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Governance and Globalisation

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1. INTRODUCTION

> In each case, the increased pluralism ensured by democratic institutions generates policy outcomes that reduce the MNE's degree of freedom in the host developing country [and consequently FDI inflows]. On the other hand, democratic institutions promote FDI inflows by strengthening property rights protection (Li and Resnick et al., 2003, p. 177).

INTERNATIONAL trade and foreign direct investment (FDI) – two of the main channels for the economic globalisation of the world economy – continue to advance at a rapid pace. First, while much is known empirically about the determinants of both bilateral trade and bilateral FDI flows separately, our knowledge about the empirical relationship between FDI and trade flows – either cross-sectionally in a particular year or over time – is more limited; most empirical studies have investigated trade or FDI flows, not both simultaneously.[1] Second, researchers have also typically studied the impact of 'democratic institutions' on FDI and trade separately. The results to date are mixed; in some studies, indexes of democracy increase trade (FDI), whereas in others it reduces trade (FDI). As the introductory quote above suggests, democratic institutions tend to foster 'pluralism', which may have a negative effect on trade and FDI. However, democratic institutions also tend to foster 'property rights protection', which may have a positive effect on trade and FDI.

Surprisingly, no study has yet looked systematically at measures of 'pluralism', alongside other aspects of 'good governance', on bilateral international trade and FDI flows simultaneously using state-of-the-art gravity equations in a unified approach motivated by a formal general equilibrium model – much less the influence of such factors on FDI relative to trade. Moreover, while researchers have just started to examine the impact of governance indicators on selection of countries (and/or firms) into trade, no study has yet examined the influence of pluralism alongside other governance indicators on selection of countries (or firms) into FDI. This is the first study to our knowledge that examines systematically how various measures of governance influence bilateral FDI flows relative to bilateral trade flows and also the selection

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[1] Some notable exceptions are the study of foreign affiliate production relative to trade in Brainard (1997) and Helpman et al. (2004) using US cross-industry data across destinations, Lai and Zhu (2006) using US flows across destinations, Eaton and Tamura (1994) using US and Japanese trade and FDI flows across destinations, and Bergstrand and Egger (2007) using bilateral trade and FDI flows across numerous origin and destination countries.

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of countries into FDI (i.e. the country extensive FDI margin), also accounting for firm heterogeneity (i.e. the firm margin).[2]

Our study focuses on three contributions. First, international trade and FDI flows are likely influenced in reality simultaneously by common factors. Trade does not cause FDI, nor does the reverse hold; firms select into or enhance their level of trade or FDI based upon common economic and political factors. Not until theoretical research on the general equilibrium determinants of foreign affiliate sales (FAS) and international trade flows in Helpman (1984), Markusen (1984), Markusen and Venables (1998, 2000) and Markusen (2002) using 2-country, 2-factor, 2-good models did economists develop a more systematic framework for understanding conceptually the determinants of the levels of multinational firms' foreign affiliate production and sales (FAS) in foreign markets simultaneously with the levels of national firms' production and export decisions to various markets. Carr et al. (2001), Markusen and Maskus (2001, 2002), and Blonigen et al. (2003) used the $2 \times 2 \times 2$ 'knowledge-capital' model to motivate empirical specifications for FAS. More recently, Bergstrand and Egger (2007, 2010, 2013a) extended these $2 \times 2 \times 2$ general equilibrium models of FAS and trade to include three countries – to explain the influences of economic size and similarity, relative factor endowments, and investment and trade costs on explaining the behaviour of bilateral flows of trade, FDI and FAS in a world with more than two countries – and allowing for three factors of production – unskilled labour, skilled labour and physical capital – to help explain the complementarity of trade, FDI and FAS flows with respect to countries' GDP sizes and similarities found in aggregate data. We draw upon these recent theoretical developments to help motivate estimating state-of-the-art gravity equations of trade and FDI flows – the most common specification for explaining such flows – and to explore empirically the pattern of FDI flows relative to trade flows.[3] While rigorous theoretical economic foundations for gravity models of trade have existed and evolved since Anderson (1979), Bergstrand (1985), and Helpman and Krugman (1985), no such foundation has been formulated for gravity equations of FDI and FAS flows until the 3-country, 3-factor, 2-good model in Bergstrand and Egger (2007), even though the gravity model works extremely well for these flows also (cf. Blonigen and Piger, 2011; Eicher et al., 2011).[4]

Second, although economists and political scientists have examined political determinants of trade for decades, the literature on political determinants of FDI is much smaller, with a

[2] Eicher et al. (2011) have explored determinants of the margins of FDI using Bayesian model averaging, based upon a gravity-equation approach. Also, Globerman and Shapiro (2003) appears to be the lone study first examining selection into FDI, using bilateral US FDI flows with numerous other countries (for three consecutive years). However, each of that study's probit estimations included only a constant, foreign GDP and only one Worldwide Governance Indicator at a time; consequently, their specifications precluded separating the effects simultaneously of pluralism from the effects of other measures of good governance. Moreover, that study ignored accounting for firm heterogeneity.

[3] Since 2003, researchers have augmented 'traditional' trade gravity equations with 'multilateral price' (or resistance) terms for each country, to account for rest-of-world (ROW) effects (cf. Anderson and van Wincoop, 2003, 2004). In estimation, various methods have been used to account for endogeneity bias created by these terms. To date, alternative methods to account for these terms in estimation include country-specific fixed effects, non-linear structural estimation or log-linear approximations of the underlying non-linear price terms (cf. Baier and Bergstrand, 2009, and Bergstrand et al., 2013) on these issues. We address these in detail later.

[4] See Bergstrand and Egger (2011) for a survey of the gravity-equation literature regarding trade and FDI. For more on theoretical foundations, see Bergstrand and Egger (2010, 2013a, 2013b) using a homogeneous firms model and Ramondo and Rodriguez-Clare (2013) using a heterogeneous firms model.

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scant literature to date examining the effect of democracy on FDI and finding conflicting empirical effects of various measures of democracy. Moreover, only one study has used gravity equations with bilateral FDI flows to focus on the effects of democratic institutions. We will review this sparse literature briefly later. However, we note that Kaufmann et al. (2007a) describe a panel data set of – what many researchers consider – the 'best existing measures of the quality of political institutions' (Kurtz and Schrank, 2007, p. 539). The Kaufmann et al. (2007a) 'Worldwide Governance Indicators' (WGIs), constructed under the auspices of the World Bank, aggregate numerous measures of democracy and governance into six well-defined groupings. Following Alcala and Ciccone (2004) and Badinger (2008), we employ these World Bank WGIs (explained in detail below) to address the ambiguity surrounding the effects of governance indicators – and, in particular, measures of 'democracy' – on FDI and trade flows. To preview our results, we note that econometric specifications including only the pluralism measure – *Voice and Accountability* – yield no economically or statistically significant effect of pluralism on trade or FDI flows. Yet, individually the other five WGI variables typically have positive and statistically significant effects on trade and FDI flows (including *Political Stability*). However, inclusion of all six WGI variables typically reveals a statistically significant positive effect of *Regulatory Quality* on trade and FDI flows, a significant negative effect of *Voice and Accountability* and of *Political Stability* on trade flows, but still no effect of *Voice and Accountability* or *Political Stability* on FDI flows. *Voice and Accountability* for citizens tends to have negative effects on trade inflows, likely associated with discrimination against foreign exporters in favour of domestic firms by more protectionist members of society due to 'pluralism'. The higher the degree of pluralism, the higher the relative influence of less educated persons. There is now established a central finding in the political science literature that less educated persons tend to oppose 'trade openness' (cf. Hainmueller and Hiscox, 2006); this will be discussed in more detail later along with recent research on wage inequality effects of firm heterogeneity.

Third, while *Voice and Accountability* – the WGI index most closely associated with the democratic notion of 'pluralism' (i.e. freedom of speech, political participation, assembly) – is negatively related to trade levels in our results, no one has yet examined how governance indexes influence the selection of countries into FDI. In other words, the absence of an observed significant effect of pluralism noted above may be due to ignoring the effects of fixed bilateral investment costs that cause some country-pairs to have zero FDI flows and others positive flows. This suggests the importance of examining separately the (country) intensive margin versus the extensive margin of FDI, in the context of fixed exporting and investment costs and also firm heterogeneity.[5] While theoretical developments regarding the roles of fixed exporting costs and firm heterogeneity have spanned the trade literature in the last decade, the role of fixed FDI costs and firm heterogeneity for explaining selection of countries into FDI flows is less developed with the exception of a few papers (cf. Helpman et al., 2004; Yeaple, 2009; Ramondo and Rodriguez-Clare, 2013). In the spirit of this new

[5] The intensive margin denotes the amount of trade (FDI) of existing firms already exporting (with plants abroad), while the extensive margin refers to the number of exporting (FDI exporting) firms, influencing whether or not a country is exporting (investing). A zero trade (FDI) flow from one country to another is interpreted in this context as no firms exporting (investing) from the origin country. Even though our data set includes both FDI and trade flows for the same pairings of 28 source countries with 124 destination countries, our sample of bilateral trade flows is composed of positive flows only, precluding examining selection into trade.

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literature, we examine the potential impact of the WGIs on the selection of countries into FDI. Notably, this is the first study to find that *Voice and Accountability* in the host country – which tends to have a significant negative impact on their level of FDI inflows – has a *significant positive* (selection) effect on the decision of capital-exporting country *i* to have positive FDI into country *j*. Moreover, we find that host country *Political Stability* and *Regulatory Quality* have significant positive impacts on the both the extensive and intensive margins of FDI from *i* to *j*. This suggests that – for developing countries searching for FDI inflows from more countries – not only good governance in the host country in the form of strong regulatory quality matters for FDI entry of new capital-exporting countries and firms, but also strong democratic institutions fostering pluralism and political stability also tend to increase the likelihood of positive FDI into a host country.

The remainder of the paper is as follows. In Section 2, we summarise the analytical framework behind our economic determinants of trade and FDI flows, the motivation for using the gravity equation in the econometric work and the role of democracy and the WGIs in our analysis. Section 3 addresses the data and econometric issues. Section 4 presents the empirical results using ordinary least squares (OLS) and Poisson pseudo-maximum likelihood (PPML) estimators for 'traditional' gravity-equation specifications as well as 'modern' ones accounting for multilateral resistance terms. Section 5 examines the effects of variables on the (country) intensive and extensive FDI margins, accounting for firm heterogeneity using the Helpman et al. (2008) approach. Section 6 provides conclusions.

