

# LUCAS PARADOX AND ALLOCATION PUZZLE - IS SOUTH - SOUTH FDI DIFFERENT?

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*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 paper 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.*

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## 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).<sup>1</sup> 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.<sup>2</sup> 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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<sup>1</sup>For more details, see King and Rebelo (1993), Razin and Yuen (1994), Gomme (1993), and Tornell and Velasco (1992).

<sup>2</sup>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 pseudo likelihood estimator.<sup>3</sup> 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, I review the literature. Section 3 briefly lays out the conceptual framework. Section 4 describes the data and provides descriptive statistics. Section 5 motivates my econometric approach. Section 6 reports the main econometric results and Section 7 concludes.

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<sup>3</sup>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 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.

### 3 Conceptual framework

Lucas paradox represents one of the major puzzles in international macroeconomics and finance.<sup>4</sup> 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. Nevertheless, 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-

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<sup>4</sup>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  $L$

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

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  $f(\cdot)$  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.<sup>5</sup> 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 institutions 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  $\tau$ , which differs across countries. Thus, for country  $i$  and country  $j$ , the true return is

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<sup>5</sup>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.<sup>6</sup> 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

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

## 4 Data and descriptive statistics

### 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.<sup>7</sup> This

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<sup>6</sup>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 separately.

<sup>7</sup>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.

## 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.<sup>8</sup> 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.<sup>9</sup> Lower ranks indicate better, usually simpler regulations for businesses and stronger protections of property rights.

### 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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<sup>8</sup>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.

<sup>9</sup>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.

#### 4.4 Control variables

Estimating gravity equations is one of the most prominent empirical techniques to analyze bilateral trade. The gravity equation rests on the assumptions that countries trade in proportion to their respective GDPs and proximity.<sup>10</sup> 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 1**.

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<sup>10</sup>A thorough treatment of the gravity equation can be found in Chapter 5 of Feenstra (2004).

## 5 Estimation strategy

### 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:<sup>11</sup>

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

where the subscript  $t = 1, \dots, T$  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.  $\varphi_i$ ,  $\varphi_j$ ,  $\delta_t$ , and  $\epsilon_{ijt}$  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.

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<sup>11</sup>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.

## 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).

## 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.

## 6 Empirical findings

### 6.1 Estimation results

#### 6.1.1 Main results

**Table 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 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**, average institutional quality remains robust to the exclusion of China.

**Table 3** and **Table 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 5** and **Table 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.

### 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 Havrylchuk (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).<sup>12</sup> They can harmonize

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<sup>12</sup>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 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).

## 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](https://www.wto.org/english/tratop_e/region_e/region_e.htm)

increase the costs associated with capital movements and associated transactions.<sup>13</sup> As seen in **Table 8** and **Table 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 8** and **Table 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

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<sup>13</sup>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 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.

