countries come from the "OECD International Direct Investment Statistics Yearbook", "OECD Foreign Direct Investment," and Eurostat's "New Cronos" database. For developing and least-developed countries, I use bilateral FDI data from national sources, World Bank, ASEAN, and the UNCTAD (for details, see Appendix B). The data cover countries from Latin America, Asia, Central and Eastern Europe, and African countries. Moreover, my chapter excludes inflows from islands and countries identified as tax havens or offshore financial centers.

The sample period is between 2004 and 2013 and data frequency is annual, in line with the availability of other variables. This leaves us with 17,280 country-pairs-years in the bilateral data set. However, the data set contains about a 6% of zero-value observations. As mentioned in the previous section, institutional weakness and asymmetric information are often cited as the foremost explanations for the scarcity of capital flows to developing countries. I analyze each of these independent variables in detail below.

2.4.2 Institutions

Despite having established itself as a ubiquitous concept in the international discourse, the operationalization of institutions remains a difficult task. I operationalize institutions based on a clear definition derived from the Worldwide Governance Indicators (WGI) project proposed in (Kaufmann, Kraay, & Mastruzzi, 2010). The WGI rating system consists of weighted variables measuring various dimensions of institutional challenges facing firms in a country. Howell (2002) and Hoti, Chan, and McAleer (2002) provide a good overview of major country risk rating agencies.

For this chapter, WGI rating system is the best choice for the following reasons. First,

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a foreign investor holds at least 10% of a local firm's equity while the remaining equity purchases are classified under portfolio equity investment. We do not distinguish between minority and majority shareholders, as this distinction is not important for my analysis.

it covers various dimensions of institutional quality, proxied by courts, bureaucracy, and the threat of political violence. Second, while many rating agencies provide information on a selective sample of countries, the WGI covers nearly 140 countries. Finally, the WGI rating system provides information for all years that are covered in my analysis. Each institutional measure is normalized between 0 and 10, with higher values indicating good institutional quality. The institutional measures include voice and accountability, political stability and violence, government effectiveness, control of corruption, rule of law, and regulatory quality. To avoid multicollinearity, I rely on a simple average of these measures to construct the average institutional quality variable.

I also use additional exogenous variables to capture macro- and microdistortions associated with government policies. Inflation volatility captures macroeconomic stability.[8] The World Bank's Doing Business indicators are used to capture microeconomic factors affecting firms. They rank the difficulty, costs, and time it would take a firm to start the business, deal with construction permits, register property, access credit, pay taxes, import and export goods, enforce contracts, and complete the bankruptcy process. It also measures the level of protection for investors. I take the simple average of each of the seven ranks.[9] Lower ranks indicate better, usually simpler regulations for businesses and stronger protections of property rights.

2.4.3 Information asymmetry

Capital market imperfections are often caused by an asymmetry of information among borrowers and lenders (Bernanke & Gertler, 1989). It is difficult to obtain accurate and timely information about a country from abroad. This local information might include information on supply lines, local financing, local tastes and preferences, bureaucratic procedures, the underground economy, minimizing the costs of corruption, and other local idiosyncrasies. Several authors consider this relationship in open economies. Gertler and Rogoff (1990) show that capital market imperfections might cause a reversal in the direc-

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[8]The capital controls measure is the average of four dummy variables: exchange arrangements, payments restrictions on current transactions and on capital transactions, and repatriation requirements for export proceeds. The measure is constructed using data collected by the IMF.

[9]More specifically, a country's *starting the business* index is developed by taking the average of rankings on the procedures, time, cost, and minimum capital requirements to register a business.

tion of North-South capital flows. Capital market imperfections handicaps a firm's ability to choose the optimal level of capital investment, which may cause underinvestment or excess capacity (Froot & Stein, 1991; Gordon & Bovenberg, 1996).

Bilateral distance in kilometers is often used as a proxy for the international capital market failures, mainly asymmetric information. Coval and Moskowitz (2001) show that fund managers earn abnormal returns in geographically proximate investments. Fund managers are able to exploit informational advantages in their selection of nearby stocks. Distance had a similar effect when analyzing the determinants of bilateral FDI (Portes & Rey, 2005; Wei & Wu, 2002). Most studies use distance as a proxy measure for geographic proximity. It is measured as the distance in thousands of kilometers from the capital city of country i to the capital city of country j. However, I follow Kalemli-Ozcan, Sorensen, and Yosha (2003) and Volosovych (2013) to construct an augmented distance variable based on the weighted average of the distance in thousands of kilometers from the capital city of country i to the capital city of country j using the per capita GDP shares of country j as a weight. Denoting the distance from country i's capital city to country j's capital city by d_{ij}, country i's augmented distance D_{ijt} is defined as

$$D_{ijt} = \sum_{j} \frac{dist_{ij}}{GDPC_{jt}/GDPC_{Wt}}$$

where $GDPC_{jt}$ is per capita GDP in country j at time t. $GDPC_W$ is sample-wide per capita GDP at time t. I use Arcview software to obtain latitude and longitude of each capital city and calculate the great arc distance between each pair.

The augmented distance variable can lead to some intriguing results. First, the variable is different from "distance from equator" so it is not a direct measure for geographic proximity. In my case, it aims to proxy the information frictions and remoteness. As an example, consider two equally distant countries. The country which has a comparatively smaller economy as a share of per capita GDP would display a higher value. For Congo, average distance without the weights is approximately 6600 kilometers while augmented distance with per capita GDP weights is approximately 9000 kilometers. For the US, average distance without the weights is approximately 8700 kilometers while augmented distance with weights is approximately 6400 kilometers. Moreover, sample-wide, the most disadvantaged country in terms of augmented distance is four times more distant than the

least disadvantaged country.

2.4.4 Control variables

Estimating gravity equations is one of the most prominent empirical techniques to analyze biltateral trade. The gravity equation rests on the assumptions that countries trade in proportion to their respective GDPs and proximity.[10] It is only recently that the gravity equation has been applied to the empirical analysis of FDI flows (Braconier, Norbäck, & Urban, 2005; Brainard, 1997; Egger & Pfaffermayr, 2004; Javorcik, Özden, Spatareanu, & Neagu, 2011). This chapter estimates an augmented gravity model to explain bilateral FDI. The model operates under the assumption that market size, distance, and factor endowments determine the direction of bilateral FDI (Brainard, 1997; Helpman & Krugman, 1985).

There are two GDP-related core gravity variables. Host country's GDP and source country's GDP capture size effects at a time *t*: the larger the market size of a host country the more foreign investment it should receive; and similarly, the larger the source country of FDI the more outward FDI from this country. The third core gravity variable is the bilateral distance. As explained in the previous section, this chapter uses an augmented distance variable that aims to proxy information frictions and remoteness. However, the effect of the distance variable is likely to be nonlinear and to depend on cultural as well as geographic distance. I therefore add contiguous borders, common language, and colonial ties, as is common practice.

In addition to the core gravity variables, a wide variety of location factors is considered in empirical studies on the determinants of FDI. GDP per capita of the host country measured in PPP is a measure of purchasing power and a measure of wage levels. I also include human capital as an alternative explanation to Lucas paradox. Higher accumulation of human capital is positively associated with returns to capital. Less FDI tends to flow to countries with lower levels of human capital (Noorbakhsh, Paloni, & Youssef, 2001). The descriptive statistics of control variables are provided in **Table 2.1**.

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[10] A thorough treatment of the gravity equation can be found in Chapter 5 of Feenstra (2004) .

2.5 Estimation strategy

2.5.1 Gravity model for FDI

As mentioned in the previous section, the basic gravity approach is frequently applied to study the determinants of bilateral FDI flows. This model has become the most widely used specification to study bilateral FDI flows (Blonigen, Davies, Waddell, & Naughton, 2007). For example, Wei (2000) relies on gravity equation to evaluate the influence of corruption on outward FDI. The baseline equation relates the logarithm of outward FDI to the logarithm of GDPs of the source and host countries and the logarithm of the distance between them.

Head and Ries (2008) provide the theoretical microfoundations for a gravity model of FDI. They develop a model of FDI with heterogeneous multinationals who want to control existing foreign assets. Their model yields an equation identical to the gravity equation used for bilateral trade. Recently, Kleinert and Toubal (2010) applied the gravity equation to the analysis of FDI. I rely on Kleinert and Toubal (2010) specification to estimate the many variations of the following gravity equation:[11]

$$\begin{aligned}\ln(Y_{ijt}) &= \alpha_1 + \gamma_1 \ln(GDP_{it}) + \gamma_2 \ln(GDP_{jt}) + \gamma_3 \ln(GDPC_{jt}) + \gamma_4 \ln(H_{jt}) + \\ &\quad \gamma_5 (D_{ij}) + \gamma_6 X_{ij} + \gamma_7 GOV_{ijt} + \gamma_8 C_{jt} + \gamma_9 IQL_{jt} + \varphi_i + \varphi_j + \delta_t + \epsilon_{ijt}\end{aligned}$$

where the subscript $t = 1, ..., T$ denotes the time period. Y_{ijt} is the bilateral FDI flow from country i to country j in t; GDP_{it} and GDP_{jt} are the GDP of country i and country j in t, respectively. $GDPC_{jt}$ is the GDP per capita of country j in t. H_{jt} is proxied by average years of secondary, higher, and total schooling in the total population over 25 years old in country j at t. Information frictions and remoteness is captured by distance D_{jt}. X_{ij} is a vector of other binary gravity variables (contiguity, common language, and colonial ties). GOV_{jt} is a vector that includes inflation volatility and ease of doing business, capturing government policies. IQL_{jt} is the average institutional quality. φ_i, φ_j, δ_t, and ϵ_{ijt} correspond to a source country time-invariant fixed effect, a host country time-invariant fixed effect, a country invariant time effect, and the error term, respectively.

[11] The log-log specification was determined based on an appropriate Box-Cox test. I also estimate the model using Poisson pseudo maximum likelihood estimator without taking the log-linear transformation of the dependent variable.

2.5.2 Multilateral resistance

Anderson and van Wincoop (2003) argue that since estimated gravity equations do not have a theoretical foundation, they suffer from omitted variables bias. Their theoretical equation says that bilateral trade, after controlling for size, depends on bilateral trade barriers between two countries relative to the product of their price indices which they call multilateral resistance variables.

Since price indices are difficult to measure, Anderson and van Wincoop (2003) suggest replacing multilateral resistance term with country-specific dummies. However, the most commonly used method includes source and host fixed-effects in order to control for the specific country multilateral resistance term. The coefficient of the dummies for the source and host should reflect the multilateral resistance of each country. R. Baldwin and Taglioni (2006) develop a micro-founded gravity equation for panel data. They suggest that ignoring multilateral resistance term seriously distorts the estimates of the gravity equations.

R. Baldwin and Taglioni (2006) recommend using nation dummies and time-constant pair dummies to resolve the so-called "gold-medal error", i.e., the bias that results from the omission of the multilateral resistance term (R. Baldwin & Taglioni, 2006). The gravity model used in this study is inspired by these theoretically grounded gravity models, especially by Anderson and van Wincoop (2003) and by R. Baldwin and Taglioni (2006).

2.5.3 Zero-value observations

A well-known problem of the log specification of the gravity equation is the difficulty of accounting for zeros in the dependent variable, because dropping them could create a selection bias. The exclusion of a subset of the data can affect the significance of the test results and leads to biased conclusions. Therefore, the higher the number of zero-value observations in the sample, the greater will be the selection bias and the higher the likelihood of obtaining biased results.

My data set contains 6% of zero-value observations for bilateral foreign direct investment from a source country s to a host country d. Various methods have been implemented in the empirical literature to overcome this problem. Some studies, such as Benassy-Quere, Coupet, and Mayer (2007) for FDI stocks, replace the zeros with 1 or a small positive number. However, this is an ad-hoc method that can lead to biased coefficients if the equation

is estimated using OLS (Gómez-Herrera, 2013). Other empirical analyses estimate the gravity equation using a Tobit model with a left censoring (censoring from below) limit at zero. Eaton and Tamura (1994) and Wei (2000) apply a Tobit model to the estimation of a gravity equation for FDI. However, this method is not appropriate for explaining why some trade or investment flows are missing (Linders & de Groot, 2006).

In the present study I use Poisson pseudo maximum likelihood estimator (PPML) as a way to avoid dropping the zero value observations. Even though Poisson is more commonly used as an estimator for count data models, it is appropriate to apply it far more generally to non-linear models, such as the gravity equation (Santos Silva & Tenreyro, 2006; Westerlund & Whilhelmson, 2011). Poisson model allows to estimate the gravity equation in its multiplicative form without taking the log-linear transformation. Unlike the Tobit model, it is possible in a Poisson model to retain the fixed effects and provides robust results in the presence of heteroskedasticity.