2. FRAMEWORK AND HYPOTHESES

a. Framework for Explaining Bilateral Trade and FDI Flows

Most econometric studies that have examined determinants of bilateral trade flows and of bilateral FDI flows have used the gravity equation (cf. Blonigen, 2005).[6] In this paper, we use the gravity equation as well. As Blonigen and Piger (2011) recently noted, Carr et al. (2001) and Bergstrand and Egger (2007) provided theoretical general equilibrium models of multinational enterprises' and national exporting firms' behaviour to suggest economic factors that explain simultaneously trade and foreign affiliate sales (FAS). Carr et al. (2001) and Markusen and Maskus (2001, 2002) use the 2-good, 2-factor, 2-country 'knowledge-capital' model of Markusen (2002), which is based upon earlier work in Helpman (1984), Markusen (1984), Markusen and Venables (1998, 2000), and several other papers of Markusen with various coauthors. This framework provided foundations for the roles of two countries' GDP sizes, GDP similarities, relative skilled-to-unskilled-labour shares, and bilateral trade and FAS costs in influencing the levels of bilateral FAS.[7]

Bergstrand and Egger (2007) is an extension of the $2 \times 2 \times 2$ 'knowledge-capital' (KC) model in Markusen (2002), also with national exporters (NEs), horizontal multinational enterprises (MNEs) and vertical MNEs. Prior to Bergstrand and Egger (2007), the limitation of the general equilibrium KC model to two factors (skilled and unskilled labour) and two countries did not allow a theoretical foundation for the observed complementarity of aggregate bilateral

[6] Empirically, it is standard to investigate bilateral FDI 'stocks'. Consistent with the literature, we use FDI stock data (not flows *per se*), (cf. Blonigen and Piger, 2011).

[7] Moreover, as Markusen (2002) notes, this $2 \times 2 \times 2$ framework cannot explain FDI flows, only FAS flows.

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trade and FDI flows for identical countries (once all other factors known to influence trade and FDI were accounted for), nor did it generate a theoretical foundation for using the 'gravity equation' for explaining empirically FDI flows – much less explaining simultaneously the use of gravity equations for both FDI and trade flows.

Motivated by the puzzle in the Markusen–Venables $2 \times 2 \times 2$ general equilibrium model of NEs and MNEs that two countries with identical relative factor endowments maximise their bilateral foreign affiliate sales when their absolute factor endowments (and hence GDPs) are identical but have zero bilateral trade – which is empirically rejected – Bergstrand and Egger (2007) introduced a third factor (physical capital) to resolve this puzzle. Although introducing a third factor implies coexistence of NEs and HMNEs for identically sized economies, this extension cannot explain empirically the 'complementarity' of bilateral trade and FDI flows to GDP similarity. Typical empirical gravity equations of international trade and FDI tend to suggest that both trade and FDI from country i to country j should be positively related to the size and similarity of their GDPs. However, the introduction of a third country – *ROW* – to the three-factor 'knowledge-and-physical-capital (KAPC) model can explain readily the complementarity of bilateral trade, FDI and FAS to changes in a pair of countries' economic size and similarity as typical to gravity equations. In a two-country world, gross multilateral and bilateral trade (or foreign affiliate sales) are identical; NEs and HMNEs must substitute for one another when the two countries are identically sized in the face of trade and investment costs. However, introducing a third country (along with imperfect mobility of the services of physical capital) allows two countries' trade, FDI and foreign affiliate sales (FAS) to co-vary positively with increases in these two countries' GDP similarity because the 'substitution effect' associated with exogenous trade-to-investment costs is potentially offset by a 'complementarity effect' generated by endogenous relative prices of physical-to-human capital interacting with the three countries' economic sizes. With three countries, both bilateral trade and FAS are maximised when a pair of countries' GDPs are identical, unlike a two-country world. Moreover, the presence of the third country can explain why FDI from one country to another is not maximised when GDPs are perfectly identical – which is actually observed empirically.[8]

Given the potentially large number of variables that have been used in the extensive empirical literature using gravity equations to explain bilateral FDI stocks, Blonigen and Piger (2011) recently conducted a Bayesian moving average (BMA) analysis to allow one to select (for the gravity equation of FDI) from an enormous set of candidate variables the ones most likely to explain FDI stocks. The variables most likely to explain (the log of) FDI bilateral stocks – using a cut-off threshold of 100 per cent – included home and host countries' (log) real GDPs, (log) bilateral distance, the (log of) home country's *per capita* real GDP – which are all standard gravity-equation variables – and relative skilled labour endowments (specifically, the squared difference in the two countries' shares of unskilled labour). The variables with likelihoods ranging from 90 to 100 per cent included common official language, host country's remoteness, home country capital–labour ratio, host country's urban concentration ratio and regional trade agreement dummy – many of which are often included in gravity equations.[9]

[8] One of the important theoretical results in Bergstrand and Egger (2007) was that – in the context of their numerical general equilibrium model – for FDI flows, the home country's GDP elasticity should exceed the host country's GDP elasticity, whereas for trade flows, the exporter's and importer's GDP elasticities should be virtually identical. See Bergstrand and Egger (2007) for details for these conclusions. We address this issue here as well.

[9] In many cases, regional trade agreements include bilateral FDI liberalisation provisions also.

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Bergstrand and Egger (2007, section 7) also provides guidance for several of the bilateral trade-and-FDI-cost variables mentioned above, typically found in gravity equations. For instance, bilateral distance is common to all gravity equations. For trade flows, it is well established empirically that the distance elasticity of trade is approximately −0.9 (cf. Disdier and Head, 2008). However, FDI distance elasticities are typically smaller (in absolute terms); horizontal FAS activity can be positively related to distance since horizontal FAS and trade flows are substitutes with respect to relative trade and FDI costs. However, FDI distance elasticities still tend to be negative because vertical FAS activity often requires trade in intermediates from home countries. For similar economic reasons, dummy variables for sharing a common land border also have potentially different effects on FDI flows relative to trade flows. More likely is that trade flows and FDI flows are both positively related to two countries sharing a common language or common colonial history.

Consequently, given the theoretical motivation in Bergstrand and Egger (2007) and the econometric motivation from the BMA analysis in Blonigen and Piger (2011), our empirical specification for the gravity equation includes most of the explanatory variables suggested in Blonigen and Piger (2011) as having systematic material influence: source and destination countries' GDPs and *per capita* GDPs, bilateral distance, common language dummy, common colonial relationship dummy and destination country's political variables. At this time, we exclude free trade agreement and customs union dummies; there are numerous econometric (endogeneity) issues associated with such dummies in gravity equations, which have been addressed elsewhere (cf. Baier and Bergstrand, 2007) and are beyond the scope of this paper. We also for now exclude source country's physical capital–labour ratio and country-pairs' differences in unskilled labour shares, which have been addressed elsewhere (cf. Bergstrand and Egger, 2013a) and are beyond the scope of this paper. Trade 'openness' is omitted for reasons discussed earlier; given our theoretical context, trade and FDI flows are determined simultaneously by common factors.[10]

A novel specification in this paper is estimating a 'gravity equation' explaining empirically the (log of the) ratio of FDI to trade for pairs of countries. Typically, gravity equations explain log-levels of flows. However, since trade and FDI flows tend to be substitutes with respect to many trade and investment costs proxies, it is quite plausible that the (log) ratio of FDI to trade may be significantly related to certain RHS variables. For instance, for reasons just discussed, bilateral distance may have a positive impact on FDI relative to trade. Similar considerations will be discussed below for the governance indicators, as some may affect trade costs differently relative to investment costs.

Finally, it is well known that many pairs of countries in the world do not trade at all (the 'zeros issue'). The prevalence of the zeros issue has led many researchers to re-examine the determinants of trade flows using gravity equations to account for the country intensive and extensive margins, as well as firm heterogeneity (cf. Helpman et al., 2008). While several studies have examined the effects of presence of zeros on estimation of gravity equations for trade, fewer studies exist that address this issue for FDI flows, where the prevalence of zeros is even larger.[11] Moreover, no study has examined the differential effect on the (country) intensive versus extensive margin of FDI of governance indicators. One of the main potential

[10] For now, we also exclude the destination country's urban concentration ratio and corporate tax rate; we leave their inclusion for future research.

[11] Some recent studies examining empirically the zeros issue for FDI are Davies and Kristjansdottir (2010) and Paniagua (2011).

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contributions of this study is to address this. As the introductory quote suggests, pluralism is likely to reduce MNEs' degrees of freedom in host developing countries. However, strong pluralism – or democracy – may be necessary to attract a positive FDI flow from a country, by reducing the fixed cost of FDI. Thus, pluralism may have a negative relationship with the level of FDI, but a positive relationship with the probability of positive FDI. For instance, in one of the few studies examining the (country) intensive and extensive margins of trade, Helpman et al. (2008; HMR model), found that a common land border, common official language and common colonial ties all had different *qualitative* effects on the intensive and extensive margins of trade.

In the next section, we examine the World Bank WGIs (used in several previous influential economic analyses), as potential determinants of bilateral FDI, trade and FDI relative to trade, as well as selection into FDI.

b. Governance and Globalisation

The title of our paper reveals our emphasis on examining the effects of governance – not just 'democracy' – on FDI, trade, FDI relative to trade and selection into FDI. As the WGIs are now considered the best governance indicators, we use all six major WGIs to explore the effects of governance on globalisation, noting that the few previous studies using the WGIs have used each of the six individually (although many experts on governance indicators suggest that they are not substitutes for each other, cf. Arndt and Oman, 2006). Building upon the discussion above, our approach suggests that various governance factors may influence levels of trade and FDI similarly or differently, depending upon how they affect trade costs relative to investment costs. Moreover, even for FDI alone, governance factors may influence similarly or differently the decision by a country to have positive FDI in a host versus the level of FDI of a home country in a host, depending upon whether such factors influence variable versus fixed investment costs. For instance, democracy *per se* in country j may contribute to a lower fixed investment cost that potentially affects the likelihood of FDI of country i in country j, while at the same time, democracy may limit the level of FDI if it raises variable investment costs (e.g. 'pluralism' effects).