## 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

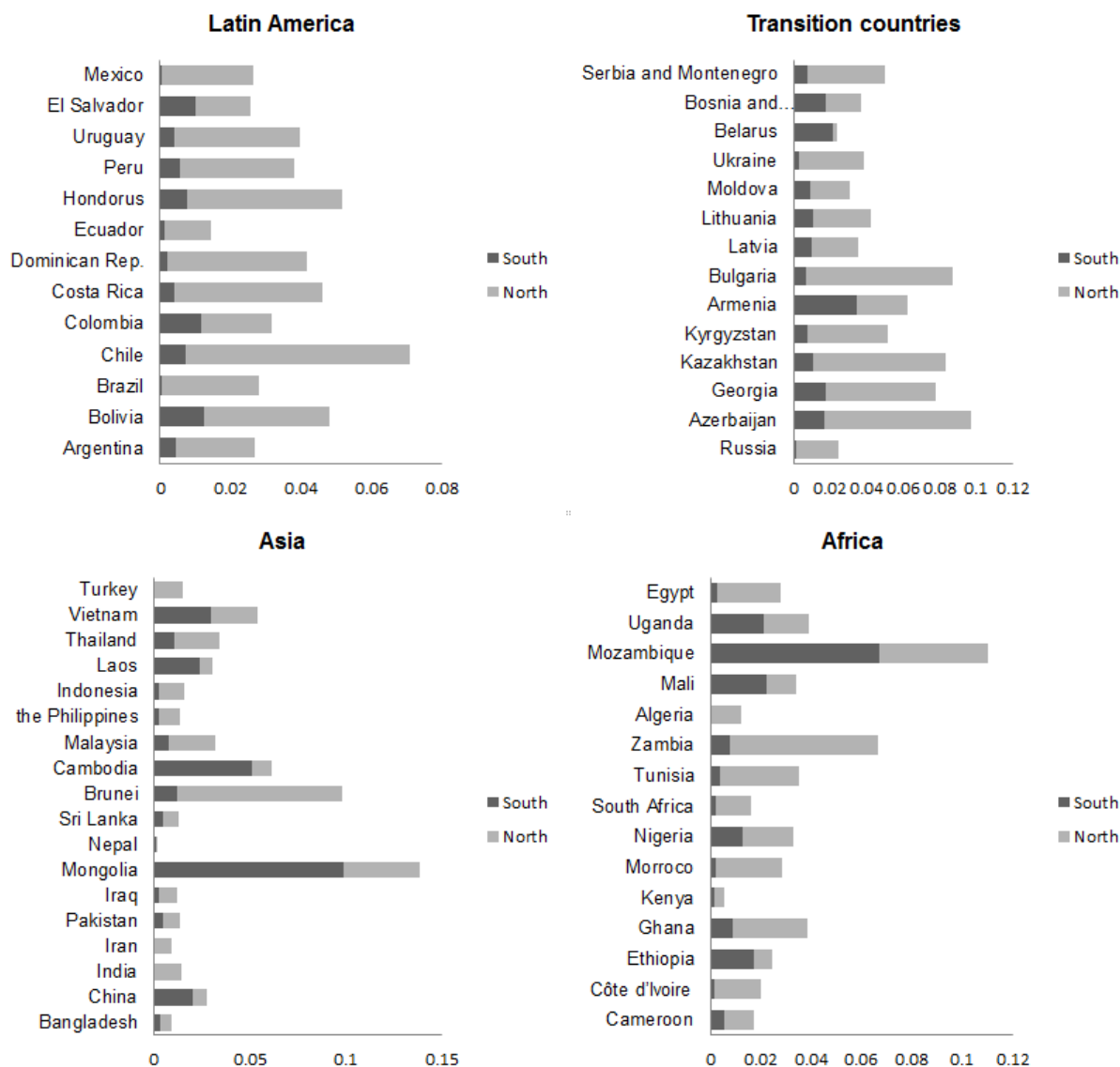
to local information is difficult. Among the government policy variables, average cost of doing business variable is not a significant determinant of South-South FDI, whereas North-South FDI is significantly related to average cost of doing business. Macroeconomic instability, as proxied by inflation 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.<sup>14</sup> 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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<sup>14</sup>See Durham (2000) and De Gregorio (2003) for a review of literature on the effect of FDI on growth.