2.6 Empirical findings

2.6.1 Estimation results

2.6.1.1 Main results

Table 2.2 presents the baseline regression. Model (1) presents the regression results and the test statistics using the OLS estimator. Model (2) repeats the same exercise using the Poisson pseudo maximum likelihood estimator (PPML). Notice that all specifications include time invariant country and year fixed effects. The overall fit of the regression is reasonable, especially considering the heterogeneous set of countries included in the analysis.

Although the significance level of some of the standard variables is sensitive to the specification used, it is reassuring to note that they have the expected signs in PPML. I find that the size of the host market, proxied by its GDP, strongly increases bilateral FDI. Contiguity, common language, and colonial past also significantly affect bilateral FDI. The distance variable is negative and significant at the 1% level. These results are in line with previous works using the identical specification, such as (Head & Ries, 2008). Average institutional quality is positive and highly significant. The result indicates that countries with strong institutions received more foreign investment over the sample period. The

results for human capital vary according to the estimator used. Human capital is positive but not significant in the OLS estimator. However, the coefficient becomes significant at the 10% level once I include the zero-value observations and control for selection bias. Inflation volatility has the expected sign but is not significant, whereas the cost of doing business is positive and significant at the 5% level.

Models (3) and (4) present the main results by estimating the North-South and South-South FDI separately. The determinants of FDI differ widely according to the host country category. Per capita income is positive and significantly related to North-South FDI, which indicates a preference for countries with higher capital-labor ratios. However, per capita income is not an important variable explaining South-South FDI. The results also demonstrate that the average institutional quality is highly significant for North-South FDI. Average institutional quality is only significant at the 10% level for South-South FDI. Human capital also appears to be a significant factor for investors from the North. Information friction as proxied by the distance variable is highly significant for both North-South and South-South FDI. Put differently, investors underinvest in markets that are remote and where access to local information may be difficult. Macroeconomic stability, proxied by inflation volatility, has the expected sign, though it is insignificant for both North-South and South-South FDI. Nevertheless, North-South FDI is sensitive to the cost of doing business, reflecting the importance of local microeconomic factors. Market size as proxied by the host country's GDP is significant for both models. Among the traditional gravity variables, nearly all the variables are significantly related to South-South flows, whereas only colonial ties and and common language are significantly related to North-South flows.

However, it is possible that China may be driving the results. China constitutes a fairly large share of North-South and South-South flows. Moreover, as noted by Chapter 1, there has long been an issue of 'round-tripping' of investment in China. Preferential treatment offered to foreign investors in China motivates local firms to move money offshore and then bring it back to China disguised as FDI. Models (5) and (6) exclude China to account for the potential biases. As seen in **Table 2.2**, average institutional quality remains robust to the exclusion of China.

Table 2.3 and **Table 2.4** show which components of the average institutional quality are driving the results. To avoid multicollinearity, the institutional quality components are

added one by one. Voice and accountability, political stability and absence of violence, government effectiveness, and regulatory quality are shown from models (1) to (8). Other components such as control of corruption and rule of law are insignificant and thus I do not report the results. The results reveal that Southern investors perceive government accountability and regulatory quality as less of a concern than their Northern counterparts. However, political stability turns out to be highly significant, which indicates that political violence and conflict abroad is an important determinant of FDI from the South. The explanation for this may rest on the perception that political instability cannot be effectively mitigated (*World investment and political risk*, 2009). **Table 2.5** and **Table 2.6** disaggregate the cost of doing business components. The components enter the specification as distinct variables. The results show that access to credit and ease of trading across borders are significantly associated with FDI from the North. Trading across borders is also significantly related to South-South FDI. The explanation for this may rest on the traditional proximity-concentration literature. A multinational may rely on intermediate goods which are imported from elsewhere. It may also cater to markets outside the host country. Thus, foreign investors might be attentive to the cost of trading across borders.

2.6.1.2 Role of natural resource endowments and RTAs

One of the primary motivations for overseas investments according to the eclectic paradigm is resource-seeking (Dunning, 1981). According to UNCTAD (2007), Southern investors have increasingly pursued foreign exploration projects owing to an increased demand and soaring prices of natural resources. Resource-seeking FDI is likely to ignore high investment barriers as long as they do not prevent the firm from acquiring domestic resources. According to Aleksynska and Havrylchyk (2013), resource-seeking FDI is influenced by considerations other than institutional quality.

A different factor aimed at reducing the investor's risk of investing abroad is a regional free trade agreement (RTA). The last two decades have seen a surge in RTAs. According to WTO estimates, 406 RTAs were in effect worldwide in 2015 compared with only 19 in 1989. Most of this growth is driven by the South-South RTAs. RTAs can affect the incentives for FDI in multiple ways (Blomström & Kokko, 1997; Jaumotte, 2004).[12] They can harmonize

[12]Regional trade agreements (RTAs) are defined as reciprocal trade agreements between two or more

regulatory and institutional frameworks. Coe, Kelly, and Yeung (2007) note that RTAs often comprise commitments to domestic reforms that create a more conducive political and investment climate for multinationals to invest, thereby reducing institutional risk. Thangavelu and Findlay (2011) show a positive effect of multilateral trade agreements and FDI inflows into the Asia-Pacific region. Mercosur trading bloc has also led to substantial FDI inflows into the Latin American region (Özden & Parodi, 2004; Yeyati, Stein, & Daude, 2004).

To capture the impact of natural resources, I add a variable of natural resource endowment of the host country, proximated by the subsoil resources in USD dollars per capita in the host country. RTA is captured by a dummy variable that includes free trade agreements and custom unions, regardless of whether they are bilateral, subregional, or regional in nature. The results in **Table 2.7** reveal that both RTA and natural resource endowment have a positive and statistically significant effect on FDI flows from the South, whereas the variables are insignificant for North-South FDI. They show that natural resources may not be a significant motivation for North-South FDI. With respect to RTA, the result is not entirely unexpected. South-South RTAs appear to have a much wider scope and coverage than its counterpart. They not only include tariff concessions but also address nontrade measures, such as investment, government procurement, and labor mobility (UNCTAD, 2008).

2.6.2 Robustness checks

So far, there has been no discussion of the endogeneity bias. FDI inflows and average institutional quality might be determined by an omitted third factor. It is possible that capital account liberalization might be a variable driving the results. In order to see if this is the case, I construct an index of capital controls. The index is a mean value of four variables that include exchange arrangements, payments restrictions for current transactions, payment restrictions for capital transactions, and repatriation requirements for export proceeds. Capital controls may deter FDI (Asiedu & Esfahani, 2001). They

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partners. They include free trade agreements and customs unions. Detailed information on RTAs is available at https://www.wto.org/english/tratop_e/region_e/region_e.htm

increase the costs associated with capital movements and associated transactions.[13] As seen in **Table 2.8** and **Table 2.9**, capital controls are negatively signed but not significant at the 5% level. Upon the addition of capital controls, the average institutional quality remains positive and significant. Another variable that might be an important factor is trade. A trade openness variable is constructed based on the sum of exports and imports as a share of output. Trade openness can positively influence the export-oriented FDI flows (UNCTAD, 2009). As shown in **Table 2.8** and **Table 2.9**, average institutional quality is robust to the inclusion of trade openness. Trade openness is positive and significant for FDI from the North. I also try standard measure of tax burden. If a country's tax burden is high relative to other countries, foreign investors may shift to countries with a less burdensome tax regime. Total tax rates have a significant and negative effect on FDI flows from the North. However, average institutional quality measure remains robust to its inclusion. I also include financial market development as potential drivers of FDI flows. Nasser and Gomez (2009) note that financial development affects the cost structure of investment projects. It provides better business opportunities for firms. Inclusion of this measure did not change the overall picture.

Reverse causation can also be a source of endogeneity. It is possible that bilateral FDI inflows affect the institutional quality of a country. More FDI inflows can strengthen institutional capacity in the host country through improved regulation and investor friendly environment. Following Alfaro et al. (2008), I employ a two-stage least squares (2SLS) regression to include instruments that could explain the institutional variation. I use legal origin as an instrument of average institutional quality. According to La Porta, Lopez-de Silanes, Shleifer, and Vishny (1999), a country's legal origin has a significant effect on its average institutional quality. For example, English common law offers stronger legal protection to investors than its counterparts. However, Acemoglu, Johnson, and Robinson (2001) disregard legal origin as a way to explain the average institutional quality. The European settlers set up worse institutions in places where they faced a difficult disease environment. They propose historical mortality rates of European settlers as an instrument

[13] Foreign investors may be able to overcome these problems through other channels such as transfer pricing. Thus, capital controls may be favored if the stabilization effect helps in reducing the occurrence of financial crisis.

of average institutional quality. The data on European settlers mortality rates come from Acemoglu et al. (2001). However, these rates are not available for the whole sample. Thus, my sample is reduced to 41 countries from the South.

Table 2.10 presents the first stage results in Panel A. As shown in model (1), I choose legal origin as an instrument of average institutional quality. Panel B presents the second stage results. There is a strong relationship between legal origin and average institutional quality. The F-statistic of legal origin is 12.42. In model (2), I choose European settler mortality rates as an instrument of average institutional quality. As shown in Panel B, average institutional quality remains significant. The F-statistic is 15.75. Model (3) reports the results using both settler mortality and legal origin as instruments for average institutional quality. This approach provides a stronger first stage fit. The p-value of 0.41 of the Sargan-Hansen J-test indicates instrument validity. The second stage coefficient on average institutional quality is statistically significant at the 1% level. The results demonstrate that the historically predetermined measure of institutional quality has a positive and significant impact on FDI.

2.7 Conclusion

Lucas paradox has provided a parsimonious explanation for the scarcity of capital flows to developing countries. The explanations range from human capital to institutional weakness. However, the gravity model accounts for the differences across countries which may eliminate the return differentials among countries. The chapter examines some of the explanations of Lucas paradox using a bilateral panel data set of North-South and South-South FDI flows. The chapter relies on the gravity model that accounts for the Lucas paradox across countries which may eliminate the return differentials among countries.

Everything else equal, the empirical evidence suggests that per capita income, human capital, and average institutional quality are not important variables explaining South-South FDI. However, political stability and absence of violence is a significant determinant of FDI from the South. The explanation for this may rest on the perception that political instability risks cannot be effectively mitigated. Moreover, information friction as proxied by the distance variable and most gravity variables are highly significant. Like Northern investors, Southern investors underinvest in markets that are remote and where access

to local information is difficult. Among the government policy variables, average cost of doing business variable is not a significant determinant of South-South FDI, whereas North-South FDI is significantly related to average cost of doing business. Macroeconomic instability, as proxied by inflation volatility, is not significant in any of the models. Finally, South-South FDI is substantially more sensitive to natural resource endowments and regional free trade agreements than North-South FDI.

To address the endogeneity problem, I undertake extensive robustness analysis. First, extra control variables are added to account for specification bias. Total tax rate and trade openness has a significant affect on FDI from the North, whereas only trade openness is significantly related to South-South FDI. Nevertheless, average institutional quality remains robust to the inclusion of additional control variables. Second, I estimate instrumental variable two-stage least squares models to address reverse causality between institutional quality and FDI. The model employs legal origin and settler mortality rates as historically predetermined proxies of institutional quality. The IV estimates suggest that historically predetermined institutional quality has a significant impact on FDI.

Institutional quality and human capital remain an important source for traditional North-South flows. However, the affects disappear once I observe the South-South flows. Moreover, reduction in trade barriers positively affects FDI from the South. From a policy perspective, since building up secure property rights and institutions is slow and costly for developing countries, ensuring political stability and absence of violence can provide an avenue to attract FDI from the South. However, FDI does not directly imply higher economic growth. [14] For many countries, reaping the advantages that may accrue from Southern FDI may be more challenging than Northern FDI. In particular, Southern FDI appears to be neutral to low levels of institution building and accumulation of human capital. It may reinforce the low-equilibria trap found in many developing countries. The results call for more research on host country effects of FDI from the South. Understanding the role of Southern FDI in employment and labor productivity may be a good channel to evaluate the real potential of such FDI as an essential engine of growth in developing countries.