(i) Background Literature

Milner and Mukherjee (2009) provide one of the most comprehensive recent literature reviews of the interaction between 'democracy' and 'trade'.[12] To date, most empirical work analysing the interactions of these variables has examined causality running from democracy to international trade. Milner and Mukherjee (2009) summarise the literature as showing that increased democracy tends to increase the trade openness of countries significantly. However, when examining the literature reporting surveys of workers 'trade preferences', the literature tends to suggest that low-skilled/unskilled workers in countries – either developed or developing – tend to be against trade openness. The authors note several surveys that confirm this

[12] Milner and Mukherjee (2009) examine both the relationships between democracy with trade as well as between democracy and measures of 'capital account liberalisations'. Since their survey is recent and comprehensive, we refer the reader to that paper for a full list of the important contributions. Since they do not address the literature on the relationship between democracy and FDI, this survey does not shed light on their relationship. However, a useful review of the sparse literature on democracy and FDI is provided recently in Asiedu and Lien (2011), discussed shortly.

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view (cf. Scheve and Slaughter, 2001; Mayda and Rodrik, 2005). Milner and Mukherjee (2009) conclude the widening of a 'skill premium' bias in countries following trade liberalisation may affect preferences, attitudes and the 'voice' of workers against trade liberalisation, even though *broad* measures of 'democracy' may be positively correlated with trade. More recently, Helpman et al. (2012) show that firm heterogeneity can influence how trade can affect wage inequality. They show theoretically and empirically across industries that less productive firms (who tend to be less engaged internationally) are affected negatively more by trade openness than more productive firms; pluralism may reflect the voices of workers at less productive firms. Also, Milner and Mukherjee (2009) summarise that the evidence to date on the reverse direction of causality – from trade to democracy – is weak, at best. Moreover, the empirical analysis in Milner and Mukherjee (2009) – representative of other like analyses – includes several typical control variables in addition to their (re-normalised) polity measure of democracy, but excludes other governance indicators, an issue we address specifically. Finally, one of the most recent analyses of bilateral trade and democracy indexes, using a properly specified gravity equation, finds a negative relationship of importer's democracy on trade flows (cf. Yu, 2010, Table 5).

By contrast, the literature examining the effect of democracy on FDI is much smaller. Recently, Asiedu and Lien (2011, p. 101) noted that within the context of a vast empirical literature on the determinants of FDI, 'only a few of the studies include democracy as an explanatory variable'. They noted only 12 published studies that have included democracy as a determinant of FDI, and only two were published before 2000. Of these 12 studies, eight found significant positive effects of democracy on FDI, three found no significant effects, and only one found a significantly negative effect of democracy on FDI.[13] Of the eight studies finding positive relationships, several of the studies were limited by numerous aspects: (i) *ad hoc* FDI specifications lacking rigorous theoretical foundations; (ii) including only measures of democracy but excluding representation of measures of property rights or 'good governance'; (iii) small samples typically using multilateral FDI inflows by country, rather than bilateral flows; and/or (iv) inclusion in FDI regressions of measures of trade (to reflect 'openness'), creating potential endogeneity bias (cf. Harms and Ursprung, 2002); Jensen, 2003; Jakobsen, 2006; Adam and Filippaios, 2007; Busse and Hefeker, 2007). None of these 12 studies used bilateral FDI flows or a gravity-equation methodology, including Asiedu and Lien (2011).[14]

[13] They noted that Rodrik (1996), Harms and Ursprung (2002), Jensen (2003), Busse (2004), Jakobsen (2006), Jakobsen and de Soysa (2006), Adam and Filippaios (2007) and Busse and Hefeker (2007) found positive effects; O'Neal (1994), Alesina and Dollar (2000) and Buthe and Milner (2008) found no significant effects; and Li and Resnick (2003) found a significant negative effect.

[14] Globerman and Shapiro (2002) examined the influences of the Worldwide Governance Indicators separately on FDI, but also used multilateral FDI levels and did not include simultaneously all the Worldwide Governance Indicators. As noted earlier, Globerman and Shapiro (2003) appears to be the lone study first examining selection into FDI, using bilateral US FDI flows with numerous other countries (for three consecutive years), and then accounting for selection bias in subsequent regressions explaining FDI levels. However, each of those authors' probit and second-stage estimations included only a constant, foreign GDP and only one Worldwide Governance Indicator (at a time); consequently, their specifications precluded separating the effects simultaneously of pluralism from the effects of other measures of good governance. Moreover, that study ignored accounting for firm heterogeneity. The lone study we have found using a gravity methodology and bilateral FDI stocks is Benassy-Quere et al. (2007). Of course, Blonigen and Piger (2011) and Eicher et al. (2011) included democracy measures in their respective BMA analyses, but did not focus on such variables.

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Asiedu and Lien (2011) note that only one published study – Li and Resnick (2003) – found a significant negative effect of democracy on FDI. The notable distinction of Li and Resnick (2003) was the additional inclusion of numerous measures of 'property rights' on the RHS. With those variables included, democracy had a negative impact. However, in response to Li and Resnick (2003), Jakobsen and de Soysa (2006) showed that – if one doubles the sample size from 50 countries to nearly 100 and uses the logarithm of multilateral FDI flows (rather than the level) – this finding is reversed; democracy and property rights indexes have complementary positive effects on FDI.

Li and Reuveny (2003) and Li and Resnick (2003) are straightforward regarding the potentially conflicting effects of 'democracy' on FDI, noting that democratic 'institutions' (such as regulatory quality) tend to strengthen property rights' protections, thus enhancing FDI. However, democratic 'constraints' (such as voice and accountability for citizens) tend to weaken market powers of MNEs, diminishing FDI. Thus, indexes of higher pluralism – such as 'voice of citizens' along with 'accountability of government to citizens' – may increase unskilled labour's voice and be correlated negatively with trade and FDI – even though the more transparent, less corrupt and more effective governance associated with democracies may well lead to more trade and FDI.[15]

(ii) The Worldwide Governance Indicators

The mixed empirical outcomes in the empirical literature on democracy and globalisation suggest the need for a study using a broader set of measures of 'governance' – of which variables related to pluralism *per se* can be isolated – to separate the potentially conflicting effects of pluralism from other governance structures. In this paper, we employ WGIs which are very useful because they include six indicators that span a wide array of factors that can potentially affect FDI, trade and even FDI relative to trade. Important studies such as Alcala and Ciccone (2004) and Badinger (2008) employed the WGIs, because they are considered in a recent survey 'probably the most carefully constructed governance indicators' (Arndt and Oman, 2006). While there is now an emerging literature on these indicators, two of the notable features of them are that by aggregating over numerous sources they dramatically reduce measurement error and they are now constructed annually over a much larger number of countries than most other governance indicators.[16] While critiques of these indicators have been made because of their prominent adoption, they are widely respected indicators and the most suitable for this study (cf. Kaufmann et al., 2006, 2007a, 2007b, 2007c; Kurtz and Schrank, 2007; Arndt and Oman, 2006; and references therein; we refer the reader to this literature for more detail).

[15] Many of the studies in the political science journals cited in the previous footnote articulate the rationale for a potential negative effect of democracy on FDI. Li and Resnick (2003) are particularly clear that the increased pluralism associated with democracies tends to weaken MNEs' freedom in host countries, tending to reduce FDI inflows. They note that democratic constraints over elected politicians tend to weaken the oligopolistic or monopolistic positions of MNEs, democratic constraints bind host governments from offering generous financial incentives for FDI, and broad access to elected officials and wide political participation offer institutionalised routes through which businesses can seek protection.

[16] The indicators are constructed annually beginning in 2002; prior to 2002, the indicators were constructed for 1996, 1998 and 2000. They now cover over 200 countries and use information from 31 different data sources from 25 organisations, including some of the most prominent political science indicators of democracy.

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While each of the six WGIs will be defined shortly, we briefly summarise the indicators and formulate hypotheses about their expected impacts on trade and FDI, in the context of the analytical frameworks described above. First, the six WGIs are categorised according to three concepts. The first concept deals with the 'process by which governments are selected, monitored and replaced'. This concept is measured by two indicators: one is *Voice and Accountability* of a country's citizens (i.e. the extent to which citizens are able to participate in government) and one is *Political Stability*. The first is likely to be the measure most closely associated with democracy (or pluralism). We argue that greater pluralism in a goods-importing or capital-importing country is likely to increase resistance to international trade and foreign direct investment, respectively. This reflects the Li and Resnick (2003) argument that increased pluralism reduces the foreign exporter's or foreign MNE's degree of freedom in the importing or host, respectively, developing country, and the other arguments noted above. In other words, larger host country pluralism is like a tax, equivalent to an ad valorem trade or investment cost. In this regard, we expect to confirm Li and Resnick's (2003) finding of a negative correlation between pluralism and the level of trade and FDI. Yet, we only expect to find this result by holding constant the influences of other measures of governance.

However, recent developments in the theory of trade and FDI raise the issues of firm heterogeneity and fixed export and investment costs (cf. Helpman et al., 2004), and suggest a novel hypothesis. Although pluralism may create a variable trade and investment cost on the levels of trade and FDI, respectively, pluralism in a host country may be a requirement by a capital-exporting country for positive investment in that host. Consequently, increased pluralism may reduce fixed foreign direct investment costs, increasing the probability of FDI by country i into host country j. That pluralism potentially could have differential qualitative effects on levels of FDI flows (intensive margin) than on the likelihood of positive FDI flows (extensive margin) is in the spirit of the Helpman et al. (2008) finding that common land borders, common official languages and common colonial ties had different qualitative effects on the level of trade flows relative to the probability of positive trade flows.

The other variable in the first category is *Political Stability* and suggests a second set of hypotheses. Measures of political stability have long been used by economists in explaining FDI flows. More political stability in a host country has tended to have a positive impact on the level of FDI inflow. However, it is possible that political stability could increase both the probability of and level of FDI. Moreover, if political stability is an important factor for lowering costs of FDI, and if FDI and trade are substitutes in relation to relative investment and trade costs, it is possible that political stability – which lowers the cost of FDI – may have a negative effect on trade. Unlike democracy, political stability is not typically explored as a determinant of international trade flows. We hypothesise that political stability and FDI are positively related, but political stability and trade are negatively related.

The other two categories of the WGIs are related more to 'good governance'. The second category refers to factors influencing the 'capacity of the government to effectively formulate and implement sound policies'; the two WGIs associated with this category are *Government Effectiveness* and *Regulatory Quality*. We expect both of these indexes to be positively associated with trade and FDI. The third category refers to factors associated with 'respect of citizens and the state for institutions that govern economic and social interactions'; the two WGIs associated with this category are *Rule of Law* and *Control of Corruption*. We expect both of these indexes to be positively associated with trade and FDI. Hence, our third and final set of hypotheses is that these four good governance indexes are positively related to the levels of trade and FDI, as well as the probability of (positive) FDI.