Source: Author's construction

**Figure 1.** The share of FDI inflows in GDP in developing and transition economies (2004-2013)

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

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

	Whole	Whole	North-South	South-South	North-South	South-South
	World	World			(ex. China)	(ex. China)
	OLS	Poisson	Poisson	Poisson	Poisson	Poisson
		PML	PML	PML	PML	PML
	(1)	(2)	(3)	(4)	(5)	(6)
$\ln(GDP_{ijt})$	0.714*** (0.194)	0.421** (0.215)	0.368** (0.173)	0.205** (0.112)	0.298** (0.178)	0.187* (0.114)
$\ln(GDP_{it})$	0.454 (0.328)	0.335 (0.308)	0.253 (0.210)	0.192 (0.227)	0.215 (0.219)	0.164 (0.238)
$\ln(GDPC_{ijt})$	-0.402 (0.453)	0.412** (0.240)	0.501** (0.259)	0.388 (0.382)	0.486** (0.262)	0.312 (0.389)
Human capital	1.201 (0.984)	1.139* (0.886)	1.162** (0.680)	1.014 (0.797)	1.148** (0.694)	0.951 (0.819)
$\ln(D_{ijt})$	-0.853*** (0.092)	-0.425*** (0.155)	-0.628*** (0.262)	-0.588** (0.258)	-0.612*** (0.263)	-0.535** (0.266)
Common language	0.653*** (0.171)	0.466*** (0.102)	0.582* (0.438)	0.894*** (0.317)	0.613* (0.439)	0.877*** (0.321)
Colonial ties	0.943*** (0.099)	0.282*** (0.081)	0.264*** (0.093)	0.378*** (0.064)	0.251*** (0.094)	0.414*** (0.086)
Contiguity	0.421*** (0.156)	0.220* (0.144)	0.091 (0.120)	0.217** (0.111)	0.098 (0.120)	0.350*** (0.127)
Inflation volatility	-0.158 (0.254)	-0.136 (0.261)	-0.116 (0.266)	-0.130 (0.258)	-0.129 (0.262)	-0.136 (0.257)
Cost of business	-0.010** (0.006)	-0.008** (0.004)	-0.005** (0.003)	-0.002* (0.002)	-0.004** (0.003)	-0.002 (0.002)
$IQL_{ijt}$	0.801*** (0.282)	0.685*** (0.277)	0.644*** (0.242)	0.382* (0.245)	0.717*** (0.250)	0.330* (0.249)
Constant	9.541*** (2.791)	27.255*** (7.911)	28.736*** (7.872)	30.712*** (7.782)	26.283*** (7.981)	33.822*** (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
<i>R-squared</i>	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 3.** Disaggregated institutional quality for North-South, 2004-2013

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

	North-South			
	ACCT (1)	POLS (2)	GOVT (3)	REG (4)
$\ln(GDP_{ijt})$	0.461*** (0.072)	0.458*** (0.075)	0.507*** (0.070)	0.447*** (0.076)
$\ln(GDP_{it})$	0.264 (0.202)	0.211 (0.217)	0.256 (0.211)	0.281 (0.211)
$\ln(GDPC_{ijt})$	0.479** (0.245)	0.483** (0.248)	0.462*** (0.237)	0.480*** (0.245)
Human capital	1.158** (0.676)	1.128** (0.664)	1.160** (0.679)	1.141** (0.670)
$\ln(D_{ijt})$	-0.614*** (0.252)	-0.617*** (0.252)	-0.624*** (0.251)	-0.653*** (0.251)
Common language	0.558* (0.436)	0.550* (0.429)	0.571* (0.441)	0.551* (0.429)
Colonial ties	0.203*** (0.021)	0.201*** (0.022)	0.208*** (0.023)	0.200*** (0.022)
Contiguity	0.091 (0.113)	0.085 (0.117)	0.088 (0.117)	0.096 (0.111)
Inflation volatility	-0.111 (0.272)	-0.108 (0.275)	-0.110 (0.272)	-0.105 (0.276)
Cost of business	-0.004** (0.002)	-0.005** (0.003)	-0.005** (0.003)	-0.004** (0.002)
$IQL_{jt}$	0.621** (0.283)	0.704*** (0.281)	0.852*** (0.280)	0.601** (0.282)
Constant	30.492*** (0.535)	27.437*** (0.580)	28.487*** (0.543)	33.835*** (0.526)
Year fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Observations	6184	6184	6184	6184
<i>R-squared</i>	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 4.** Disaggregated institutional quality for South-South, 2004-2013