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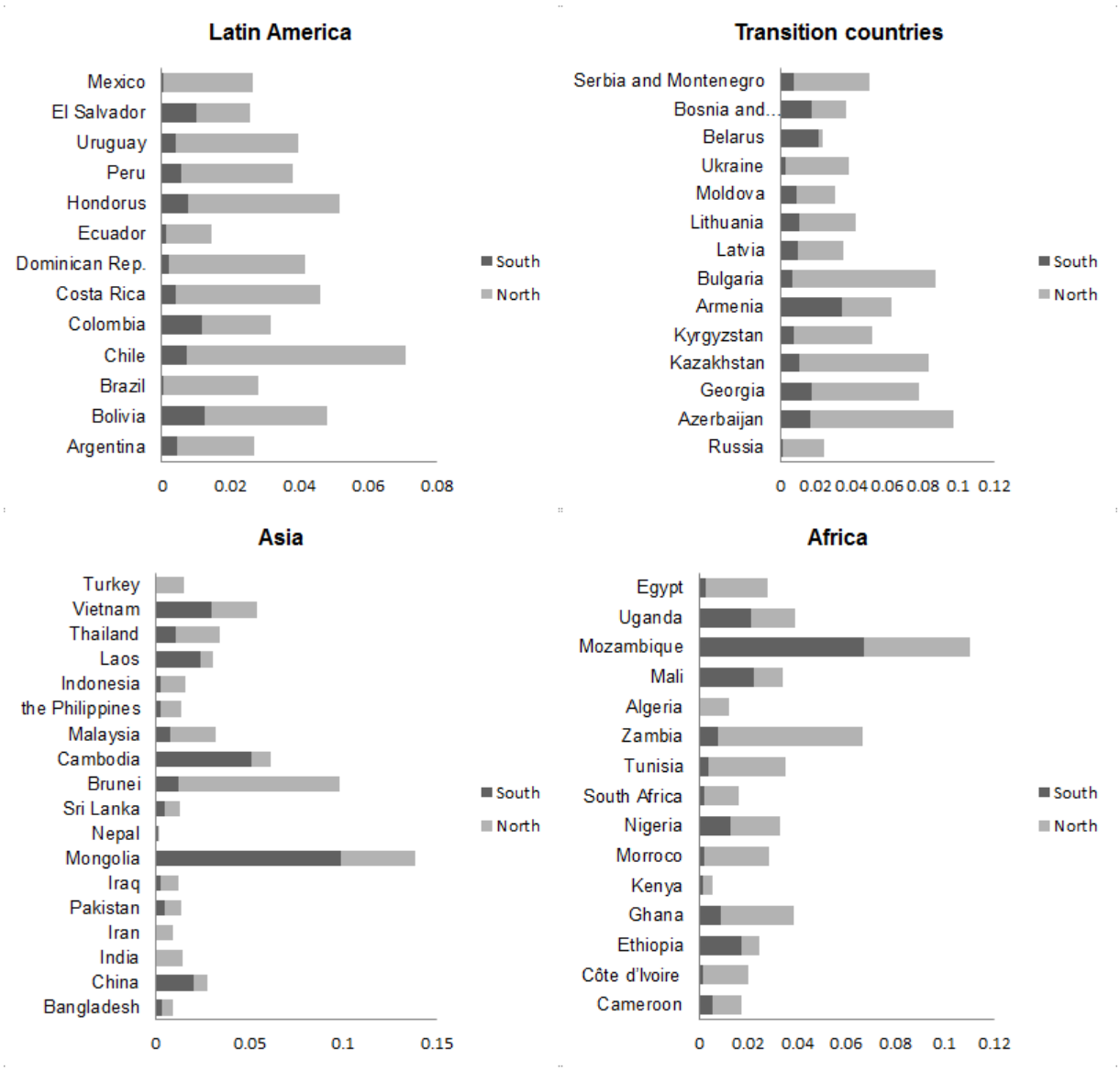
[14] See Durham (2000) and De Gregorio (2003) for a review of literature on the effect of FDI on growth.



Source: Author's construction

Figure 2.1. The share of FDI inflows in GDP in developing and transition economies (2004-2013)

Table 2.1. Descriptive statistics

Variable	Mean	*SD*	Minimum	Maximum
Log of bilateral FDI (North-South)	14.62	4.83	4.17	27.53
Log of bilateral FDI (South-South)	8.20	5.51	2.96	20.81
$\ln(GDP_{it})$	10.08	1.76	2.10	15.67
$\ln(GDP_{jt})$	6.27	1.46	1.87	8.78
$\ln(GDPC_{jt})$	3.71	0.73	1.71	4.44
Human capital (H_{jt})	5.61	2.82	0.46	11.51
Log of distance $(\ln D_{ij})$	9.08	1.10	4.82	10.67
Contiguity	0.10	0.29	0.00	1.00
Common Language	0.16	0.37	0.00	1.00
Colonial ties	0.07	0.24	0.00	1.00
Log of inflation volatility	4.72	6.01	0.69	7.68
Log of average institutional quality $(\ln IQL_{jt})$	2.37	1.59	3.77	4.52

Notes: The bilateral sample is composed of 110 countries for which all the main explanatory variables are available. Average institutional quality includes all the rating components from International Country Risk Guide, averaged over the relevant sample period. The components are voice and accountability, political stability and absence of violence, government effectiveness, rule of law, regulatory quality, and control of corruption. The index ranges from 0 to 10, where a higher score means lower risk. Years of schooling is years of total schooling in total population over the age of 26. Distance is constructed as the weighted average of the distances in thousands of kms from the capital city of the particular country to the capital cities of the other countries, using the total per capita GDP shares of the other countries as weights. Average cost of doing business includes the difficulty, costs, and time it would take a firm to start the business, deal with construction permits, register property, access credit, pay taxes, import and export goods, enforce contracts, and complete the bankruptcy process, averaged over the relevant sample period. See Appendices A and B for detailed explanations of all the variables and sources.

Table 2.2. Main results using OLS and Poisson PML, 2004-2013

Dependent variable is annual bilateral FDI inflows (Y_{ijt})

	Whole World	Whole World	North-South	South-South	North-South (ex. China)	South-South (ex. China)
	OLS	Poisson PML	Poisson PML	Poisson PML	Poisson PML	Poisson PML
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln(GDP_{jt})$	0.714***	0.421**	0.368**	0.205**	0.298**	0.187*
	(0.194)	(0.215)	(0.173)	(0.112)	(0.178)	(0.114)
$\ln(GDP_{it})$	0.454	0.335	0.253	0.192	0.215	0.164
	(0.328)	(0.308)	(0.210)	(0.227)	(0.219)	(0.238)
$\ln(GDPC_{jt})$	-0.402	0.412**	0.501**	0.388	0.486**	0.312
	(0.453)	(0.240)	(0.259)	(0.382)	(0.262)	(0.389)
Human capital	1.201	1.139*	1.162**	1.014	1.148**	0.951
	(0.984)	(0.886)	(0.680)	(0.797)	(0.694)	(0.819)
$\ln(D_{ijt})$	-0.853***	-0.425***	-0.628***	-0.588**	-0.612***	-0.535**
	(0.092)	(0.155)	(0.262)	(0.258)	(0.263)	(0.266)
Common language	0.653***	0.466***	0.582*	0.894***	0.613*	0.877***
	(0.171)	(0.102)	(0.438)	(0.317)	(0.439)	(0.321)
Colonial ties	0.943***	0.282***	0.264***	0.378***	0.251***	0.414***
	(0.099)	(0.081)	(0.093)	(0.064)	(0.094)	(0.086)
Contiguity	0.421***	0.220*	0.091	0.217**	0.098	0.350***
	(0.156)	(0.144)	(0.120)	(0.111)	(0.120)	(0.127)
Inflation volatility	-0.158	-0.136	-0.116	-0.130	-0.129	-0.136
	(0.254)	(0.261)	(0.266)	(0.258)	(0.262)	(0.257)
Cost of business	-0.010**	-0.008**	-0.005**	-0.002*	-0.004**	-0.002
	(0.006)	(0.004)	(0.003)	(0.002)	(0.003)	(0.002)
IQL_{jt}	0.801***	0.685***	0.644***	0.382*	0.717***	0.330*
	(0.282)	(0.277)	(0.242)	(0.245)	(0.250)	(0.249)
Constant	9.541***	27.255***	28.736***	30.712***	26.283***	33.822***
	(2.791)	(7.911)	(7.872)	(7.782)	(7.981)	(7.820)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	17295	18280	6184	12096	5992	10090
R-squared	0.63	0.67	0.66	0.65	0.66	0.68

Notes: t-values, reported in parentheses, are based on White's correction for heteroskedasticity; multicollinearity has been tested by the creation of variance inflation factors (VIF); all regressions pass at conventional levels; *** significant at 1% level; * significant at 5% level; * significant at 10% level.

Table 2.3. Disaggregated institutional quality for North-South, 2004-2013

Dependent variable is annual bilateral FDI inflows (Y_{ijt})

	North-South			
	ACCT	POLS	GOVT	REG
	(1)	(2)	(3)	(4)
$\ln(GDP_{jt})$	0.461***	0.458***	0.507***	0.447***
	(0.072)	(0.075)	(0.070)	(0.076)
$\ln(GDP_{it})$	0.264	0.211	0.256	0.281
	(0.202)	(0.217)	(0.211)	(0.211)
$\ln(GDPC_{jt})$	0.479**	0.483**	0.462***	0.480***
	(0.245)	(0.248)	(0.237)	(0.245)
Human capital	1.158**	1.128**	1.160**	1.141**
	(0.676)	(0.664)	(0.679)	(0.670)
$\ln(D_{ijt})$	-0.614***	-0.617***	-0.624***	-0.653***
	(0.252)	(0.252)	(0.251)	(0.251)
Common	0.558*	0.550*	0.571*	0.551*
language	(0.436)	(0.429)	(0.441)	(0.429)
Colonial ties	0.203***	0.201***	0.208***	0.200***
	(0.021)	(0.022)	(0.023)	(0.022)
Contiguity	0.091	0.085	0.088	0.096
	(0.113)	(0.117)	(0.117)	(0.111)
Inflation	-0.111	-0.108	-0.110	-0.105
volatility	(0.272)	(0.275)	(0.272)	(0.276)
Cost of business	-0.004**	-0.005**	-0.005**	-0.004**
	(0.002)	(0.003)	(0.003)	(0.002)
IQL_{jt}	0.621**	0.704***	0.852***	0.601**
	(0.283)	(0.281)	(0.280)	(0.282)
Constant	30.492***	27.437***	28.487***	33.835***
	(0.535)	(0.580)	(0.543)	(0.526)
Year fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Observations	6184	6184	6184	6184
R-squared	0.63	0.64	0.64	0.63

Notes: *t*-values, reported in parentheses, are based on White's correction for heteroskedasticity; multicollinearity has been tested by the creation of variance inflation factors (VIF); all regressions pass at conventional levels; *** significant at 1% level; * significant at 5% level; * significant at 10% level.

Table 2.4. Disaggregated institutional quality for South-South, 2004-2013

Dependent variable is annual bilateral FDI inflows (Y_{ijt})

	South-South			
	ACCT	POLS	GOVT	REG
	(5)	(6)	(7)	(8)
$\ln(GDP_{jt})$	0.218**	0.222**	0.216**	0.203**
	(0.120)	(0.108)	(0.110)	(0.111)
$\ln(GDP_{it})$	0.388*	0.383*	0.376*	0.372*
	(0.248)	(0.238)	(0.230)	(0.228)
$\ln(GDPC_{jt})$	0.357	0.341	0.359	0.332
	(0.320)	(0.323)	(0.320)	(0.323)
Human capital	1.013	1.011	1.019	1.012
	(0.795)	(0.796)	(0.794)	(0.795)
$\ln(D_{ijt})$	-0.570**	-0.574**	-0.582**	-0.566**
	(0.284)	(0.283)	(0.289)	(0.272)
Common	0.901***	0.892***	0.917***	0.906***
language	(0.281)	(0.273)	(0.284)	(0.281)
Colonial ties	0.312***	0.310***	0.349***	0.309***
	(0.068)	(0.069)	(0.062)	(0.069)
Contiguity	0.236**	0.261**	0.230**	0.227**
	(0.137)	(0.132)	(0.137)	(0.139)
Inflation	-0.128	-0.125	-0.129	-0.122
volatility	(0.260)	(0.261)	(0.261)	(0.263)
Cost of business	-0.002*	-0.004*	-0.002*	-0.002*
	(0.001)	(0.002)	(0.001)	(0.001)
IQL_{jt}	0.311	0.436***	0.390*	0.345
	(0.271)	(0.260)	(0.270)	(0.277)
Constant	35.578***	24.965***	29.384***	32.691***
	(0.663)	(0.654)	(0.643)	(0.667)
Year fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Observations	12096	12096	12096	12096
R-squared	0.64	0.65	0.64	0.64

Notes: *t*-values, reported in parentheses, are based on White's correction for heteroskedasticity; multicollinearity has been tested by the creation of variance inflation factors (VIF); all regressions pass at conventional levels; *** significant at 1% level; * significant at 5% level; * significant at 10% level.