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3. ECONOMETRIC AND DATA ISSUES

a. Econometric Issues

In our econometric analysis, we will use a traditional ordinary least squares (OLS) specification for gravity equations with only positive trade and FDI flows (i.e. we omit zeros), and we will use a more recently emphasised Poisson pseudo-maximum likelihood (PPML) specification that accounts for heteroscedasticity bias and allows inclusion of zeros (cf. Santos Silva and Tenreyro, 2006). We will estimate each specification using three alternative variables: bilateral trade, bilateral FDI and the ratio of bilateral FDI to trade. In later results, we will consider using the HMR framework for two-stage estimation of the probability of FDI and then the level of FDI.

Our first specification for (the logarithm of) bilateral trade, bilateral FDI and the ratio of bilateral FDI to bilateral trade uses OLS:

$$\begin{aligned}\ln X_{ijt} = {} & \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln PCGDP_{it} + \beta_4 \ln PCGDP_{jt} + \beta_5 \ln DIST_{ij} \\ & + \beta_6 ADJ_{ij} + \beta_7 LANG_{ij} + \beta_8 COLONY_{ij} + \beta_9 VA_{jt} + \beta_{10} PS_{jt} + \beta_{11} GE_{jt} + \beta_{12} RQ_{jt} \\ & + \beta_{13} RL_{jt} + \beta_{14} CC_{jt} + \epsilon_{ijt}. \end{aligned} \tag{1}$$

We use three different left-hand-side (LHS) variables for ln X_{ijt}. First, we use ln $TRADE_{ijt}$, which is the natural logarithm of the flow of merchandise trade from exporting country i to importing country j (in year t). Second, we use ln FDI_{ijt}, which is the natural log of the stock of foreign direct investment of home country i in host country j; FDI stocks rather than flows are the standard in the empirical gravity-equation literature on FDI 'inflows' (cf. Blonigen, 2005). Finally, we use ln $FDITRADE_{ijt}$, which is the natural log of the ratio of the FDI flow to the trade flow. In the OLS specifications, we only use positive values of FDI and trade flows. In our data set, all trade flows have positive values, but numerous FDI flows are zeros; we address the zeros in FDI flows later. Data sources and countries included will be discussed later.

In equation (1), the following variables are included on the right-hand side (RHS). Variable ln GDP_{it} (ln GDP_{jt}) denotes the natural logarithm of the GDPs of country i (j) in year t. Variable ln $PCGDP_{it}$ (ln $PCGDP_{jt}$) denotes the logarithm of *per capita* GDP of country i (j) in year t. As the trade and FDI gravity-equation literature remains ambiguous about the interpretation of *per capita* GDPs in the gravity equation, we remain agnostic and do not offer any firm prediction.[17] Variable ln $DIST_{ij}$ denotes the logarithm of the bilateral distance between the economic centres of countries i and j. ADJ_{ij} is a dummy variable assuming the value 1 (0) if countries i and j share (do not share) a common land border. $LANG_{ij}$ is a dummy variable assuming the value 1 (0) if countries i and j share (do not share) a common language. $COLONY_{ij}$ is a dummy variable assuming the value 1 if one of the countries was a former colony of the other country, and 0 otherwise. All WGI indexes are included in level (not log-level) form;

[17] There has been no theoretical rationale for including *per capita* GDPs of home and host countries in the FDI gravity-equation literature. In the trade gravity-equation literature, Bergstrand (1989, 1990) remain the only studies that have offered a theoretical rationale for exporter and importer *per capita* GDPs. In those studies, exporter *per capita* GDP can be interpreted in his context as a proxy for the capital–labour endowment ratio of country i; a positive (negative) coefficient estimate implies that the trade flows embody on average capital (labour) intensive goods. In that study, a positive (negative) coefficient estimate on the importer's *per capita* GDP implies that the bundle of (aggregate) trade flow from i to j is comprised on average of luxuries (necessities).

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consequently, their coefficient estimates will be considerably smaller (in absolute value terms) than the coefficients on variables in log form. As for the dummy variables, inclusion of these variables in level form (0 to 100) allows easy interpretation of their coefficients.

We also consider two other specifications. With OLS and the use of logarithms in the typical gravity equation, observations with zeros in the aggregate bilateral FDI stocks are necessarily dropped, and the coefficient estimates are potentially biased because of Jensen's inequality causing possible heteroscedasticity. Following Santos Silva and Tenreyro (2006), we also run the specifications above accounting for heteroskedasticity using Poisson pseudo-maximum likelihood (PPML) and then also including zeros.[18] The PPML specification analogous to equation (1) is:

$$\begin{aligned}\ln X_{ijt} = \; & exp[\beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln PCGDP_{it} + \beta_4 \ln PCGDP_{jt} \\ & + \beta_5 \ln DIST_{ij} + \beta_6 ADJ_{ij} + \beta_7 LANG_{ij} + \beta_8 COLONY_{ij} + \beta_9 VA_{jt} + \beta_{10} PS_{jt} \\ & + \beta_{11} GE_{jt} + \beta_{12} RQ_{jt} + \beta_{13} RL_{jt} + \beta_{14} CC_{jt}] + \epsilon_{ijt}, \end{aligned} \tag{2}$$

where *exp* denotes the exponentiated value of the term in parentheses.

Also, as discussed extensively in Anderson (1979), Bergstrand (1985), Anderson and van Wincoop (2003), Baier and Bergstrand (2009) and elsewhere, the typical gravity equation is mis-specified when measures of 'multilateral resistance' are omitted. Because such multilateral resistance terms are country specific and time varying – like the Worldwide Governance Indicators – one cannot simply include exporter-and-time and importer-and-time fixed effects, as this would eliminate the WGIs (i.e. perfect collinearity). While we could use exporter and importer fixed effects, the results would be biased by not accounting for the time variation in multilateral resistance terms. Moreover, the time variation in our sample is extremely small (five years) relative to the cross-sectional variation. Consequently, because of the limited time variation in our RHS variables and the inability to use as appropriate exporter-time and importer-time fixed effects, we consider a procedure suggested recently in Baier and Bergstrand (2009) to account simultaneously for the unobservable time-varying multilateral resistance terms as well as the WGIs. Baier and Bergstrand (2009) used a first-order log-linear Taylor-series approximation method to isolate exogenous components of the multilateral price terms, while still allowing time- and cross-section variation in the WGIs.[19] This PPML specification is:

[18] As noted in Santos Silva and Tenreyro (2006) and the subsequent literature, there are two reasons for using PPML: the existence of zeros and heteroscedasticity-induced potential bias. Hence, even for our trade data set with no zeros, PPML will yield different coefficient estimates for the trade gravity equation than OLS.

[19] Baier and Bergstrand (2009) employ a first-order log-linear Taylor-series expansion of the multilateral price terms in Anderson and van Wincoop (2003) to show how one can account for these price terms in estimation and in comparative statics, without losing the informational content of other country-specific time-varying exogenous variables. Baier and Bergstrand (2009) provide empirical and Monte Carlo evidence supporting that the approach yields unbiased and precise coefficient estimates in gravity equations.

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$$\begin{aligned}\ln X_{ijt} = exp[&\beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln PCGDP_{it} + \beta_4 \ln PCGDP_{jt} \\ &+ \beta_5 \ln DIST_{ij} + \beta_6 ADJ_{ij} + \beta_7 LANG_{ij} + \beta_8 COLONY_{ij} + \beta_9 VA_{jt} + \beta_{10} PS_{jt} \\ &+ \beta_{11} GE_{jt} + \beta_{12} RQ_{jt} + \beta_{13} RL_{jt} + \beta_{14} CC_{jt} + \beta_{15} MR \ln DIST_{ijt} + \beta_{16} MRADJ_{ijt} \\ &+ \beta_{17} MRLANG_{ijt} + \beta_{18} MRCOLONY_{ijt}] + \epsilon_{ijt}, \end{aligned} \tag{3}$$

where

$$MR \ln DIST_{ijt} = \left(\sum_{j=1}^{N} \theta_{jt} \ln DIST_{ij}\right) + \left(\sum_{i=1}^{N} \theta_{it} \ln DIST_{ij}\right) - \left(\sum_{m=1}^{N}\sum_{n=1}^{N} \theta_{mt}\theta_{nt} \ln DIST_{mn}\right),$$

$$MRADJ_{ijt} = \left(\sum_{j=1}^{N} \theta_{jt} ADJ_{ij}\right) + \left(\sum_{i=1}^{N} \theta_{it} ADJ_{ij}\right) - \left(\sum_{m=1}^{N}\sum_{n=1}^{N} \theta_{mt}\theta_{nt} ADJ_{mn}\right),$$

$$MRLANG_{ijt} = \left(\sum_{j=1}^{N} \theta_{jt} LANG_{ij}\right) + \left(\sum_{i=1}^{N} \theta_{it} LANG_{ij}\right) - \left(\sum_{m=1}^{N}\sum_{n=1}^{N} \theta_{mt}\theta_{nt} LANG_{mn}\right),$$

$$\begin{aligned} MRCOLONY_{ijt} = &\left(\sum_{j=1}^{N} \theta_{jt} COLONY_{ij}\right) + \left(\sum_{i=1}^{N} \theta_{it} COLONY_{ij}\right) \\ &- \left(\sum_{m=1}^{N}\sum_{n=1}^{N} \theta_{mt}\theta_{nt} COLONY_{mn}\right), \end{aligned}$$

where θ_{it} is i's time-varying GDP as a share of time-varying world GDP. The basic intuition for the Baier and Bergstrand (2009) procedure is that the first-order Taylor-series linear approximations allow the Anderson and van Wincoop (2003) endogenous multilateral resistance terms to be captured empirically by the exogenous variables influencing bilateral trade costs. Baier and Bergstrand (2009) demonstrated both empirically and using Monte Carlo simulations that the Anderson—van Wincoop multilateral resistance terms can be well approximated using the 'exogenous' components of the Anderson—van Wincoop 'endogenous' non-linear MR terms. Using a first-order log-linear Taylor-series expansion, the authors showed that there are simple log-linear terms that can be incorporated into 'good old' OLS gravity equations to account for third-country prices without using non-linear least squares estimation of the underlying structural gravity model or using exporter and importer fixed effects.