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

	South-South			
	ACCT (5)	POLS (6)	GOVT (7)	REG (8)
$\ln(GDP_{jt})$	0.218** (0.120)	0.222** (0.108)	0.216** (0.110)	0.203** (0.111)
$\ln(GDP_{it})$	0.388* (0.248)	0.383* (0.238)	0.376* (0.230)	0.372* (0.228)
$\ln(GDPC_{jt})$	0.357 (0.320)	0.341 (0.323)	0.359 (0.320)	0.332 (0.323)
Human capital	1.013 (0.795)	1.011 (0.796)	1.019 (0.794)	1.012 (0.795)
$\ln(D_{ijt})$	-0.570** (0.284)	-0.574** (0.283)	-0.582** (0.289)	-0.566** (0.272)
Common language	0.901*** (0.281)	0.892*** (0.273)	0.917*** (0.284)	0.906*** (0.281)
Colonial ties	0.312*** (0.068)	0.310*** (0.069)	0.349*** (0.062)	0.309*** (0.069)
Contiguity	0.236** (0.137)	0.261** (0.132)	0.230** (0.137)	0.227** (0.139)
Inflation volatility	-0.128 (0.260)	-0.125 (0.261)	-0.129 (0.261)	-0.122 (0.263)
Cost of business	-0.002* (0.001)	-0.004* (0.002)	-0.002* (0.001)	-0.002* (0.001)
$IQL_{jt}$	0.311 (0.271)	0.436*** (0.260)	0.390* (0.270)	0.345 (0.277)
Constant	35.578*** (0.663)	24.965*** (0.654)	29.384*** (0.643)	32.691*** (0.667)
Year fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Observations	12096	12096	12096	12096
<i>R-squared</i>	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 5.** Disaggregated ease of doing business for North-South, 2004-2013Dependent variable is annual bilateral FDI inflows ( $Y_{ijt}$ )

	North-South				
	(1)	(2)	(3)	(4)	(5)
$\ln(GDP_{jt})$	0.372** (0.179)	0.385** (0.178)	0.298** (0.181)	0.374** (0.179)	0.323** (0.180)
$\ln(GDP_{it})$	0.215 (0.218)	0.243 (0.202)	0.221 (0.218)	0.252 (0.204)	0.208 (0.219)
$\ln(GDPC_{jt})$	0.780** (0.271)	0.796* (0.268)	0.697** (0.295)	0.751** (0.278)	0.639** (0.297)
Human capital	1.122** (0.189)	1.148** (0.183)	1.021** (0.191)	1.134** (0.184)	1.013** (0.196)
$\ln(D_{ijt})$	-0.527*** (0.168)	-0.542*** (0.163)	-0.482*** (0.192)	-0.539** (0.164)	-0.446*** (0.190)
Common language	0.394* (0.245)	0.347* (0.275)	0.325* (0.281)	0.358* (0.272)	0.311* (0.288)
Colonial ties	0.133*** (0.092)	0.168*** (0.091)	0.087*** (0.097)	0.142*** (0.092)	0.080*** (0.098)
Contiguity	0.083 (0.102)	0.088 (0.101)	0.076 (0.105)	0.084 (0.102)	0.075 (0.105)
Inflation volatility	-0.112 (0.281)	-0.145 (0.278)	-0.107 (0.282)	-0.121 (0.280)	-0.102 (0.284)
Starting a business	-0.003* (0.001)				-0.002 (0.001)
Getting credit		-0.006** (0.002)			-0.005* (0.003)
Trading across borders			-0.007*** (0.002)		-0.006*** (0.002)
Enforcing contracts				-0.003* (0.001)	-0.002 (0.001)
$IQL_{jt}$	0.518*** (0.490)	0.572*** (0.481)	0.492*** (0.494)	0.527*** (0.489)	0.488*** (0.497)
Constant	31.451*** (0.530)	29.812*** (0.537)	29.241*** (0.532)	33.326*** (0.546)	28.842*** (0.524)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	6184	6184	6184	6184	6184
<i>R-squared</i>	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 6.** Disaggregated ease of doing business for South-South, 2004-2013Dependent variable is annual bilateral FDI inflows ( $Y_{ijt}$ )