Table 2.5. Disaggregated ease of doing business for North-South, 2004-2013

Dependent variable is annual bilateral FDI inflows (Y_{ijt})

	North-South				
	(1)	(2)	(3)	(4)	(5)
$\ln(GDP_{jt})$	0.372**	0.385**	0.298**	0.374**	0.323**
	(0.179)	(0.178)	(0.181)	(0.179)	(0.180)
$\ln(GDP_{it})$	0.215	0.243	0.221	0.252	0.208
	(0.218)	(0.202)	(0.218)	(0.204)	(0.219)
$\ln(GDPC_{jt})$	0.780**	0.796*	0.697**	0.751**	0.639**
	(0.271)	(0.268)	(0.295)	(0.278)	(0.297)
Human capital	1.122**	1.148**	1.021**	1.134**	1.013**
	(0.189)	(0.183)	(0.191)	(0.184)	(0.196)
$\ln(D_{ijt})$	-0.527***	-0.542***	-0.482***	-0.539**	-0.446***
	(0.168)	(0.163)	(0.192)	(0.164)	(0.190)
Common language	0.394*	0.347*	0.325*	0.358*	0.311*
	(0.245)	(0.275)	(0.281)	(0.272)	(0.288)
Colonial ties	0.133***	0.168***	0.087***	0.142***	0.080***
	(0.092)	(0.091)	(0.097)	(0.092)	(0.098)
Contiguity	0.083	0.088	0.076	0.084	0.075
	(0.102)	(0.101)	(0.105)	(0.102)	(0.105)
Inflation volatility	-0.112	-0.145	-0.107	-0.121	-0.102
	(0.281)	(0.278)	(0.282)	(0.280)	(0.284)
Starting a business	-0.003*				-0.002
	(0.001)				(0.001)
Getting credit		-0.006**			-0.005*
		(0.002)			(0.003)
Trading across borders			-0.007***		-0.006***
			(0.002)		(0.002)
Enforcing contracts				-0.003*	-0.002
				(0.001)	(0.001)
IQL_{jt}	0.518***	0.572***	0.492***	0.527***	0.488***
	(0.490)	(0.481)	(0.494)	(0.489)	(0.497)
Constant	31.451***	29.812***	29.241***	33.326***	28.842***
	(0.530)	(0.537)	(0.532)	(0.546)	(0.524)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	6184	6184	6184	6184	6184
R-squared	0.63	0.63	0.63	0.63	0.67

Notes: t-values, reported in parentheses, are based on White's correction for heteroskedasticity; multicollinearity has been tested by the creation of variance inflation factors (VIF); all regressions pass at conventional levels; *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 2.6. Disaggregated ease of doing business for South-South, 2004-2013

Dependent variable is annual bilateral FDI inflows (Y_{ijt})

	South-South				
	(6)	(7)	(8)	(9)	(10)
$\ln(GDP_{jt})$	0.276**	0.282**	0.184**	0.279**	0.175**
	(0.124)	(0.121)	(0.137)	(0.123)	(0.138)
$\ln(GDP_{it})$	0.108	0.122	0.103	0.114	0.101
	(0.262)	(0.256)	(0.263)	(0.259)	(0.263)
$\ln(GDPC_{jt})$	0.265	0.281	0.179	0.270	0.175
	(0.290)	(0.284)	(0.293)	(0.289)	(0.294)
Human capital	1.017	1.025	1.008	1.020	1.002
	(0.195)	(0.194)	(0.196)	(0.195)	(0.196)
$\ln(D_{ijt})$	-0.394***	-0.407***	-0.281***	-0.401***	-0.205***
	(0.333)	(0.329)	(0.340)	(0.330)	(0.348)
Common language	0.679***	0.694***	0.585***	0.682***	0.498***
	(0.281)	(0.275)	(0.288)	(0.276)	(0.290)
Colonial ties	0.163***	0.195***	0.098***	0.182***	0.083***
	(0.082)	(0.079)	(0.090)	(0.080)	(0.095)
Contiguity	0.568**	0.581**	0.476**	0.580**	0.459**
	(0.082)	(0.080)	(0.088)	(0.080)	(0.092)
Inflation volatility	-0.109	-0.112	-0.102	-0.109	-0.100
	(0.260)	(0.259)	(0.261)	(0.260)	(0.261)
Starting a business	-0.002				-0.0008
	(0.002)				(0.002)
Getting credit		-0.003*			-0.002
		(0.002)			(0.002)
Trading across borders			-0.006***		-0.005***
			(0.002)		(0.002)
Enforcing contracts				-0.002	-0.0007
				(0.002)	(0.002)
IQL_{jt}	0.214*	0.247*	0.188*	0.224*	0.113*
	(0.578)	(0.573)	(0.590)	(0.575)	(0.591)
Constant	32.438***	30.401***	30.012***	32.563***	29.742***
	(0.633)	(0.615)	(0.615)	(0.640)	(0.612)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	12096	12096	12096	12096	12096
R-squared	0.65	0.65	0.65	0.65	0.68

Notes: t-values, reported in parentheses, are based on White's correction for heteroskedasticity; multicollinearity has been tested by the creation of variance inflation factors (VIF); all regressions pass at conventional levels; *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 2.7. Natural resource and RTAs, 2004-2013

Dependent variable is annual bilateral FDI inflows (Y_{ijt})

	North-South			South-South		
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln(GDP_{jt})$	0.372*	0.311**	0.305**	0.212**	0.249**	0.210**
	(0.180)	(0.178)	(0.179)	(0.111)	(0.118)	(0.112)
$\ln(GDP_{it})$	0.182	0.274	0.177	0.182	0.214	0.166
	(0.240)	(0.216)	(0.242)	(0.242)	(0.237)	(0.245)
$\ln(GDPC_{jt})$	0.458**	0.472**	0.425**	0.340	0.370	0.315
	(0.212)	(0.215)	(0.213)	(0.301)	(0.297)	(0.304)
Human capital	1.182**	1.101**	1.089*	0.972	0.984	0.931
	(0.686)	(0.661)	(0.662)	(0.806)	(0.807)	(0.810)
$\ln(D_{ijt})$	-0.625***	-0.606***	-0.590***	-0.547**	-0.505**	-0.496**
	(0.253)	(0.247)	(0.250)	(0.251)	(0.256)	(0.258)
Common language	0.546*	0.533*	0.530*	0.784***	0.825***	0.741***
	(0.430)	(0.413)	(0.415)	(0.297)	(0.310)	(0.313)
Colonial ties	0.292***	0.276***	0.264***	0.292***	0.314***	0.269***
	(0.072)	(0.067)	(0.068)	(0.050)	(0.057)	(0.060)
Contiguity	0.069	0.087	0.040	0.201**	0.230**	0.197*
	(0.120)	(0.115)	(0.118)	(0.117)	(0.120)	(0.122)
Inflation volatility	-0.063	-0.057	-0.022	-0.101	-0.120	-0.093
	(0.212)	(0.215)	(0.216)	(0.241)	(0.239)	(0.242)
Cost of business	-0.002**	-0.002**	-0.002**	-0.003*	-0.002	-0.002
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
Natural resource	0.513		0.492	0.640**		0.610**
	(0.411)		(0.414)	(0.277)		(0.280)
RTA_{ijt}		0.483*	0.465		0.302***	0.267***
		(0.376)	(0.379)		(0.108)	(0.113)
IQL_{jt}	0.640***	0.655***	0.655***	0.406*	0.365	0.340
	(0.264)	(0.267)	(0.267)	(0.296)	(0.290)	(0.291)
Constant	30.521***	29.101***	28.655***	29.952***	29.469***	27.182***
	(0.530)	(0.522)	(0.572)	(0.612)	(0.611)	(0.620)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6184	6184	6184	12096	12096	12096
R-squared	0.64	0.64	0.64	0.66	0.65	0.68

Notes: t-values, reported in parentheses, are based on White's correction for heteroskedasticity; multicollinearity has been tested by the creation of variance inflation factors (VIF); all regressions pass at conventional levels; *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 2.8. Robustness I: Additional control variables for North-South

Dependent variable is annual bilateral FDI inflows (Y_{ijt})

	North-South			
	(1)	(2)	(3)	(4)
$\ln(GDP_{jt})$	0.301**	0.295*	0.290**	0.314**
	(0.137)	(0.132)	(0.137)	(0.140)
$\ln(GDP_{it})$	0.219	0.212	0.283	0.218
	(0.234)	(0.235)	(0.210)	(0.234)
$\ln(GDPC_{jt})$	0.683***	0.534**	0.552**	0.570**
	(0.232)	(0.237)	(0.242)	(0.259)
Human capital	1.210**	1.173**	1.198**	1.248**
	(0.691)	(0.685)	(0.687)	(0.698)
$\ln(D_{ijt})$	-0.601***	-0.622***	-0.610***	-0.591***
	(0.247)	(0.252)	(0.249)	(0.241)
Common	0.539*	0.521*	0.540*	0.532*
language	(0.347)	(0.342)	(0.348)	(0.343)
Colonial ties	0.201***	0.188***	0.181***	0.213***
	(0.074)	(0.069)	(0.068)	(0.078)
Contiguity	0.080	0.094*	0.085	0.078
	(0.117)	(0.110)	(0.116)	(0.117)
Inflation	-0.062	-0.085	0.041	-0.060
volatility	(0.210)	(0.205)	(0.214)	(0.210)
Cost of	-0.002**	-0.002**	-0.001*	-0.002**
business	(0.001)	(0.001)	(0.001)	(0.001)
Removal of	0.552			
capital controls	(1.380)			
Trade openness		0.387**		
		(0.201)		
Tax burden			-0.608	
			(1.672)	
Finance				-0.168
development				(0.481)
IQL_{jt}	0.612***	0.685***	0.601***	0.629***
	(0.290)	(0.287)	(0.288)	(0.292)
Constant	28.155***	27.925***	27.438***	28.962***
	(0.521)	(0.517)	(0.516)	(0.532)
Year fixed	Yes	Yes	Yes	Yes
effects				
Country fixed	Yes	Yes	Yes	Yes
effects				
Observations	5469	6184	6184	5858
R-squared	0.65	0.66	0.65	0.65

Notes: t-values, reported in parentheses, are based on White's correction for heteroskedasticity; multicollinearity has been tested by the creation of variance inflation factors (VIF); all regressions pass at conventional levels; *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 2.9. Robustness I: Additional control variables for South-South

Dependent variable is annual bilateral FDI inflows (Y_{ijt})

	South-South			
	(5)	(6)	(7)	(8)
$\ln(GDP_{jt})$	0.282**	0.231**	0.267**	0.294**
	(0.122)	(0.117)	(0.120)	(0.128)
$\ln(GDP_{it})$	0.198	0.184	0.190	0.206
	(0.240)	(0.243)	(0.241)	(0.240)
$\ln(GDPC_{jt})$	0.411	0.388	0.404	0.417
	(0.391)	(0.395)	(0.390)	(0.392)
Human capital	0.975	0.982	0.972	0.984
	(0.806)	(0.805)	(0.806)	(0.807)
$\ln(D_{ijt})$	-0.526**	-0.510**	-0.520**	-0.537**
	(0.240)	(0.237)	(0.238)	(0.253)
Common	0.818***	0.816***	0.815***	0.822***
language	(0.309)	(0.308)	(0.308)	(0.311)
Colonial ties	0.315***	0.304***	0.310***	0.332***
	(0.057)	(0.054)	(0.056)	(0.060)
Contiguity	0.272**	0.248**	0.251**	0.298**
	(0.144)	(0.141)	(0.142)	(0.151)
Inflation	-0.106	-0.101	-0.102	-0.117
volatility	(0.240)	(0.241)	(0.241)	(0.238)
Cost of	-0.002*	-0.002*	-0.002*	-0.003*
business	(0.002)	(0.002)	(0.002)	(0.002)
Removal of	0.371			
capital controls	(1.428)			
Trade openness		0.313*		
		(0.220)		
Tax burden			-0.578	
			(1.691)	
Finance				-0.120
development				(0.486)
IQL_{jt}	0.312*	0.330	0.368*	0.311*
	(0.231)	(0.235)	(0.240)	(0.231)
Constant	30.732***	29.340***	30.182***	29.720***
	(0.622)	(0.613)	(0.618)	(0.615)
Year fixed	Yes	Yes	Yes	Yes
effects				
Country fixed	Yes	Yes	Yes	Yes
effects				
Observations	11381	12096	12096	11770
R-squared	0.64	0.64	0.64	0.64

Notes: t-values, reported in parentheses, are based on White's correction for heteroskedasticity; multicollinearity has been tested by the creation of variance inflation factors (VIF); all regressions pass at conventional levels; *** significant at 1% level; ** significant at 5% level; * significant at 10% level.

Table 2.10. Robustness II: Two-stage least squares

Panel A			
First stage regression	(1)	(2)	(3)
French legal origin	-2.457***		-1.077***
	(0.462)		(0.478)
Log settler mortality		-0.864***	-0.951***
		(0.205)	(0.210)
Panel B			
Second stage regression	(1)	(2)	(3)
IQL_j	0.715***	0.458**	0.528***
	(0.254)	(0.191)	(0.166)
$\ln(GDPC_j)$	0.474	0.172	0.245
	(0.823)	(1.388)	(1.401)
Countries	41	41	41
Sargan-Hansen J-test			0.41

Notes: The table reports instrumental variable estimates. Panel A reports second stage estimates of two stage least squares estimates. The dependent variable is the bilateral FDI from country i to country j. Panel B reports estimates of the corresponding first stage models.