Finally, to examine selection into FDI and the influence of firm heterogeneity, we employ probit regressions later to predict the probability of positive FDI flows and then implement the Helpman et al. (2008) two-stage methodology to control for country-selection bias and for firm-heterogeneity bias.

b. Data

The trade and FDI flow data are annual observations for the period 1997–2004. Cross-section time-series bilateral FDI data are more difficult to obtain than bilateral trade-flow data. The FDI data are FDI 'stocks' from the Organization for Economic Cooperation and Development

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(OECD) data base on International Direct Investment with 28 OECD countries as source countries and (potentially) 124 destination countries; the home and host countries for FDI are listed in Table 1. The bilateral trade-flow data used are from the UN COMTRADE database.[20]

GDP and population data are from the International Monetary Fund's International Financial Statistics. Unfortunately, within the eight-year time frame of 1997–2004, the WGIs only exist for the years 1998, 2000 and 2002–04, as discussed in Kaufmann et al. (2007a). This limits our time dimension to only five years.[21] The WGIs range between −2.5 and 2.5. Following Milner and Mukherjee (2009), we normalise the WGI variables to range between 0 and 100 to aid interpretation of the results. The bilateral distance (between economic centres) variable and adjacency, language and colonial relationship dummies (defined earlier) were obtained from the CEPII website.

We now list what each of the six indicators measures, as summarised in Kaufmann et al. (2007a):

1. *Voice and Accountability (VA)*: This variable measures the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, of association and of media. Of the six WGIs, this variable best captures most individuals' notion of how a democratic institution fostering voice and accountability affects pluralism.[22]
2. *Political Stability (PS)*: This variable measures perceptions of the likelihood that the government will not be destabilised or overthrown by unconstitutional or violent means.
3. *Government Effectiveness (GE)*: This variable measures the quality of public services, of the civil service (and its degree of independence), of policy formation process and implementation, and of the government's commitment to implementing policies.
4. *Regulatory Quality (RQ)*: This variable measures the ability of the government to formulate and implement sound policies and regulations that permit and promote *private sector development*.
5. *Rule of Law (RL)*: This variable measures the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, the police and the courts.
6. *Control of Corruption (CC)*: This variable measures the extent to which public power is not exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests.

As the WGIs are central to our analysis, we provide some descriptive information about them. Table 2 summarises the distribution of data points that we have for the six WGIs and their sources. Table 3 provides some descriptive statistics for the six WGIs. Since each has

[20] This implies 17,220 potential gross flows for the five years. Both the trade-flow data and the FDI flow data are constrained by numerous missing observations. This leaves 12,229 trade-flow observations (with no zeros) and 9,360 FDI flow observations (and 4,840 positive FDI observations). In calculating the ratios of FDI to trade, the number of observations was smaller due to mismatches between trade and FDI missing observations (leaving 9,200 observations including zeros). It is important to note that the trade data are merchandise (goods) trade flows, while the FDI stocks relate to goods and services sectors.

[21] Since the years 1997, 1999 and 2001 were missing, we also tried interpolated values for the WGIs, generating three more years of observations. The results for all our specifications were not materially different using five or eight years. We report only the results using the five years discussed.

[22] The frequently considered minimum requirements for a democracy are regular, free and fair elections; divisions of power; checks and balances; and inalienable human freedoms, rights, and voice.

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TABLE 1
Exporter-Home and Importer-Host Countries

Exporter-Home	Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Mexico, Netherlands, New Zealand, Norway, Poland, Puerto Rico, Slovakia, South Korea, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States
Importer-Host	Albania, Algeria, Angola, Argentina, Armenia, Australia, Austria, Azerbaijan, Bangladesh, Belarus, Belgium, Benin, Bolivia, Bosnia and Herzegovina, Brazil, Bulgaria, Burkina Faso, Burundi, Cambodia, Canada, Cameroon, Central African Republic, Chad, Chile, China, Colombia, Congo (Republic of), Costa Rica, Croatia, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, El Salvador, Eritrea, Ethiopia, Finland, France, Georgia, Germany, Ghana, Greece, Guatemala, Guinea, Haiti, Honduras, Hong Kong, Hungary, India, Indonesia, Iran, Ireland, Israel, Italy, Ivory Coast, Japan, Jordan, Kazakhstan, Kenya, Korea (South), Kyrgyzstan, Lao People's Democratic Republic, Lebanon, Libya, Lithuania, Madagascar, Malawi, Malaysia, Mali, Mexico, Moldova, Morocco, Mozambique, Myanmar, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Pakistan, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Puerto Rico, Romania, Russia, Rwanda, Saudi Arabia, Senegal, Sierra Leone, Singapore, Slovakia, Slovenia, South Africa, Spain, Sri Lanka, Sudan, Sweden, Switzerland, Syrian Arab Republic, Taiwan, Tajikistan, Tanzania, Thailand, Togo, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Kingdom, United States, Uruguay, Uzbekistan, Venezuela, Vietnam, Yemen, Zambia, Zimbabwe

been re-scaled to a range of 0–100, note that the means are all close to 50. Table 4 provides observations for select countries for two years, addressing two issues. First, it provides cross-sectional evidence of relative values of the six WGIs for a range of developed and developing countries. Second, it provides evidence of changes over time in these select countries' WGIs.

We note two important considerations that may influence our results. First, as suggested by Arndt and Oman (2006) and Kaufmann et al. (2007a), the six WGIs should not be aggregated into a single 'governance' indicator as each reflects a considerably different measure of governance, with *Voice and Accountability* and *Political Stability* in a different category than the other four WGIs. Hence, in principle, all should be included in a regression to try to limit omitted variables bias. However, it is also well known that the six WGIs are positively correlated. Table 5 provides a correlation matrix of all six WGIs. We note that *Voice and Accountability* and *Political Stability* have correlation coefficients of approximately 80 per cent or less with the other four WGIs. However, the four WGIs sharing the other two governance categories are all highly correlated, with correlation coefficients above 90 per cent. This suggests that only one or two of the four 'good governance' indicators may surface as statistically important, and these four WGIs are likely more susceptible to multicollinearity.

4. EMPIRICAL RESULTS

(i) OLS Results

Table 6 presents the empirical results for trade flows, FDI and their ratio using OLS. The table is organised as follows. Column (1) lists the RHS variables used in the first empirical specification (equation (1)), which is the traditional gravity equation estimated using OLS. Column (2) lists the expected coefficient signs when possible for specifications listed in columns (3), (4) and (5) only. Column (3) lists the results for the trade regression using the entire sample of trade observations. Column (4) lists the results for the FDI regression using

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TABLE 2
Distribution of Data Points by Type of Data in 2006 WGIs

	Commercial Business Information Providers	*Surveys of Firms or Households*	*Non-Governmental Organizations*	*Public Sector Organizations*	*Total*
Number of data points					
Voice and Accountability	497	340	684	324	1,845
Political Stability	1,027	179	0	227	1,433
Government Effectiveness	845	371	315	314	1,845
Regulatory Quality	795	206	277	343	1,621
Rule of Law	960	371	410	655	2,396
Control of Corruption	959	439	133	314	1,845
Total	5,083	1,906	1,819	2,177	10,985
Shares of total for each indicator					
Voice and Accountability	0.27	0.18	0.37	0.18	1.00
Political Stability	0.72	0.12	0.00	0.16	1.00
Government Effectiveness	0.46	0.20	0.17	0.17	1.00
Regulatory Quality	0.49	0.13	0.17	0.21	1.00
Rule of Law	0.40	0.15	0.17	0.27	1.00
Control of Corruption	0.52	0.24	0.07	0.17	1.00
Total	0.46	0.17	0.17	0.20	1.00
Weighted shares of total for each indicator					
Voice and Accountability	0.35	0.03	0.54	0.08	1.00
Political Stability	0.82	0.04	0.00	0.14	1.00
Government Effectiveness	0.65	0.12	0.09	0.14	1.00
Regulatory Quality	0.59	0.09	0.12	0.19	1.00
Rule of Law	0.59	0.12	0.13	0.15	1.00
Control of Corruption	0.59	0.20	0.06	0.16	1.00
Total	0.60	0.10	0.16	0.14	1.00

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TABLE 3
WGI Descriptive Statistics, 1997–2004

	Mean	*Median*	*Standard Deviation*
Voice and Accountability	51.36	49.0	29.76
Political Stability	45.94	40.9	28.86
Government Effectiveness	53.59	52.6	29.79
Regulatory Quality	54.17	53.2	29.46
Rule of Law	50.60	48.1	30.21
Control of Corruption	51.47	47.6	30.38
Number of observations = 20,161			

positive observations (4,828); note that the FDI sample is much smaller than the trade sample.[23] In column (5), we provide the trade-flow estimates under the same sample as the FDI estimates (4,828 observations). Then in column (6), we provide the results for the specification for FDI relative to trade, using the same observations as in columns (4) and (5). Hence, column (2)'s expected signs do not apply to the last specification in column (6). In the case of *per capita* GDPs, even for columns (3), (4) and (5), the expected coefficient signs are unknown *a priori*.[24] We discuss the results for each of the four specifications in columns (3)–(6) in order. Recall that, in our data set, all trade flows are positive, but only about half of our FDI flows are positive; Table 6 shows the use of only positive values of FDI using OLS.

We organise our discussion below of variables' coefficient estimates into three parts: (i) GDPs and *per capita* GDPs; (ii) bilateral natural trade and investment cost variables (ln *DIST*,*ADJ*,*LANG*, and *COLONY*); and (iii) the WGI variables.[25] First, consistent with Bergstrand and Egger's (2007) knowledge-and-physical-capital model's predictions, exporter and importer GDPs in columns (3) and (5) and home and host country GDPs in column (4) have positive effects on trade and FDI flows, respectively. Country *i*'s *per capita* GDP also has an economically and statistically significant effect on country *i*'s FDI outflow to country *j*; this is consistent with evidence in Blonigen and Piger (2011). It is also important to note that country *j*'s *per capita* GDP has no perceptible impact on *j*'s bilateral FDI inflow; this will be important later for econometric 'identification' purposes when we isolate intensive and extensive margin effects using the Helpman et al. (2008) methodology to account for selection bias and firm heterogeneity. Moreover, consistent with the coefficient estimates for *i*'s *per capita* GDP in columns (4) and (5) using the same sample, *i*'s *per capita* GDP coefficient in column (6) is economically and statistically significant. This result is consistent with the finding in Helpman et al. (2004) that the ratio of foreign affiliate sales to export sales is positively related to the industry's capital–labour ratio. Many firm-level empirical results imply that multinational enterprises (MNEs) tend to be much more human-capital and physical capital intensive in production than national exporting firms (NEs) and that developed countries –

[23] Also, we use only the positive FDI observations for which we also have trade observations.
[24] However, Blonigen and Piger (2011) suggest strong *ex post* empirical evidence that home country *per capita* GDP is positively related to FDI flows to a host country.
[25] We use clustered standard errors, clustered around the destination-country variables to avoid overestimating the significance of the destination-country WGI variables' coefficient estimates. Using 'robust' standard errors often yielded lower standard errors.