	South-South				
	(6)	(7)	(8)	(9)	(10)
$\ln(GDP_{jt})$	0.276** (0.124)	0.282** (0.121)	0.184** (0.137)	0.279** (0.123)	0.175** (0.138)
$\ln(GDP_{it})$	0.108 (0.262)	0.122 (0.256)	0.103 (0.263)	0.114 (0.259)	0.101 (0.263)
$\ln(GDPC_{jt})$	0.265 (0.290)	0.281 (0.284)	0.179 (0.293)	0.270 (0.289)	0.175 (0.294)
Human capital	1.017 (0.195)	1.025 (0.194)	1.008 (0.196)	1.020 (0.195)	1.002 (0.196)
$\ln(D_{ijt})$	-0.394*** (0.333)	-0.407*** (0.329)	-0.281*** (0.340)	-0.401*** (0.330)	-0.205*** (0.348)
Common language	0.679*** (0.281)	0.694*** (0.275)	0.585*** (0.288)	0.682*** (0.276)	0.498*** (0.290)
Colonial ties	0.163*** (0.082)	0.195*** (0.079)	0.098*** (0.090)	0.182*** (0.080)	0.083*** (0.095)
Contiguity	0.568** (0.082)	0.581** (0.080)	0.476** (0.088)	0.580** (0.080)	0.459** (0.092)
Inflation volatility	-0.109 (0.260)	-0.112 (0.259)	-0.102 (0.261)	-0.109 (0.260)	-0.100 (0.261)
Starting a business	-0.002 (0.002)				-0.0008 (0.002)
Getting credit		-0.003* (0.002)			-0.002 (0.002)
Trading across borders			-0.006*** (0.002)		-0.005*** (0.002)
Enforcing contracts				-0.002 (0.002)	-0.0007 (0.002)
$IQL_{jt}$	0.214* (0.578)	0.247* (0.573)	0.188* (0.590)	0.224* (0.575)	0.113* (0.591)
Constant	32.438*** (0.633)	30.401*** (0.615)	30.012*** (0.615)	32.563*** (0.640)	29.742*** (0.612)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	12096	12096	12096	12096	12096
<i>R-squared</i>	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 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)
$\ln(GDP_{ijt})$	0.372* (0.180)	0.311** (0.178)	0.305** (0.179)	0.212** (0.111)	0.249** (0.118)	0.210** (0.112)
$\ln(GDP_{it})$	0.182 (0.240)	0.274 (0.216)	0.177 (0.242)	0.182 (0.242)	0.214 (0.237)	0.166 (0.245)
$\ln(GDPC_{ijt})$	0.458** (0.212)	0.472** (0.215)	0.425** (0.213)	0.340 (0.301)	0.370 (0.297)	0.315 (0.304)
Human capital	1.182** (0.686)	1.101** (0.661)	1.089* (0.662)	0.972 (0.806)	0.984 (0.807)	0.931 (0.810)
$\ln(D_{ijt})$	-0.625*** (0.253)	-0.606*** (0.247)	-0.590*** (0.250)	-0.547** (0.251)	-0.505** (0.256)	-0.496** (0.258)
Common language	0.546* (0.430)	0.533* (0.413)	0.530* (0.415)	0.784*** (0.297)	0.825*** (0.310)	0.741*** (0.313)
Colonial ties	0.292*** (0.072)	0.276*** (0.067)	0.264*** (0.068)	0.292*** (0.050)	0.314*** (0.057)	0.269*** (0.060)
Contiguity	0.069 (0.120)	0.087 (0.115)	0.040 (0.118)	0.201** (0.117)	0.230** (0.120)	0.197* (0.122)
Inflation volatility	-0.063 (0.212)	-0.057 (0.215)	-0.022 (0.216)	-0.101 (0.241)	-0.120 (0.239)	-0.093 (0.242)
Cost of business	-0.002** (0.001)	-0.002** (0.001)	-0.002** (0.001)	-0.003* (0.002)	-0.002 (0.002)	-0.002 (0.002)
Natural resource	0.513 (0.411)		0.492 (0.414)	0.640** (0.277)		0.610** (0.280)
$RTA_{ijt}$		0.483* (0.376)	0.465 (0.379)		0.302*** (0.108)	0.267*** (0.113)
$IQL_{ijt}$	0.640*** (0.264)	0.655*** (0.267)	0.655*** (0.267)	0.406* (0.296)	0.365 (0.290)	0.340 (0.291)
Constant	30.521*** (0.530)	29.101*** (0.522)	28.655*** (0.572)	29.952*** (0.612)	29.469*** (0.611)	27.182*** (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