CHAPTER 3

SOUTHERN MULTINATIONALS AND PRODUCTIVE EFFICIENCY

3.1 Introduction

Foreign direct investment outflow from developing countries has increased substantially in recent years. South-South FDI has stayed strong even as traditional North-South FDI has been volatile amidst the global slowdown. The surge in South-South FDI has motivated developing countries to embark upon a series of policies aimed at attracting South FDI. Some of these policies aim to fast track new investments and equalize operating conditions for foreign capital. Other policies provide monetary incentives for foreign investors, including special and preferential treatment in taxation and lax environmental regulations, whereas policies that level the playing field for foreign firms operating in a country are prerequisites for FDI seeking higher yields; the policies that subsidize foreign investors through tax incentives and lenient regulations may be justified only if these investments raise productivity and contribute to spillovers in the local economy.

The existing literature covers several channels through which foreign ownership leads to productivity gains. First, foreign affiliates are more efficient than their domestic counterparts. They have greater operational advantages and assets that lead to higher productivity (Arnold & Javorcik, 2009; E., Sjöholm, & Sun, 2010; Markusen, 2004). Second, foreign affiliates may produce positive externalities benefiting local firms through training local employees hired next by local firms, thus enhancing technology imitation or simply through backward or forward linkages. Third, potential increases in local competition following the entry of foreign affiliates may also be considered as externalities contributing to productivity spillovers. That said, the entry of foreign affiliates may also adversely affect the productivity of local firms by disturbing the existing market equilibrium. It may erode the market power of local firms, thereby reducing their productivity. Despite this, foreign

ownership is shown to have a positive effect on productivity.

Until now, most of the studies on productivity of FDI have focused on traditional North-South flows. However, as more Southern investors internationalize, policymakers must grapple with this subject. South FDI is different from the traditional North FDI. It defies the traditional neoclassical framework that applies to North FDI. South FDI faces disadvantages in terms of size and advanced technology (Cuervo-Cazurra & Genc, 2008). However, the informational advantage of South FDI may overcome North FDI's advantage in proprietary assets (Dixit, 2012). Little empirical evidence on the relationship between South FDI and productivity in developing countries exists. Given the rapid expansion of South FDI, this chapter attempts to fill this void.

The purpose of this chapter is to examine the contribution of FDI in enhancing efficiency in Rwanda, testing first the hypothesis that North and South FDI cause different productivity shifts.[1] Then, productivity spillovers are analyzed and their relationship to North and South FDI is also explored. In addition to the usual productivity determinants, the consequences of other explanatory variables on the productivity of firms are also taken into account. The chapter focuses on Rwanda because it is among the world's poorest nations and faces particular challenges in leveraging FDI for development. It has low levels of human capital accumulation, a history of political instability, and is landlocked and small in size. However, in recent years, Rwanda has embarked upon stabilization policies and a series of structural reforms aimed at attracting inward FDI. The inward FDI in Rwanda to date has increased more than threefold. Moreover, a large share of inward FDI has come from other developing countries.

As a benchmark, the empirical model is estimated using the ordinary least squares (OLS) estimator. However, the distribution of productivity is analyzed and is found to be skewed with a long right tail. Formal testing leads to a rejection of the usual assumption of normality of labor productivity. In this case, OLS would yield estimates not representative of the entire firm distribution. For this reason, the quantile regression technique is employed. By estimating quantile regressions, I am able first to test for

[1]The definition of FDI is as proposed in Balance of Payments Manual: Fifth Edition (BPM5) by the International Monetary Fund (IMF). A firm requires a 10% or more of equity ownership from a foreign investor to qualify as foreign-owned.

differences in productivity by North and South FDI at various quantiles and second, I take into account any possible bias due to long tails and unoberseved heterogeneity among firms. The estimates produced by quantile regressions are considered robust as opposed to the estimates produced by OLS.

My empirical findings are based on a sample of 6,707 private sector firms producing in Rwanda in 2014. The plant-level data are collected through the Rwanda Establishment Census 2014. While the data set lacks time dimension, it contains very rich information on many aspects of firm's state and behavior. The findings contribute to the literature in two major ways. First, productivity in Rwanda is improved with the entry of both North and South FDI, although the coefficient estimate of North FDI is stronger than that of South FDI. Second, the productivity spillovers stemming from South FDI are limited to low-productivity local firms, whereas the presence of North FDI causes productivity spillovers across the productivity conditional distribution. These spillovers suggest that policy recommendations with respect to attracting FDI cannot be generalized. The recommendations should take into account the policy objectives of an economy as well as the firm productivity distribution involved.

The rest of the chapter is organized as follows. Section 3.2 provides a brief review of the previous literature. Section 3.3 describes the data and provides descriptive statistics. Section 3.4 motivates my econometrics approach. Section 3.5 reports the main econometrics results and Section 3.6 concludes.

3.2 Literature review

With a population expected to roughly double by 2050 and a gross domestic product (GDP) growth rate of more than 5% a year, Africa is the world's second-fastest developing continent. However, Africa faces the challenge of creating enough jobs to support its growing working-age population—especially the increasing number of young people. The pace of job creation must accelerate to keep up with the number of people who need employment and to maintain high levels of economic growth. Until now, only a few African workers have found work in the formal sector. Most find themselves trapped in the informal economy, characterized by low wages and productivity. FDI can play a catalyst role in productivity growth in sub-Saharan Africa. Within the past decade, sub-Saharan

African countries have made significant strides in attracting FDI from the South. However, the contribution to productivity of FDI from the South remains moot.

The presence of foreign affiliates affect productivity in several ways. Foreign affiliates are inherently disadvantaged relative to local firms. They have less knowledge of local markets and practices. However, they are able to overcome their informational disadvantage by possesing firm-specific advantages in the form of proprietary assets such as technology and management, and knowledge-capital (Cuervo-Cazurra & Genc, 2008). These proprietary assets act as a joint input across affiliates and give rise to scale economies at the firm level (Markusen, 2004). Local firms may also benefit from the productivity spillovers. Productivity spillovers occur when the entry of foreign affiliates leads to efficiency or productivity benefits for local firms (Blomström & Kokko, 1998). Local firms may be able to improve their productivity by hiring workers trained at foreign affiliates. Proprietary assets may be observed and imitated. However, the entry of foreign affiliates into a market may also reduce the productivity of local firms through a market-stealing effect, causing them to cut production, hence increasing their average cost (Bernard, Eaton, Jensen, & Kortum, 2003). On the other hand, local firms can benefit from having backward and forward linkages with foreign firms (Crespo & Fontoura, 2007).

The first strand of literature exploring whether foreign investment results in beneficial effects focuses on macroeconomic factors and cross-country analyses using aggregate data. Another strand focuses on productivity effects at the firm level. For the purpose of this chapter, I focus on the latter since increases in firm productivity feed into aggregate productivity (Syverson, 2011). Lipsey (2004) maintains that although the foreign owned firms are more productive and pay higher average wages, their spillover effect on local firms is much less clear. Görg and Greenaway (2004) show that the evidence on foreign ownership and productivity remains moot. It varies based on the study methodology and data employed. Nevertheless, several empirical studies examine the effect of foreign ownership on firm productivity in developing and developed countries.

I will begin by reviewing the evidence at the macro level. Using a cross-country panel data set, Nourzad (2008) shows that increased FDI is positively related to potential output in both developing and developed countries. However, this effect is more pronounced in developed than in developing countries. Fillat and Woerz (2011) examine the effect of

foreign ownership on productivity at the industry and country levels. They find that FDI is positively related to productivity in industries characterized by export orientation and high capital investments. More recently, Waldkirch (2014) has observed the relationship between foreign presence and productivity across 118 countries. Waldkirch's results show that foreign firms are more productive than local firms in developing countries.

The study by Blomström and Wolff (1994) is among the earliest attempts to consider the relationship between foreign ownership and productivity at the firm level. They estimate the impact of industry foreign participation on labor productivity growth of Mexican manufacturing firms. The results show that foreign firms generate positive externalities and labor productivity growth is positively associated with foreign participation. Aitken and Harrison (1999) investigate whether foreign equity participation in Venezuela leads to greater firm productivity. They find some evidence that even though foreign ownership is positively correlated with establishment productivity, it negatively affects the productivity of domestically owned establishments. Blomström and Sjöholm (1999) find some evidence that foreign-owned firms have comparatively higher levels of labor productivity. However, export-oriented local firms do not benefit from FDI spillovers, whereas firms that service only the local market do benefit from foreign presence.

Jordaan (2005, 2008) uses data from the 1993 Industrial Census to examine positive externalities from FDI on labor productivity of local establishments. He finds that foreign ownership has a significant and positive effect on labor productivity. The effect is more common in industries where foreign investors tend to crowd in. Arnold and Javorcik (2009) provide a comprehensive study of a wide range of firm-level outcomes, including productivity growth. They find that local firms acquired by foreign investors in Indonesia experiences greater productivity growth than domestic firms. The restructuring at firm following acquisition raises investment, employment, and wages. Liu (2008) investigates Chinese firms to provide evidence that foreign presence is negatively related to productivity levels. However, Waldkirch and Ofosu (2010) find that foreign presence has a positive effect on productivity levels at manufacturing firms in Ghana.

I now turn to a brief discussion of the data and descriptive statistics.

3.3 Data and descriptive statistics

Data are drawn at the establishment-level collected through the Rwanda Establishment Census 2014. The census provides a profile of all establishments in the country excluding governmental establishments providing not-for-sale governmental services. The questionnaire covers extensive information on domestic and foreign establishments. The main objective of the census is to provide a comprehensive profile of all economic activities practiced by establishments in Rwanda. The characteristics considered are economic activity, ownership, registration of establishment, capital employed, labor employed, taxation, and payment status. The data collection covered all 40 districts and was conducted during a period of 26 days from 24th November to 24th December in 2014.

In my analysis, I consider the sample of private sector establishments registered with the Rwanda Revenue Authority (RRA) along the dimensions of size (1-3, 4-30, 31-100 or 100+ employees), ownership (domestic or foreign), and sector (ISIC Rev. 3.1 2-digit level).[2] Nearly 90% of the sample is comprised of single-unit establishments.[3] The sample has 6,651 establishments, of which 476 (7.16%) are foreign affiliates. Of 476 foreign affiliates, 211 are North-owned and 265 are South-owned.[4] The services sector accounts for the largest share of enterprises, followed by manufacturing. The capital and largest city in Rwanda, Kigali, has the highest concentration of firms. More than half the firms are small and medium enterprises (SMEs) employing between 4 to 100 employees. The total number of workforce employed is 157,827, of which 57,291 are females. Most of the workforce is concentrated in wholesale and retail activities, education, and manufacturing.

The available establishment-level variables include the level of employment, firm age, value of firm sales, labor productivity, capital-labor ratio, share of female in total employment, and share of foreign in total employment. The ownership variable takes the value 1 if the firm is a foreign affiliate and 0 otherwise. **Table 3.2** presents the descriptive statistics

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[2] An establishment is defined as the smallest unit with proper equipment and personnel to produce goods or services.

[3] The questionnaires were only distributed to single-unit enterprise or a head office of a multi-unit establishment. For a multi-unit establishment, a head office had to fill in questionnaires for brance offices.

[4] Following much of the existing literature a firm is defined as foreign-owned if 10% or more of its equity is held by foreign nationals.

of firms by ownership and economic sector. Due to differences in firm size and economic activity, some of the variables have a large standard deviation. The table indicates that in the majority of cases the mean value is larger for foreign affiliates. Foreign affiliates are more capital-intensive and have higher productivity levels than local firms. They also have a greater share of foreign employees, whereas local firms have greater value of sales and female employees than their domestic counterparts.

Lastly, the use of this data set brings with it certain advantages and limitations. The main advantage is that the data are representative for the entire sample of enterprises in Rwanda. Also, the only other census data previously made available are for 2011. However, the present census includes a much wider set of variables, which speaks to its uniqueness. The disadvantages must also be noted. The census data do not provide a matched employer-employee database, which means that my analysis is not able to control for workforce heterogeneity at the individual level. It is also a single cross-section with no time-series variation. Thus, I am unable to control for unobserved firm heterogeneity through the use of firm fixed effects.

3.4 Empirical strategy

3.4.1 Main model

The hypothesis I seek to test in this chapter can be formulated within a neoclassical production theory framework. Assuming a standard Cobb-Douglas production function:

$$Q = AK^{\alpha}L^{1-\alpha} \tag{3.1}$$

where Q, K, and L are production, capital, and labor, respectively. A is the efficiency parameter.