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TABLE 4
Select WGIs, 1996 and 2006

Country	*Year*	*Percentile Rank (0–100)*	*Country*	*Year*	*Percentile Rank (0–100)*
Voice and Accountability			Political Stability		
Brazil	2006	59.6	Brazil	2006	40.4
	1996	54.5		1996	26.4
China	2006	5.8	China	2006	34.6
	1996	5.3		1996	35.1
France	2006	91.3	France	2006	62.0
	1996	78.9		1996	76.4
Germany	2006	95.7	Germany	2006	77.9
	1996	90.9		1996	92.8
India	2006	59.1	India	2006	17.8
	1996	52.6		1996	14.9
Italy	2006	85.1	Italy	2006	59.1
	1996	75.1		1996	61.1
Japan	2006	76.0	Japan	2006	86.1
	1996	74.2		1996	76.0
Russia	2006	20.7	Russia	2006	22.1
	1996	34.9		1996	16.3
United Kingdom	2006	94.2	United Kingdom	2006	64.9
	1996	79.4		1996	76.9
United States	2006	84.1	United States	2006	60.1
	1996	91.4		1996	78.4
Government Effectiveness			Regulatory Quality		
Brazil	2006	53.2	Brazil	2006	53.2
	1996	58.0		1996	58.0
China	2006	42.0	China	2006	42.0
	1996	50.7		1996	50.7
France	2006	85.4	France	2006	85.4
	1996	77.6		1996	77.6
Germany	2006	92.7	Germany	2006	92.7
	1996	89.3		1996	89.3
India	2006	46.8	India	2006	46.8
	1996	39.5		1996	39.5
Italy	2006	76.6	Italy	2006	76.6
	1996	73.2		1996	73.2
Japan	2006	86.3	Japan	2006	86.3
	1996	64.9		1996	64.9
Russia	2006	30.2	Russia	2006	30.2
	1996	28.3		1996	28.3
United Kingdom	2006	99.5	United Kingdom	2006	99.5
	1996	97.1		1996	97.1
United States	2006	93.7	United States	2006	93.7
	1996	94.6		1996	94.6
Rule of Law			Control of Corruption		
Brazil	2006	44.8	Brazil	2006	53.4
	1996	49.0		1996	51.5
China	2006	43.8	China	2006	35.4
	1996	46.7		1996	52.4
France	2006	89.5	France	2006	91.7
	1996	89.0		1996	89.8

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TABLE 4 *Continued*

Country	*Year*	*Percentile Rank (0–100)*	*Country*	*Year*	*Percentile Rank (0–100)*
Germany	2006	94.8	Germany	2006	93.2
	1996	95.2		1996	95.1
India	2006	56.2	India	2006	51.5
	1996	61.9		1996	39.3
Italy	2006	60.5	Italy	2006	69.4
	1996	82.4		1996	73.3
Japan	2006	90.0	Japan	2006	90.3
	1996	91.0		1996	85.4
Russia	2006	17.1	Russia	2006	21.4
	1996	24.8		1996	23.3
United Kingdom	2006	93.8	United Kingdom	2006	93.7
	1996	96.7		1996	96.1
United States	2006	91.9	United States	2006	89.8
	1996	94.3		1996	92.2

which are relatively abundant in human and physical capital – tend to headquarter more MNEs relative to NEs (cf. Helpman et al, 2004).

Second, consider the bilateral natural trade-and-FDI-cost variables. First, (the log of) bilateral distance, ln $DIST_{ij}$, has economically and statistically significant negative effects on trade and FDI flows. The larger (in absolute terms) coefficient estimate in the trade-flow specifications in columns (3) and (5) relative to the FDI flow specification in column (4) – contributing to the positive and statistically significant coefficient estimate for FDI relative to trade in column (6) – is typical. Distance is commonly considered to raise natural 'trade costs' of exporting from *i* to *j*. The smaller (absolute) coefficient for FDI can be readily explained by the tension between horizontal FDI versus vertical FDI. Horizontal FDI is related to market access, and a motivation for

TABLE 5
Correlation Matrix for 2005 WGIs

	Voice and Accountability	*Political Stability and Violence*	*Government Effectiveness*	*Regulatory Quality*	*Rule of Law*	*Control of Corruption*
Voice and Accountability	1.00					
Political Stability and Violence	0.70	1.00				
Government Effectiveness	0.79	0.75	1.00			
Regulatory Quality	0.80	0.72	0.96	1.00		
Rule of Law	0.78	0.81	0.95	0.91	1.00	
Control of Corruption	0.74	0.75	0.95	0.90	0.95	1.00

Note:
WGIs, Worldwide Governance Indicators.

Source: Kaufmann et al. (2007a).

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TABLE 6
OLS

(1) *LHS Variables*	*(2)* *Expected Coefficient Signs for Columns 3, 4 & 5*	*(3)* *ln* $TRADE_{ijt}$	*(4)* *ln* FDI_{ijt}	*(5)* *ln TRADE*	*(6)* *ln*(FDI_{ijt}/$TRADE_{ijt}$)
ln GDP_{it}	+	0.93***	0.91***	0.89***	0.14***
		(49.98)	(23.72)	(45.67)	(4.22)
ln GDP_{jt}	+	0.91***	0.74***	0.73***	0.05
		(24.40)	(10.43)	(20.08)	(0.72)
ln $PCGDP_{it}$	?	0.38***	1.40***	−0.04	1.78***
		(9.63)	(14.09)	(−0.80)	(18.28)
ln $PCGDP_{jt}$	?	−0.01	0.01	0.00	−0.06
		(−0.08)	(0.12)	(0.00)	(−0.46)
ln $DIST_{ij}$	–	−1.07***	−0.52***	−0.78***	0.21***
		(−22.73)	(−6.23)	(−21.70)	(2.59)
ADJ_{ij}	+ / ?	0.20	0.88***	0.57***	0.57**
		(1.16)	(3.07)	(5.35)	(2.05)
$LANG_{ij}$	+	0.67***	1.08***	0.49***	0.51***
		(5.08)	(5.75)	(4.49)	(3.25)
$COLONY_{ij}$	+	0.60***	0.60***	0.31	0.43**
		(4.69)	(3.40)	(0.52)	(2.47)
VA_{jt}	–	−0.012***	−0.007	−0.014***	0.007
		(−2.68)	(−1.04)	(−3.18)	(1.46)
PS_{jt}	− / + / −	−0.001	0.010**	0.002	0.008*
		(−0.32)	(2.02)	(0.76)	(1.88)
GE_{jt}	+	0.012***	0.007	0.015***	−0.006
		(2.85)	(0.69)	(2.70)	(−0.63)
RQ_{jt}	+	0.008*	0.023**	0.010**	0.018*
		(1.73)	(2.37)	(2.33)	(1.74)
RL_{jt}	+	−0.003	−0.023**	−0.005	−0.017*
		(−0.46)	(−2.17)	(−0.80)	(−1.81)
CC_{jt}	+	−0.000	−0.000	0.000	−0.003
		(−0.00)	(−0.02)	(0.01)	(−0.39)
Constant		−12.97***	−26.38***	−8.24	−23.21***
		(−17.20)	(−19.96)	(−12.31)	(−18.04)
N		12,229	4,828	4,828	4,828
R^2		0.83	0.66	0.84	0.41
RMSE		1.30	1.67	0.83	1.68
F-Statistics		419.94	159.86	429.11	40.43

Notes:
(i) OLS, ordinary least squares; LHS, left-hand-side.
(ii) *,**, and *** denote statistically significant in two-tailed *t*-test at the 10, 5 and 1 per cent levels, respectively, using clustered standard errors (clustered on destination variables). Results were also materially the same including year dummies.

it is trade-cost 'jumping'. Hence, the larger the bilateral distance between a country pair, the *larger* their horizontal FDI (and associated MNE activity). However, some FDI is vertically motivated, with headquarters country *i* investing in relatively low cost country *j*, goods are produced in *j*, and then there are exports from *j* back to *i*, as well as to the rest-of-world (*ROW*). In this case, larger bilateral distance raises trade costs and tends to reduce vertical FDI from *i* to *j*. On net, coefficient estimates for distance tend to be smaller for FDI relative to trade (in absolute

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terms), as found here (see also Lankhuizen et al. (2011)). Second, having a common land border (ADJ_{ij}), common language ($LANG_{ij}$) and common colonial history ($COLONY_{ij}$) tend to increase trade and FDI, as found in earlier studies. A novel finding here is that all three variables tend to increase FDI relative to trade by economically and statistically significant amounts.

Third, consider the WGI variables' effects. As shown in columns (3) and (5) in Table 6, *Voice and Accountability* (VA_{jt}) has a negative and statistically significant effect on trade, as expected. However, VA_{jt} has a negative, but insignificant, effect on FDI. We will find that this result holds up also using PPML. Only later in Section 5, when accounting for selection and firm-heterogeneity biases, can we explain this. In economic terms (with WGIs varying between 0 and 100 in our data set), a one-unit change in VA_{jt} decreases trade (FDI) by 0.012 (0.007) per cent, using the trade estimate from column (3). We can combine this trade coefficient estimate with some of the data from Table 4 to evaluate economically the impact of changes over time, or differences across countries, in VA_{jt} for percentage changes in trade (and analogously for FDI). For instance, from Table 4, consider Brazil. Brazil's *VA* index increased by five points from 1996 to 2006. This suggests a 0.06 of one per cent decrease in Brazil's trade inflow. Also, consider differences between the US and Brazil. The US *VA* index in 2006 was 24.5 points higher than Brazil's. The estimation suggests that this would have reduced US imports relative to Brazil's imports by about 0.3 of 1 per cent.

By contrast, *Political Stability* in the destination country (PS_{jt}) tends to have no effect on trade flows into j, but a statistically significant positive impact on FDI into j. This empirical result makes economic sense because FDI in a host country typically involves significant fixed investments in plant and equipment, such that political instability in the host country (and risk of expropriation) causes non-trivial investment costs for investors. This result is consistent with our hypotheses for PS_{jt}.