<i>R-squared</i>	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 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** (0.137)	0.295* (0.132)	0.290** (0.137)	0.314** (0.140)
$\ln(GDP_{it})$	0.219 (0.234)	0.212 (0.235)	0.283 (0.210)	0.218 (0.234)
$\ln(GDPC_{jt})$	0.683*** (0.232)	0.534** (0.237)	0.552** (0.242)	0.570** (0.259)
Human capital	1.210** (0.691)	1.173** (0.685)	1.198** (0.687)	1.248** (0.698)
$\ln(D_{ijt})$	-0.601*** (0.247)	-0.622*** (0.252)	-0.610*** (0.249)	-0.591*** (0.241)
Common language	0.539* (0.347)	0.521* (0.342)	0.540* (0.348)	0.532* (0.343)
Colonial ties	0.201*** (0.074)	0.188*** (0.069)	0.181*** (0.068)	0.213*** (0.078)
Contiguity	0.080 (0.117)	0.094* (0.110)	0.085 (0.116)	0.078 (0.117)
Inflation volatility	-0.062 (0.210)	-0.085 (0.205)	0.041 (0.214)	-0.060 (0.210)
Cost of business	-0.002** (0.001)	-0.002** (0.001)	-0.001* (0.001)	-0.002** (0.001)
Removal of capital controls	0.552 (1.380)			
Trade openness		0.387** (0.201)		
Tax burden			-0.608 (1.672)	
Finance development				-0.168 (0.481)
$IQL_{jt}$	0.612*** (0.290)	0.685*** (0.287)	0.601*** (0.288)	0.629*** (0.292)
Constant	28.155*** (0.521)	27.925*** (0.517)	27.438*** (0.516)	28.962*** (0.532)
Year fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Observations	5469	6184	6184	5858
<i>R-squared</i>	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 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** (0.122)	0.231** (0.117)	0.267** (0.120)	0.294** (0.128)
$\ln(GDP_{it})$	0.198 (0.240)	0.184 (0.243)	0.190 (0.241)	0.206 (0.240)
$\ln(GDPC_{jt})$	0.411 (0.391)	0.388 (0.395)	0.404 (0.390)	0.417 (0.392)
Human capital	0.975 (0.806)	0.982 (0.805)	0.972 (0.806)	0.984 (0.807)
$\ln(D_{ijt})$	-0.526** (0.240)	-0.510** (0.237)	-0.520** (0.238)	-0.537** (0.253)
Common language	0.818*** (0.309)	0.816*** (0.308)	0.815*** (0.308)	0.822*** (0.311)
Colonial ties	0.315*** (0.057)	0.304*** (0.054)	0.310*** (0.056)	0.332*** (0.060)
Contiguity	0.272** (0.144)	0.248** (0.141)	0.251** (0.142)	0.298** (0.151)
Inflation volatility	-0.106 (0.240)	-0.101 (0.241)	-0.102 (0.241)	-0.117 (0.238)
Cost of business	-0.002* (0.002)	-0.002* (0.002)	-0.002* (0.002)	-0.003* (0.002)
Removal of capital controls	0.371 (1.428)			
Trade openness		0.313* (0.220)		
Tax burden			-0.578 (1.691)	
Finance development				-0.120 (0.486)
$IQL_{jt}$	0.312* (0.231)	0.330 (0.235)	0.368* (0.240)	0.311* (0.231)
Constant	30.732*** (0.622)	29.340*** (0.613)	30.182*** (0.618)	29.720*** (0.615)
Year fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Observations	11381	12096	12096	11770
<i>R-squared</i>	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 10.** Robustness II: Two-stage least squares

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

## 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 Dataset      Gravity



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 quality, 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 classification 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

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