Production can be stated as a function of the capital–labor ratio $k = (K/L)$:

$$Q = A\left(K/L\right)^{\alpha} L = Ak^{\alpha}L \tag{3.2}$$

Dividing both sides by L gives the physical product of labor $y = (Q/L)$:

$$y_{ij} = Ak^{\alpha} \tag{3.3}$$

Finally, stating Eq. (3.3) in log-linear form and adopting its intensive form, I obtain:

$$\ln y_{ijk} = \alpha_0 + \alpha_1 \ln k_{ijk} + e_{ijk} \tag{3.4}$$

The equation states that the estimated labor productivity y_{ijk} of the i^{th} firm in sector j in district k is a function of the capital-labor ratio k_{ijk} and where e_{ijk} is a random disturbance term. k_{ijk} is the capital-labor ratio as measured by the firm's total capital over total employment.

To allow for differences in productivity between domestic and foreign firms, a dummy variable $foreign$ may be introduced in Eq. (3.4). The variable may take the value 1 if the firm is foreign-owned and 0 otherwise. According to the theory, Northern investors possess superior proprietary assets, whereas Southern investors have informational advantages. Therefore, differences in investor origin may cause different shifts in the level of productivity. To test this assertion, two separate dummy variables, *South* and *North*, taking the value of 1 if the foreign firm is Southern-owned or Northern-owned, respectively, may replace $foreign$.

Another problem that may arise is the existence of heterogeneity across firms. There are several sources of heterogeneity, some of which are taken into account by allowing some of the factors that determine them to enter explicitly the regression equation and be treated as exogenous shocks. The literature suggests the use of firm-specific information concerning the firm. Thus, a group of firm-specific variables, X_{ijk} = value of firm sales, firm size, firm age in years, female employment share, and foreign employment share for the i^{th} firm is introduced. Firm size is measured by the level of employment. Firm sales, age, and size as measured are expected to increase productivity, as large sized and more established firms may be more efficient (J. Baldwin, 1996).

The two labor market variables are female employment share and foreign employment share. Female employment share is greater in firms that are more labor intensive, in which case it may reduce productivity. However, the sign on the foreign employment share is ambiguous *a priori*. The effect of foreign employment share likely depends on the sector. Labor-intensive, low-technology industries such as textiles and apparel or food processing may employ a greater share of foreign workers in order to exploit labor cost advantages. However, a greater share of foreign workers in capital-intensive sectors may reflect a higher degree of human capital (Foster-McGregor, Isaksson, & Kaulich, 2015).

By treating explicitly the X_{ijk} variables in the regression equation, problems of heterogeneity bias and possible collinearity with the error term from the omission of statistically significant regressors are mitigated. Thus, an augmented form of the production function is specified as:

$$\ln y_{ijk} = \alpha_0 + \alpha_1 \ln k_{ijk} + \sum \alpha_{2j} \ln X_{ijk} + \alpha_3 foreign + \varphi_{jk} + \epsilon_{ijk} \tag{3.5}$$

where φ_{jk} are industry-district fixed-effects and ϵ_{ijk} is the error term.

3.4.2 Estimation issues

3.4.2.1 Endogeneity of FDI

Potential endogeneity is a prominent source of bias in the cross-section establishment-level analysis. In particular, the endogeneity problem related to the variable of interest $foreign$ is a concern. Suppose that foreign investors select industries and districts that are *a priori* more productive and benefit from agglomeration economies, which may bias the productivity and lead to an upward bias in the foreign ownership premium. FDI in Rwanda is concentrated in capital-intensive industries. Manufacturing accounts for the third largest share of total FDI, after ICT and finance. For this reason, I introduce a sector fixed-effects to control for potential endogeneity problem related to foreign ownership. Note that the panel would have to include a large enough time span because FDI does not vary much over time.

3.4.2.2 Non-normality of productivity

When dealing with large cross-sections of firms such as those in this data set, the ordinary linear squares (OLS) estimates may not be representative of the entire distribution of the dependent variable if not identically distributed across firms. Firms may differ in productivity for reasons that are not directly measured by my baseline model, such as the quality characteristics of the firms, the entrepreneur's ability, etc. The unobserved heterogeneity may render the dependent variable $\ln y_{ijk}$, and subsequently the error term ϵ_{ijk}, being indepedently but not identically distributed (i.i.d.) across firms, which violates one of the basic assumptions of the standard regression model about the residuals of $\ln y_{ijk}$, in which case they become i.i.d. The non-normality of the dependent variable will further yield the residuals non-Gaussian.

The productivity distributions quantiles indicated skewed distributions with long tails largely departing from normality according to the appropriate tests. The non-normality of my dependent variables in the model will affect the distribution of the error terms assumed to be normally distributed as desired by the OLS. There is strong evidence that the error terms fail to satisfy the normality assumption, in which case OLS is asymptotically inefficient. The non-Gaussian distributions have led to the development of alternative estimators that place less weight on outliers and are known to be robust estimating techniques.[5] The quantile regression as introduced by Koenker and Bassett (1978) is the most appropriate technique among this class of techniques. The quantile regression estimates the parameters at various quantiles of the conditional distribution of y_{ij}, not merely its conditional mean, which gives us a more complete picture of the way the level of employment and labor productivity are affected by a covariate. It provides a parsimonious way of tracing the varying importance of foreign ownership across the entire distribution of y_{it}. The quantile regression is defined as

$$\begin{aligned} y_{ij} &= x'_{ij}\beta(q) + e_{ij} \\ &= Q_q(y_{ij}) + e_{ij}, \quad 0 < q < 1 \end{aligned}$$

where $\beta(q)$ is the vector of parameters to be estimated for a given value of the distribution's quantile $q\epsilon(0,1)$. $Q_q(y_{ij})$ denotes the q^{th} quantile of the conditional distribution of y_{ij} given the known vector of regressors x_{ij}.

However, a standard quantile regression with the fixed-effects may suffer from an incidental parameters problem. The estimated coefficients do not have the same interpretation as the standard cross-sectional quantile regression. Most standard quantile estimators include an additive fixed-effect that separates the disturbance term and assumes the parameters do not vary based on the fixed effect. A solution has been proposed by (Canay, 2011). The solution transforms the data to get rid of the fixed-effects under the assumption that these effects are location shifters. Canay (2011) methodology is implemented in a two-step process. In the first step, I estimate the standard fixed-effects regression at the

[5]Robustness means that the distribution of an estimator or test statistic should alter only slightly when the distribution of the error term alters slightly.

conditional mean and using the estimated parameters from this model construct estimate the individual fixed-effects as

$$\sum_{t=1}^{T} \frac{(y_{ij} - x'_{ij}\hat{\beta}_u)}{T}$$

where $\hat{\alpha}_i$ are the estimated fixed effects, y_{ij} is the dependent variable, x_{ij} are the explanatory variables, and $\hat{\beta}_u$ are the estimated parameters from the conditional mean regression. In the second step, I define $\hat{y}_{ij} \equiv y_{ij} - \hat{\alpha}_i$ and estimate the quantile regression using the newly defined variable as the dependent variable.

Canay (2011) shows that this estimator is consistent for large T. Canay (2011) also proposes a bootstrap procedure for estimating the variance-covariance matrix for this estimator. The bootstrap method is implemented by drawing with replacement a sample of size NT and computing the two-step estimator as described above. Repeating this process a total of B times the estimated bootstrapped variance-covariance matrix at quantile q is constructed as

$$\frac{1}{B}\sum_{j=1}^{B}\left(\hat{\beta}_j^*(q) - \bar{\beta}^*(q)\right)\left(\hat{\beta}_j^*(q) - \bar{\beta}^*(q)\right)'$$

where $\hat{\beta}_j^*(q)$ are the estimated parameters from the j^{th} bootstrap and the q^{th} quantile, and $\hat{\beta}^*(q) = \frac{1}{B}\sum_{j=1}^{B}\hat{\beta}_j^*(q)$. I adapt this approach to my establishment-level data set along the dimensions of firm and sector. I follow step 1 to construct estimates for the sector fixed effects and then use these to define the transformed dependent variable in step 2.

3.5 Empirical results

3.5.1 Productivity of domestic and foreign firms

In this section, I focus on the relationship of labor productivity on capital intensity, ownership, size, and financial variables. As a benchmark, in a first step of the econometric investigation, the empirical model was estimated by OLS. Results are reported in **Table 3.3**. The general model checking statistics indicate that the estimated model performs well. As mentioned in the previous section, unobserved heterogeneity and local characteristics are likely to matter in such a large establishment-level sample. Therefore, the results presented include industry-district fixed-effects.

In the first OLS regression of **Table 3.3**, I present the regression results and the test statistics for labor productivity on the capital-labor ratio and the dummy $foreign$ taking

into account foreign-ownership. In the subsequent regressions, other determinants of productivity enter and the $foreign$ dummy is replaced by investor origin *North* and *South*. Most of the significance levels and coefficient signs are not sensitive to the specification used. The results indicate that foreign affiliates are more productive. The $foreign$ dummy is positive and statistically significant at the 5% level in the first two regression specifications. In the subsequent regressions, I turn my attention to the investor origin variables. In the case of North-owned foreign affiliates, the coefficient *North* is positive and highly significant at the 1% level. The effect is also positive and significant for South-owned firms. However, some difference exists between the two set of firms. The effect of North FDI on productivity is substantially larger than South FDI. North-owned affiliates are more productive with a premia of 5.7% compared to 2.1% for South-owned affiliates. With respect to other determinants of productivity, the results show that firm sales and age have a positive and significant affect on productivity in Rwandan establishments, which indicates that firms that are large and have been around a long time enjoy higher labor productivity. Firms that engage in cross-border trade are also more efficient. However, the labor market variables are mostly insignificant. Even though the share of the female and foreign workforce positively impact labor productivity, the coefficients are not significant at the 5% level.

Nevertheless, in this case it is possible that OLS estimates are not reliable due to the existence of non-Gaussian disturbances. There is strong evidence that the error terms fail to satisfy the normality assumption, in which case OLS is asymptotically inefficient. The estimated regression lines provide an estimate of the productivity distribution at the conditional mean, which may not be representative of the entire distribution. Therefore, it is important to test whether the estimated regression lines move away from their mean. I estimated the regression lines separately using the lower and upper quantiles of the distribution of $y_{ij} = \ln\left(Y_{ij}/L_{ij}\right)$ and tested for the equality of coefficients between the two ends by performing a Chow test. The value of the F-statistic (F = 108.35) resulted in rejection of the hypothesis of equality at p = 0.00. These results imply that the specific characteristics of the data require a more comprehensive treatment of the conditional distribution of my dependent variable, as provided by quantile regressions.

Table 3.4 presents the regression estimates for five quantiles of the labor productivity

distribution. The results indicate that there are statistically significant differences in the coefficients between and among the various quantile regression estimates for most independent variables. The capital-labor ratio coefficient varies significantly as I move from the upper quantile to the lower quantile of labour productivity. The most productive firms are less sensitive to capital intensity and more sensitive to other determinants, such as firm sales and age. With respect to foreign ownership, the effect of *North* ownership is significant and increasing as I move to higher quantiles. As a result, the impact of North FDI tends to be larger for more productive firms. On the other hand, the effect of the developing country firms is limited. South FDI is significant at lower quantiles, which strengthens in the center of the distribution. However, it is insignificant at higher quantiles.

With respect to the main issue of this chapter, that is the effect of $foreign$ (*South* and *North*) ownership on a firm's labor productivity, the quantile results make it clear that North FDI matters across the productivity conditional distribution. North firms tend to be more productive at all levels of productivity, whereas South FDI does not matter among the very productive. It tends to have higher productivity only among the least productive.

3.5.2 FDI spillovers on labor productivity

The results so far have focused on the productive efficiency of foreign affiliates present in Rwanda. However, there may be benefits to local firms stemming from productivity spillovers. The intensity of foreign presence may lead to efficiency or productivity benefits for local firms. To test the presence of productivity spillovers in the local economy, the effect of the relative size of foreign presence on the productivity of the local firms is estimated. Suppose that there are J industries indexed $j = \{1, ...J\}$, each containing N_j firms. Suppose $M_j < N_j$ of these firms are domestic and the remainder are foreign affiliates. Then the most common measure of foreign presence in industry j is

$$foreign_j = \frac{\sum_{i=M_{i+1}}^{N_i} \omega_i}{\sum_{i=1}^{N_i} \omega_i}$$

where ω_j is weight, indicating the size of each firm. Thus, $foreign$ is the size-weighted share of foreign affiliates in industry j. Three alternative measures of foreign presence are employed: the share of foreign firms in an industry's sales, employment, and capital. The dependent variable is measured as the labor productivity of local firms. I begin by estimat-

ing the general *foreign* effect on domestic productivity. In step 2, I replace *foreign* dummy with *South* and *North* ownership. *South* is the share of sales, employment, or capital of firms with Southern ownership and *North* is the corresponding share of firms with Northern ownership. According to the theory, I would expect the sign of *North* to be positive and stronger than that of *South*. Recall that North FDI has superior proprietary assets, whereas South FDI has informational advantages. The general model checking statistics indicate that the estimated models perform well. The regressions include industry-district fixed effects.