Consider now the other four WGIs that pertain more to representing 'good governance'. *Government Effectiveness* (GE_{jt}) has a statistically significant positive effect on trade, but no significant effect on FDI. Since this variable measures the quality of public services, one might expect this to have a significant impact on both trade and FDI, and while it does have a positive impact on both, only for trade is the coefficient estimate statistically significantly different from zero. However, we will find that the statistical significance for trade is only for the OLS specification.

Regulatory Quality (RQ_{jt}) has a positive and statistically significant effect on FDI. However, we will see shortly in the PPML specifications, *Regulatory Quality* has a significant positive effect on FDI *and* trade. To foreshadow upcoming results, we will find that RQ_{jt} is the measure of good governance that consistently explains trade and FDI flows.

The only WGI variable that has an unexpected negative coefficient estimate sign is *Rule of Law* (RL_{jt}), and it is statistically significant for FDI. This negative coefficient estimate for FDI flows for RL_{jt} will become marginally statistically significant later under more econometrically appropriate specifications. Moreover, RL_{jt} is highly correlated with several other WGIs, with the exception of *Voice and Accountability* and *Political Stability*. As noted earlier, in a separate regression including each of the non-VA_{jt} WGI variables separately, all non-VA_{jt} WGI variables have statistically significant positive effects on trade and FDI flows, including RL_{jt}. Finally, *Control of Corruption* (CC_{jt}) has no perceptible effect on trade and FDI flows, when the other WGI variables are included; when included in isolation from the other WGI variables, CC_{jt} has a positive and statistically significant effect.

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Overall, the fits of the equations are good. For the trade-flow equations in columns (3) and (5), the overall R^2 value is 83–84 per cent, which is in line with previous trade gravity equations. For the FDI equation in column (4), the overall R^2 value is 66 per cent. Typically, FDI gravity equations' R^2 values tend to be less than those for trade flows. Also, we can explain 41 per cent of the variation in the ratio of FDI to trade.

(ii) PPML Results

As discussed earlier, we also estimate the model using PPML, with results provided in Tables 7 and 8. In both tables, we provide estimates for FDI stocks without the zeros (column (4)) and with the zeros (column (5)). It is important to note that the results for FDI are not materially different depending upon inclusion of zeros or not; hence, differences between OLS and PPML findings can be largely attributed to heteroscedasticity bias in the OLS results, as others have found. Table 8 is distinguished from Table 7 by the inclusion of the Taylor-series-based multilateral resistance terms in the former; that is, Table 7 uses equation (2) and Table 8 uses equation (3). Our preferred specification is that in Table 8 (equation (3)). In the interests of brevity, we discuss briefly findings that are similar to those obtained using OLS, and spend most of our time discussing the results that differ from those in Table 1.

Regarding GDPs and *per capita* GDPs, relative to OLS, the exporter and importer elasticities fall a little in size; this is a common outcome using PPML estimation relative to OLS. At 0.8 for each GDP elasticity, this is in line with earlier estimates using PPML (cf. Santos Silva and Tenreyro, 2006). Also, exporter's *per capita* GDP coefficient estimate, which was statistically significant using OLS for trade (in Table 1, column (3)) and FDI, becomes smaller economically and statistically insignificant for trade. However, exporter *per capita* GDP's elasticity is positive and significant for FDI. Note that the exporter *per capita* GDP elasticity for trade is similar now between columns (3) and (6).

Regarding the time-invariant bilateral barrier variables, several coefficients change between the OLS and PPML specifications, as is typical. First, a meta-analysis of distance elasticities suggests a mean of −0.9. The OLS specifications yielded a range of trade distance elasticities between −1.1 and −0.8. The PPML estimates in Table 7 suggest a narrower range, but smaller values around −0.7. However, the PPML specifications with MR terms in Table 8 yield estimates around −0.9, reflecting the importance especially of the *MRDIST* variable in Table 8.

The most prominent change for this group of variables is that adjacency – which was positive and statistically significant for trade and FDI using OLS – is now negative and statistically significant for FDI using PPML. Relative size of the positive coefficient estimates for language remains the same between OLS and the PPML specifications. Notably, common colonial ties' coefficient estimate in the trade specifications becomes negative and statistically significant for PPML relative to OLS. It should be emphasised, however, that coefficient signs often change for such variables between OLS and PPML. For reasons addressed earlier, the preferred results are in Table 3.

Regarding the governance indexes, notably *Voice and Accountability* retains its significant negative effect on trade across OLS and PPML specifications. Across OLS and PPML specifications, VA_{jt}'s coefficient remains statistically insignificant for FDI; this will change later once accounting for selection bias and firm heterogeneity. *Political Stability* now becomes negative and statistically significant on trade in Table 3 using the preferred PPML with MR terms

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TABLE 7
PPML

(1) *LHS Variables*	*(2)* *Expected Coefficient Signs for Columns 3, 4, 5, 6*	*(3)* $TRADE_{ijt}>0$	*(4)* $FDI_{ijt}>0$	*(5)* FDI_{ijt}	*(6)* *TRADE*	*(7)* $FDI_{ijt}/TRADE_{ijt}$
ln GDP_{it}	+	0.81***	0.79***	0.81*	0.83***	−0.04
		(26.77)	(13.16)	(13.78)	(30.91)	(−0.96)
ln GDP_{jt}	+	0.82***	0.78***	0.80***	0.80***	−0.17
		(16.23)	(11.24)	(12.21)	(15.71)	(−0.95)
ln $PCGDP_{it}$	?	−0.09	0.91***	0.95***	−0.11	2.07*
		(−1.05)	(9.41)	(9.54)	(−1.55)	(4.22)
ln $PCGDP_{jt}$	?	−0.12	−0.04	−0.04	−0.12	0.80**
		(−1.46)	(−0.18)	(−0.18)	(−1.37)	(2.48)
ln $DIST_{ij}$	–	−0.69***	−0.60***	−0.63***	−0.68***	0.39*
		(−18.20)	(−5.62)	(−6.00)	(−17.91)	(1.80)
ADJ_{ij}	+ / ?	0.48***	−0.45*	−0.48**	0.42***	−0.02
		(3.90)	(−1.85)	(−2.01)	(4.34)	(−0.04)
$LANG_{ij}$	+	0.32***	0.84***	0.85***	0.37***	0.85***
		(4.19)	(6.92)	(7.00)	(4.03)	(3.11)
$COLONY_{ij}$	+	−0.17	0.34***	0.34***	−0.17	1.36***
		(−1.01)	(2.88)	(2.83)	(−0.96)	(3.94)
VA_{jt}	–	−0.017***	−0.001	−0.0005	−0.018***	0.006
		(−3.61)	(−0.17)	(−0.08)	(−3.70)	(0.68)
PS_{jt}	− / + / + / −	−0.003	0.003	0.004	−0.002	0.003
		(−1.63)	(0.60)	(0.75)	(−1.12)	(0.37)
GE_{jt}	+	0.012*	0.015	0.017	0.013*	0.029
		(1.94)	(0.78)	(0.92)	(1.99)	(1.46)
RQ_{jt}	+	0.030***	0.047***	0.048***	0.032***	−0.044*
		(4.61)	(3.36)	(3.53)	(5.18)	(−1.91)
RL_{jt}	+	−0.002	−0.048**	−0.047**	−0.002	−0.024*
		(−0.33)	(−2.07)	(−2.03)	(−0.26)	(−1.80)
CC_{jt}	+	−0.006	0.019	0.016	−0.009	−0.004
		(−0.77)	(1.11)	(0.89)	(−1.10)	(−0.32)
Constant		−7.54*	−20.01*	−20.97*	−7.56***	−27.06***
		(−10.35)	(−12.74)	(−14.34)	(−7.39)	(−4.62)
N		12,229	4,828	9,200	9,200	9,200

Notes:
(i) PPML, Poisson pseudo-maximum likelihood; LHS, left-hand-side.
(ii) *,**, and *** denote statistically significant in two-tailed *t*-test at the 10, 5 and 1 per cent levels, respectively, using clustered standard errors (clustered on destination variables). Results were also materially the same including year dummies.

specification. As for VA_{jt}, PS_{jt}'s effect on FDI will change once we account for selection bias and firm heterogeneity.

Regarding the other four WGIs, using PPML *Regulatory Quality* now has a positive and statistically significant effect on trade and FDI, with or without the MR terms. *Government Effectiveness*' positive and statistically significant effect on trade using OLS is now insignificant using PPML, and GE_{jt} has no significant effect on FDI. Using PPML with MR terms, *Rule of Law* does have a statistically significant negative effect on FDI, but only at the 10 per

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TABLE 8
PPML with Approximated MR Terms