The least square estimates are shown in **Table 3.5**. The productivity of domestic firm increases as the relative presence of foreign firms in their respective industries becomes stronger. Foreign presence is positive and significant irrespective of the measure used. When the effects of *South* and *North* are estimated separately, they are both positive and significant when sales are used, but the size of the first is half that of the second. The differences are more obvious when either employment or capital is taken into account. North FDI has a significant and positive spillover effect when employment is used. South FDI has a much weaker spillover effect for the corresponding share of firms. It is significant at the 10% level. However, capital is likely the best proxy for foreign presence, since most of the productivity spillovers stem from its use (Dimelis & Louri, 2002). As I take capital into account, the effect of *South* is not only weaker than of *North* but is also nonsignificant. As mentioned above, this is not entirely surprising. South FDI lacks the proprietary assets that North FDI enjoys. The OLS effects of other explanatory variables on the productivity of local firms are similar to those estimated when using the entire sample.

Table 3.6 reports the results from the quantile regression with the share of capital as a variable of interest. The quantile effects of other explanatory variables are similar to that estimated using OLS. As shown in **Table 3.6**, while the effect of *North* is always positive and significant at the 5%, the effect of *South* is nonsignificant for the most productive firms and becomes significant only for the lower 10% and 25% of the distribution. Low productivity domestic firms are more strongly influenced by the presence of foreign firms in general, but high productivity domestic firms are influenced only by the presence of firms from the North. North FDI has stronger productivity spillovers on local firms, whereas the spillover effect of South FDI is limited to lower productivity local firms.

3.6 Conclusion

South FDI in sub-Saharan Africa has increased substantially in recent years. Understanding the effects of South FDI on productivity is highly policy relevant in sub-Saharan Africa. Policymakers have encouraged South FDI as a means to encourage productivity growth and technology transfer. However, these positive externalities are neither guaranteed nor automatic. South FDI may lack proprietary assets that North FDI has. Three main hypotheses are tested in this chapter: (a) Is labor productivity influenced by North and South FDI? (b) Does North and South FDI affect productivity spillovers? (c) Is the effect of North and South FDI different at various points of the productivity conditional distribution?

A sample of 7,707 private sector firms (5% of which are foreign) operating in Rwanda in 2014 is used. The empirical results provided by the analysis support the theoretical proposition that foreign ownership leads to more efficient production. However, shifts in the level of productivity vary based on investor origin. North FDI raises productivity by 13.4% compared to South FDI's 5.1%. Thus, productivity in an economy is improved with the entry of South FDI, and even more so with North FDI. Furthermore, North FDI raises productivity across the productivity conditional distribution, whereas South FDI is on average more productive among the least productive firms. We can interpret the results as evidence that South FDI does not matter among the very productive firms. It is among the least productive firms that South FDI has superior efficiency by causing a positive productivity shift.

The chapter also measures the productivity spillovers stemming from North and South FDI and benefiting local firms. The findings agree with the theory that the productivity of local firms increases as the presence of foreign affiliates becomes stronger. When industry's sales are taken into account, the positive spillovers accrued from North FDI are 4% greater than South FDI. However, South FDI does not produce any significant spillovers when industry's fixed capital is considered. Fixed capital is considered as the best proxy for foreign presence. The quantile effects use industry's fixed capital as a variable of interest. The results reveal that low productivity local firms benefit from the presence of both North and South FDI. High productivity local firms are influenced only by North FDI.

On the policy front, suggestions with respect to attracting inward FDI following such

findings must take into account that both North and South FDI have varying effects on host economies. North or South FDI are estimated to be more efficient, thus causing an overall shift in the general efficiency level of the host economy. Nevertheless, North FDI should be favored if technology transfer and spillovers leading to efficiency gains in local firms are pursued. It should be emphasized though that such policy suggestions refer to small, open, and developing host economies and depend on the availability and capability of local partners as well as the institutional framework available. Differences in the responses between high and low productivity local firms should also be taken into account in the design of the appropriate policy.

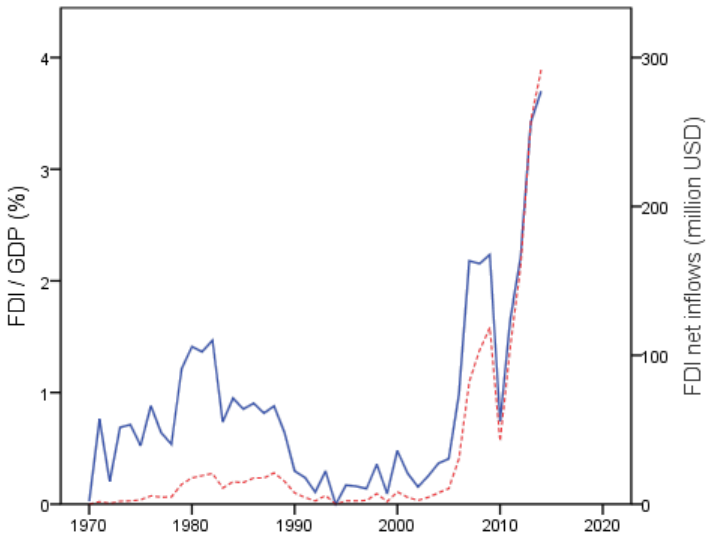

Figure 3.1. FDI inflows in Rwanda

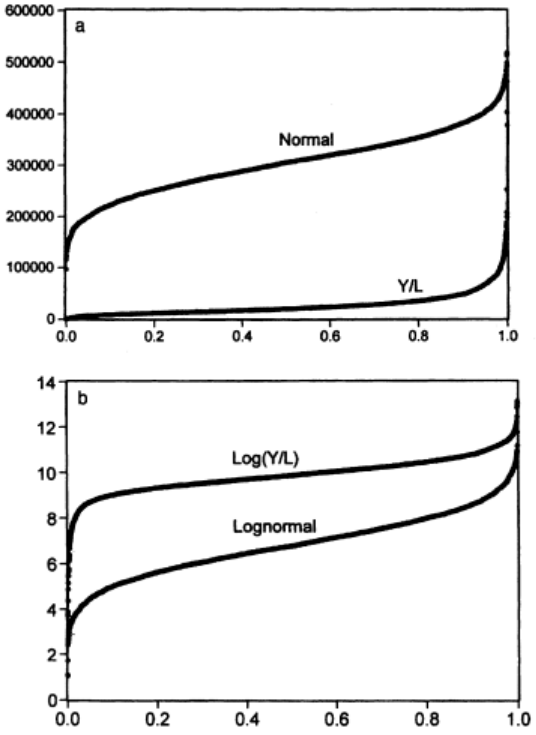

Figure 3.2. The quantiles of Y/L distribution and the normal distribution

Table 3.1. Selected indicators of FDI in Rwanda (%)

Indicator	2009	2010	2011	2012	2013
FDI inflows/GFCF[a]	16.0	36.4	14.6	28.0	16.7
FDI inflows/GDP	3.5	7.6	3.1	6.1	3.9
FDI stock/GDP	7.9	12.9	12.9	17.4	12.8
Return on assets of non-residents	2.2	2.8	1.2	2.4	6.8
Return on equity of non-residents	9.1	13.4	19.5	20.6	16.1

[a]Gross fixed capital formation
Source: National Institute of Statistics Rwanda

Table 3.2. Descriptive statistics

	Domestic		Foreign	
Variable	Mean	*SD*	Mean	*SD*
Manufacturing firms				
Log of capital-labor ratio	5.18	3.01	6.15	3.22
Log of sales	13.51	5.03	12.67	3.30
Age	6.94	4.82	4.29	2.04
Female employment	0.61	0.52	0.40	0.37
Foreign employment	0.1	0.11	0.26	0.13
Trade	0.20	0.35	0.31	0.55
Services firms				
Log of capital-labor ratio	2.87	1.14	4.29	2.08
Log of sales	11.70	3.82	12.30	1.82
Age	4.26	2.09	2.18	1.20
Female employment	0.32	0.25	0.17	0.12
Foreign employment	0.0	0.05	0.08	0.11
Trade	0.06	0.28	0.12	0.35
Agricultural firms				
Log of capital-labor ratio	1.39	1.08	3.64	1.70
Log of sales	9.41	2.27	8.32	1.29
Age	5.81	1.02	1.79	1.13
Female employment	0.14	0.21	0.10	0.28
Foreign employment	0.0	0.01	0.02	0.01
Trade	0.02	0.33	0.08	0.20

Notes: The establishment-level sample is composed of 6,651 establishments, of which 476 (7.16%) are foreign affiliates. Of 476 foreign affiliates, 211 are North-owned and 265 are South-owned. The services sector accounts for the largest share of enterprises. The available establishment-level variables include value of establishment sales, establishment age, capital-labor ratio, share of female in total employment, share of foreign in total employment, and trade.

Table 3.3. Productivity effects and foreign ownership using OLS estimates

Dependent variable is natural log of physical product of labor ($\ln y_{ijk}$)				
	(1)	(2)	(3)	(4)
$\ln(k_{it})$	0.269***	0.220***	0.223***	0.223***
	(0.020)	(0.013)	(0.014)	(0.014)
$\ln sales$		0.082***	0.090***	0.089***
		(0.015)	(0.016)	(0.016)
age		0.004***	0.005***	0.005***
		(0.001)	(0.001)	(0.001)
$femshare$		-0.150	-0.147	-0.145
		(0.109)	(0.109)	(0.109)
$forshare$		0.325*	0.331*	0.332*
		(0.185)	(0.186)	(0.186)
$trade$		0.051**	0.057**	0.060**
		(0.024)	(0.025)	(0.025)
$foreign$	0.417***	0.156***		
	(0.065)	(0.038)		
$North$			0.257***	0.252***
			(0.044)	(0.044)
$South$			0.110**	
			(0.046)	
Africa				0.143**
				(0.057)
Asia				0.109**
				(0.046)
Latin America				0.111
				(0.077)
Constant	10.492***	8.091***	8.097***	8.096***
	(0.268)	(0.231)	(0.234)	(0.232)
Industry fixed effects	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes
Observations	6,651	6,651	6,651	6,651
R-squared	0.12	0.34	0.34	0.35

Notes: t-values, reported in parentheses, are based on White's correction for heteroskedasticity; multicollinearity has been tested by the creation of variance inflation factors (VIF); all regressions pass at conventional levels; *** significant at 1% level; * significant at 5% level; * significant at 10% level.

Table 3.4. Productivity effects and foreign ownership using quantile estimates

Dependent variable is natural log of physical product of labor ($\ln y_{ijk}$)	0.10	0.25	0.50	0.75	0.90
$\ln(k_{it})$	0.194***	0.190***	0.222***	0.225***	0.228***
	(0.024)	(0.024)	(0.010)	(0.017)	(0.015)
$\ln sales$	0.082***	0.065***	0.084***	0.119***	0.120***
	(0.018)	(0.020)	(0.018)	(0.023)	(0.026)
age	0.004***	0.003***	0.004***	0.006***	0.006***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
$femshare$	-0.140	-0.148	-0.136	-0.126	-0.127
	(0.108)	(0.110)	(0.106)	(0.102)	(0.102)
$forshare$	0.287	0.284	0.320*	0.335*	0.325*
	(0.182)	(0.182)	(0.184)	(0.186)	(0.184)
$trade$	0.049*	0.052**	0.059**	0.058**	0.051**
	(0.021)	(0.026)	(0.027)	(0.027)	(0.026)
$foreign$					
$North$	0.185	0.260***	0.254***	0.241***	0.238***
	(0.140)	(0.046)	(0.033)	(0.054)	(0.068)
$South$	0.120***	0.111**	0.102**	0.092	0.098
	(0.045)	(0.044)	(0.042)	(0.061)	(0.062)
Constant	7.937***	7.984***	8.018***	8.120***	8.163***
	(0.224)	(0.225)	(0.228)	(0.230)	(0.233)
Sector fixed effects	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	6,651	6,651	6,651	6,651	6,651
Pseudo R-squared	0.25	0.24	0.25	0.25	0.25

Notes: t-values, reported in parentheses, are based on White's correction for heteroskedasticity; multicollinearity has been tested by the creation of variance inflation factors (VIF); all regressions pass at conventional levels; *** significant at 1% level; * significant at 5% level; * significant at 10% level.

Table 3.5. Productivity spillovers and foreign ownership using OLS estimates

Dependent variable is natural log of physical product of labor ($\ln y_{ijk}$) of local firms

	Sales		Employment		Capital	
$\ln(k_{it})$	0.217***	0.217***	0.220***	0.221***	0.217***	0.218***
	(0.012)	(0.013)	(0.012)	(0.013)	(0.012)	(0.013)
$\ln sales$	0.079***	0.080***	0.078***	0.079***	0.080***	0.082***
	(0.014)	(0.015)	(0.014)	(0.015)	(0.015)	(0.016)
age	0.005***	0.006***	0.004***	0.005***	0.005***	0.005***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
$femshare$	-0.142	-0.145	-0.147	-0.149	-0.147	-0.146
	(0.105)	(0.106)	(0.106)	(0.107)	(0.106)	(0.106)
$forshare$	0.318*	0.321*	0.320*	0.320*	0.319*	0.320*
	(0.182)	(0.183)	(0.183)	(0.183)	(0.182)	(0.182)
$trade$	0.048**	0.049**	0.046**	0.048**	0.047**	0.048**
	(0.030)	(0.030)	(0.029)	(0.030)	(0.029)	(0.030)
$foreign$	0.107***		0.058**		0.060**	
	(0.034)		(0.029)		(0.030)	
$North$		0.080***		0.063**		0.067***
		(0.031)		(0.035)		(0.024)
$South$		0.042*		0.014		0.029
		(0.025)		(0.013)		(0.020)
Constant	8.08***	8.12***	8.06***	5.99***	8.05***	8.05***
	(0.220)	(0.221)	(0.217)	(0.192)	(0.222)	(0.246)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,175	6,175	6,175	6,175	6,175	6,175
R-squared	0.39	0.39	0.39	0.39	0.39	0.39

Notes: t-values, reported in parentheses, are based on White's correction for heteroskedasticity; multicollinearity has been tested by the creation of variance inflation factors (VIF); all regressions pass at conventional levels; *** significant at 1% level; * significant at 5% level; * significant at 10% level.

Table 3.6. Productivity spillovers and foreign ownership using quantile estimates

Dependent variable is natural log of physical product of labor ($\ln y_{ijk}$) of domestic firms					
	0.10	0.25	0.50	0.75	0.90
$\ln(k_{it})$	0.176***	0.172***	0.217***	0.267***	0.214***
	(0.011)	(0.010)	(0.014)	(0.021)	(0.013)
$\ln sales$	0.078***	0.075***	0.079***	0.080***	0.082***
	(0.014)	(0.013)	(0.014)	(0.014)	(0.016)
age	0.004***	0.004***	0.005***	0.006***	0.006***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
$femshare$	-0.139	-0.128	-0.141	-0.154	-0.146
	(0.104)	(0.101)	(0.105)	(0.107)	(0.106)
$forshare$			0.260	0.403**	0.420**
			(0.187)	(0.187)	(0.190)
$trade$	0.040	0.052*	0.056*	0.043	0.048**
	(0.027)	(0.029)	(0.030)	(0.027)	(0.030)
$foreign$					
$North$	0.092***	0.084***	0.075***	0.067***	0.066***
	(0.030)	(0.028)	(0.028)	(0.027)	(0.027)
$South$	0.048**	0.056**	0.030	0.024	0.019
	(0.021)	(0.025)	(0.020)	(0.018)	(0.017)
Constant	7.19***	7.78***	8.05***	8.43***	8.88***
	(0.255)	(0.184)	(0.116)	(0.125)	(0.207)
Sector fixed effects	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	6,175	6,175	6,175	6,175	6,175
Pseudo R-squared	0.24	0.22	0.23	0.23	0.22

Notes: t-values, reported in parentheses, are based on White's correction for heteroskedasticity; multicollinearity has been tested by the creation of variance inflation factors (VIF); all regressions pass at conventional levels; *** significant at 1% level; * significant at 5% level; * significant at 10% level.

APPENDIX A

VARIABLE AND DEFINITIONS

Variable	Description	Source
Dependent variable		
Bilateral foreign direct investment (Y_{ijt})	Annual bilateral foreign direct investment (FDI) inflows from country i to country j at t. The definition of FDI is as proposed in Balance of Payments Manual: Fifth Edition (BPM5) by the International Monetary Fund (IMF). A foreign investor requires a 10% or more of equity ownership to qualify as foreign direct investor.	(See Appendix B)
Independent variables		
GDP_{it}	Gross domestic product (GDP) of source country i at t	(See Appendix B)
GDP_{jt}	Gross domestic product (GDP) of host country j at t	(See Appendix B)
$GDPC_{jt}$	GDP per capita of host country j at t measured in PPP	(See Appendix B)
Distance (D_{ijt})	Distance in kilometers from country i to country j using the per capita GDP share of country j as weight. The distance variable is expressed as: $D_{ijt} = \sum_j \frac{dist_{ij}}{GDPC_{jt}/GDPC_W}$	CEPII Gravity Dataset

Contiguity	1 if country i and country j share contiguous borders	CEPII Gravity Dataset
Common language	1 if the same language is spoken by at least 9% of the population in country i and country j	CEPII Gravity Dataset
Human capital (H_{jt})	Average years of secondary, higher and total schooling in the total population over 25 years old in country j at t	World Bank, World Development Indicators
Inflation volatility	Annual percentage change in consumer price index (CPI) of country j at t	World Bank, World Development Indicators
Starting a business	Average rank. A lower value means ease of starting a business. The index measures the paid-in minimum capital requirement, number of procedures, time and cost for a small- to medium-sized limited liability company to start up and formally operate.	World Bank, Doing Business
Construction permits	Average rank. A lower value means ease of dealing with construction permits. Tracks the procedures, time and cost to build a warehouse—including obtaining necessary the licenses and permits, submitting all required notifications, requesting and receiving all necessary inspections and obtaining utility connections.	World Bank, Doing Business
Getting credit	Average rank. A lower value means ease of obtaining credit. The topic explores two sets of issues—the strength of credit reporting systems and the effectiveness of collateral and bankruptcy laws in facilitating lending.	World Bank, Doing Business

Trading across borders	Average rank. A lower value means ease of trading across borders. Measures the time and cost (excluding tariffs) associated with three sets of procedures—documentary compliance, border compliance and domestic transport—within the overall process of exporting or importing a shipment of goods.	World Bank, Doing Business
Enforcing contracts	Average rank. A lower value means ease of contract enforcement. Measures the time and cost for resolving a commercial dispute through a local first-instance court. In addition, this year it introduces a new measure, the quality of judicial processes index, evaluating whether each economy has adopted a series of good practices that promote quality and efficiency in the commercial court system.	World Bank, Doing Business
Average institutional quality (IQL)	The mean value of six available measures of institutional qualiy, with higher values indicating good institutional quality. The six measures include voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, control for corruption, and rule of law.	Author's construction. Data from Kaufmann, Kraay, and Mastruzzi (2010) and World Bank, Worldwide Governance Indicators
Voice and accountability (ACCT)	The extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free press.	Kaufmann, Kraay, and Mastruzzi (2010) and World Bank, Worldwide Governance Indicators (2013)
Political stability and absence of violence (POLS)	The likelihood that the government will be destabilized or overthrown by violent means, including political violence and terrorism. Also includes risk to the incumbent government from foreign action, and ethnic and sectarian tensions.	Kaufmann, Kraay, and Mastruzzi (2010) and World Bank, Worldwide Governance Indicators (2013)

Government effectiveness (GOVT)	The quality of the bureaucracy which might act as a shock absorber to reduce policy revisions if governments change.	Kaufmann, Kraay, and Mastruzzi (2010) and World Bank, Worldwide Governance Indicators (2013)
Regulatory quality (REG)	The ability of the government to implement sound policies and regulations that promote private sector development.	Kaufmann, Kraay, and Mastruzzi (2010) and World Bank, Worldwide Governance Indicators (2013)
Additional independent variables		
Natural resource	Subsoil resources in USD dollars per capita in host country j	World Bank, Natural Resources Wealth
Capital controls	The mean value of four dummy variables, with higher values indicating more capital controls. The variables include exchange arrangements, payment restrictions, surrender or repatriation requirements for export proceeds.	International Monetary Fund, Exchange Arrangements and Exchange Restrictions
Trade openness	The sum of exports and imports of goods and services measured as a share of GDP of country j at t.	World Bank, Doing Business
Financial development	Financial market development in country j at t is proxied by domestic credit provided to private sector as a percent of GDP.	World Bank, World Development Indicators

Regional free trade agreement (RTA_{ijt})	1 if country i and country j belong to the same regional trade agreement at t	World Trade Organization, Regional Trade Agreements Information System
Tax burdensome	Tax burden in country j at t is proxied by total tax rate as a share of commercial profits. Measures the amount of taxes and mandatory contributions payable by businesses after accounting for allowable deductions and exemptions as a share of commercial profits.	World Bank, World Development Indicators
Instrumental variables		
Legal origin	1 if the legal system in country j has been influenced by the French civil code and legal tradition.	La Porta et al. (1999)
Settler mortality rate	Historical European settlers mortality rate in country j	Acemoglu, Johnson, and Robinson (2001)

Notes: The definition of North used in this study follows the UNCTAD (2005) country classification. The donor countries belonging to the Development Assistance Committee (DAC) plus Greece and Ireland are classified here as being in the North. Conversely, UNCTAD (2005) included Hong Kong (China), the Republic of Korea and Singapore in the South, even though they are now net contributors to the World Bank Group and are not eligible for loans anymore. The definition of South follows the UNCTAD (2005) country classificaion which includes both developing countries and economies in transition.

APPENDIX B

COUNTRIES AND SOURCES OF BILATERAL FDI DATA SET

Source	Country
UNCTAD (2014), World Bank (2014), and national sources	Argentina, Armenia, Bangladesh, Bolivia, Botswana, Brazil, Burkina Faso, Bulgaria, Cameroon, Chile, China, Colombia, Côte d'Ivoire, Costa Rica, Dominican Republic, Ecuador, Egypt, Ethiopia, Ghana, Honduras, India, Iran, Kenya, Latvia, Lithuania, Moldova, Morocco, Nigeria, Pakistan, Paraguay, Peru, Romania, Russia, Senegal, South Africa, Taiwan Province of China, Tunisia, Ukraine, Uruguay, and Zambia
Central banks and other national sources; Balance of payments statistics	Algeria, Angola, Azerbaijan, Belarus, Benin, Bosnia and Herzegovina, Chad, El Salvador, Eritrea, Guatemala, Georgia, Iraq, Kazakhstan, Kyrgyzstan, Liberia, Macedonia, Mali, Mongolia, Mozambique, Nepal, Serbia and Montenegro, Sri Lanka, Sudan, Tanzania, Uganda, and Yemen
ASEAN (2014)	Brunei, Cambodia, Malaysia, the Philippines, Indonesia, Myanmar, Laos, South Korea, Singapore, Thailand, and Vietnam
OECD statistics (2014) and the Eurostat's "New Cronos" (2014)	Australia, Austria, Belgium, Estonia, Canada, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, United Kingdom, United States, Mexico, and Turkey

APPENDIX C

ESTIMATION OF QUANTILE PARAMETERS

The estimation of the quantile parameters $\beta(q)$ has been implemented by solving the following minimization problem:

$$\min_b \sum |e_i| h_i = \sum |y_i - x_i' \beta| h_i \tag{C.1}$$

with

$$h_i = \left\{ \begin{array}{ll} 2q & \text{if} \quad e_i > 0 \\ 2(1-q) & \text{if} \quad e_i < 0 \end{array} \right\}$$

For $q = 0.5$, I obtain the median and problem Eq. (C.1) is equivalent to the problem of minimum absolute deviations. For the estimation of quantiles other than the median, the residuals are weighted appropriately depending on whether they are positive or negative. The problem was solved by the linear programming algorithm suggested by Armstrong et al. (1979). Similar computational techniques were also suggested by Koenker and Bassett (1978).

The elements $\beta(q)$ were estimated using the method suggested by Koenker and Bassett (1978). However, in cases of heteroskedastic errors, the estimated standard errors are understated by this method. For this reason, robust standard errors were obtained by using the option of bootstrapping procedures introduced by Gould (1997).

Estimating Eq. (C.1) for various values of q results in a sequence $\hat{\delta}$ of regression quantile estimates:

$$\hat{\delta}' = \left\lfloor \hat{\beta}'(q_i, \hat{\beta}'(q_2), \ldots, \hat{\beta}'(q_m) \right\rfloor, \qquad 0 < q_1 < q_2 < \ldots < q_m < 1$$

The properties of the estimators $\hat{\beta}(q)$ as well as the necessary and sufficient conditions for the uniqueness of $\hat{\delta}$ are given by Koenker and Bassett (1978). From an empirical point of view, then the important question that arises is to test statistically how different the above estimated parameter vectors $\hat{\beta}(q)$ are across the various quantile regressions. To perform such hypotheses tests, we need the entire variance-covariance matrix of $\hat{\delta}$. This can only

be obtained asymptotically and was implemented in this chapter using a bootstrapped sampling method.

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