(1) LHS Variables	*(2) Expected Coefficient Signs for Columns 3, 4, 5, 6*	*(3)* $TRADE_{ijt}>0$	*(4)* $FDI_{ijt}>0$	*(5)* FDI_{ijt}	*(6) TRADE*	*(7)* $FDI_{ijt}/TRADE_{ijt}$
ln GDP_{it}	+	0.74***	0.80***	0.82***	0.77***	0.03
		(33.44)	(8.42)	(8.65)	(33.01)	(0.72)
ln GDP_{jt}	+	0.78***	0.82***	0.84***	0.76***	−0.06
		(18.18)	(10.07)	(10.56)	(16.65)	(−0.44)
ln $PCGDP_{it}$	?	0.02	0.86***	0.90***	−0.06	1.77***
		(0.29)	(6.89)	(7.01)	(−0.74)	(5.88)
ln $PCGDP_{jt}$	?	−0.04	−0.07	−0.06	−0.05	0.91***
		(−0.49)	(−0.29)	(−0.25)	(−0.53)	(2.90)
ln $DIST_{ij}$	–	−0.94***	−0.65***	−0.68***	−0.91***	0.74*
		(−23.73)	(−7.37)	(−8.00)	(−21.56)	(1.78)
ADJ_{ij}	+ / ?	0.43***	−0.27	−0.32**	0.40***	0.77
		(4.56)	(−1.72)	(−2.06)	(5.09)	(0.76)
$LANG_{ij}$	+	0.23***	0.59***	0.61***	0.34***	0.25
		(3.05)	(4.08)	(4.21)	(4.42)	(1.59)
$COLONY_{ij}$	+	−0.23**	0.25*	0.25*	−0.24**	1.23***
		(−2.12)	(1.66)	(1.66)	(−2.13)	(5.19)
VA_{jt}	–	−0.009***	0.003	0.004	−0.008**	0.027***
		(−2.78)	(0.34)	(0.38)	(−2.36)	(2.62)
PS_{jt}	− / + / + / −	−0.004**	0.007	0.008	−0.005**	0.011
		(−2.24)	(1.03)	(1.11)	(−2.21)	(1.20)
GE_{jt}	+	0.009	0.011	0.014	0.010	0.028*
		(1.40)	(0.62)	(0.79)	(1.43)	(1.94)
RQ_{jt}	+	0.022***	0.041***	0.043***	0.025***	−0.051*
		(5.45)	(2.98)	(3.17)	(6.02)	(−1.84)
RL_{jt}	+	−0.006	−0.053**	−0.052*	−0.006	−0.041**
		(−0.76)	(−1.98)	(−1.94)	(−0.78)	(−2.27)
CC_{jt}	+	0.001	0.021	0.017	−0.001	−0.007
		(0.07)	(1.19)	(0.95)	(−0.16)	(−0.44)
ln $MRDIST_{ijt}$	+	0.71***	−0.12	−0.10	0.73***	−1.16*
		(9.97)	(−0.44)	(−0.33)	(9.51)	(−1.66)
ln $MRADJ_{ijt}$	− / ?	1.10	−5.38	−4.63	1.67	−14.30
		(0.85)	(−0.92)	(−0.79)	(1.30)	(−1.27)
ln $MRLANG_{ijt}$	–	−0.26	1.24*	1.24*	−0.57***	1.69***
		(−1.11)	(1.87)	(1.85)	(−2.89)	(2.57)
ln $MRCOLONY_{ijt}$	–	3.06***	1.87	1.62	2.94**	6.76
		(2.96)	(0.89)	(0.78)	(2.56)	(1.59)
Constant		−11.68***	−17.85***	−19.12***	−11.63***	−19.91***
		(−12.06)	(−6.24)	(−6.95)	(−10.53)	(−7.26)
N		12,229	4,828	9,200	9,200	9,200

Notes:
(i) PPML, Poisson pseudo-maximum likelihood; LHS, left-hand-side.
(ii) *,**, and *** denote statistically significant in two-tailed *t*-test at the 10, 5 and 1 per cent levels, respectively, using clustered standard errors (clustered on destination variables). Results were also materially the same including year dummies.

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cent level; the negative effect is likely attributable to high multicollinearity with *Regulatory Quality* discussed earlier. *Control of Corruption* has no significant effects on trade or FDI under any specifications. Thus, of the four 'good governance' variables, *Regulatory Quality* stands out as the variable most important to explaining trade and FDi flows with the expected positive relationship.

We now examine the effects of the MR terms in Table 3, first in the trade equation and then the FDI equations. Based upon Baier and Bergstrand (2009), *MRDIST* has the expected positive coefficient estimate and is statistically significant; the interpretation is that – for given bilateral distance between a pair of countries – a larger 'remoteness' of countries *i* and *j* from other countries lowers the relative cost of these two countries trading, increasing their bilateral trade flow. *MRADJ* has an unexpected positive coefficient sign, but is statistically insignificant. *MRLANG* has the expected negative coefficient sign, but the coefficient estimate is only statistically significant in column (6) using the restricted sample. *MRCOLONY* has a positive coefficient sign. Since the coefficient sign for *COLONY* is unexpectedly negative in Table 3, the positive coefficient estimate for *MRCOLONY* is consistent theoretically with the negative one for *COLONY*.

For both FDI specifications in columns (4) and (5) of Table 3, the MR terms are all statistically insignificant, except for *MRLANG*. However, we will show shortly, using the Helpman et al.'s (2008) approach, that the MR terms become correctly signed and statistically significant when examining the intensive margin.

Columns (4) and (5) report the results for positive FDI flows only and for all FDI flows (positive and zeros), respectively. The notable finding is that while there is a material difference between using PPML versus using OLS, there is no material difference between using PPML with just positive FDI flows versus using PQML with all FDI flows.

Column (6) reports the coefficient estimates for FDI relative to trade. Home and host countries' *per capita* GDPs and common colonial ties' coefficient estimates have systematically positive and statistically significant effects on FDI relative to trade in Tables 2 and 3. Of particular note among the WGIs, the strong negative effect of *Voice and Accountability* on trade contributes significantly to the positive effect of VA_{jt} on FDI relative to trade.

Finally, throughout Tables 1–3, VA_{jt} has not had a material impact on FDI flows. We will see in the next section that this outcome is related to the absence so far of separating the effect of VA_{jt} on the country extensive margin versus the country intensive margin of FDI.

5. SELECTION INTO FDI AND ACCOUNTING FOR FIRM HETEROGENEITY

Two recent observations have inspired new methodologies associated with estimating gravity equations. Helpman et al. (2008) noted that – for all the possible bilateral pairings of countries in the world – many aggregate bilateral trade flows are zero. The same holds for aggregate bilateral FDI flows; in our sample, about half of bilateral FDI flows are zeros. Also, an entirely new literature has surfaced in the last decade providing evidence for the heterogeneity of firms engaged internationally and the likely importance of fixed export and FDI costs in limiting the selection of such heterogeneous firms into international activity (either trade or FDI). While an explosion of research into the role of firm heterogeneity and fixed export costs in explaining patterns of international trade based upon the Melitz (2003) model has occurred, research into the implications of country selection into FDI outflows and the role of firm heterogeneity for FDI levels is actually quite scant (cf. Bernard et al., 2011). In their recent survey, Bernard et al. (2011) point to a handful of papers that have explored the implications of firm heterogeneity and fixed export and FDI costs for aggregate FDI patterns. Helpman

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et al. (2004) is one of the first papers to explore the implications of firm heterogeneity for aggregate FDI flows relative to aggregate trade flows. Using micro data from the US Bureau of Economic Analysis, Yeaple (2009) provides further evidence supporting the Helpman et al. (2004) theory of heterogeneous firms and FDI.

The present paper is one of the first to examine the effect of governance indicators for explaining the extensive margin of FDI flows.[26] Moreover, drawing upon the seminal methodology in Helpman et al. (2008) for aggregate bilateral trade flows, we also examine the influence of governance indicators on the intensive margin of FDI using a two-stage estimation procedure that corrects both for (country) sample-selection bias as well as for firm heterogeneity. Notably, we find that *Voice and Accountability* – our primary measure of the pluralism component of democracy – despite having a negative effect on the level of FDI into a country – has a significant positive effect on *selection* of countries into FDI. Moreover, this result is robust to accounting for firm heterogeneity.[27]

As the Helpman et al. (2008) methodology has now become commonplace in bilateral aggregate trade gravity-equation studies, it is straightforward to apply it to bilateral aggregate FDI flows. The framework is a two-stage estimation procedure. The first stage entails estimating a probit equation for the determinants of the likelihood of a pair of countries having an FDI flow from i to j. The factors that tend to determine the likelihood of a positive FDI (or trade) flow – that is, the (country) extensive margin – tend to be the same factors that affect the level of FDI (or trade) once it is positive – that is, the intensive margin. However, for econometric reasons, identification of the second-stage gravity-equation coefficient estimates requires at least one variable that significantly explains the likelihood of FDI that does not affect the level of FDI, that is, the intensive margin; this is the 'exclusion restriction'. Our results earlier, however, suggest that a likely candidate variable is host country j's *per capita* GDP. Examination of FDI gravity-equation results in Tables 1–3 reveals consistently that – while home country i's *per capita* GDP is a systematically important determinant of FDI levels – host country j's *per capita* GDP coefficient estimate is never statistically or economically significant. This differential influence on FDI flows between home and host country *per capita* GDPs is consistent with findings in Blonigen and Piger (2011) as well. As we will see, however, host country j's *per capita* GDP is an economically and statistically significant determinant of the likelihood of a positive FDI flow from i to j.[28]

[26] As noted in an earlier footnote, Globerman and Shapiro (2003) examined the influence of a constant, foreign GDP and individual WGIs for explaining the extensive margin of US bilateral FDI.

[27] Egger et al. (2011) have recently emphasised the importance also of country-selection bias and (to a lesser extent) firm heterogeneity for influencing bilateral aggregate trade flows.

[28] Helpman et al. (2008) used religion and regulatory costs variables to satisfy the exclusion restriction. In our study, there is a plausible theoretical rationale for the host country's *per capita* GDP being a significant determinant of likelihood of FDI, but not of the level. Consistent with the Markusen theoretical 'knowledge-capital' model, evidence now suggests that FDI has both horizontal (destination market size) and vertical (lower relative factor costs in host country) motivations. While a debate existed for several years that there was little systemic empirical evidence of vertical motivations, some recent studies suggest that it is as important as horizontal motives (cf. Alfaro and Charlton, 2009; Bergstrand and Egger, 2013a). For FDI levels, other things constant *per capita* GDP in the host country should be positively related to FDI inflow levels due to horizontal FDI, but *per capita* GDP in the host country should be negatively related to FDI inflow levels due to vertical FDI; thus, the effects of host *per capita* GDP may be offset in samples with developed and developing host countries (like ours). However, zeros are much more likely for developing host countries, so one might expect a significant negative relationship between the probability of FDI and host *per capita* GDP, which is what we find.

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We summarise the econometric procedure briefly, referring the reader to Helpman et al. (2008) for details. The first stage entails estimating a probit equation for FDI flows using the same RHS variables as used in earlier specifications, including country *j*'s *per capita* GDP. With these results, the predicted probabilities (denoted ρ_{ijt}) are calculated. The ρ_{ijt} can be used along with the cumulative normal distribution function, $\Phi()$, to form estimates z_{ijt} where $z_{ijt} = \Phi^{-1}(\rho_{ijt})$. Estimates of z_{ijt} are necessary to construct two variables for use in the second-stage gravity equation, η_{ijt} (which will control for selection bias) and w_{ijt} (which will control for bias associated with 'firm heterogeneity'). Using the z_{ijt}, we can estimate the inverse Mill's ratio, η_{ijt}, where $\eta_{ijt} = \phi(z_{ijt})/\Phi(z_{ijt})$ and $\phi()$ is the normal density function. The η_{ijt} are then included in the second-stage gravity equation to control for selection bias. Following Helpman et al. (2008), the z_{ijt} are also used to construct a variable w_{ijt}, where $w_{ijt} = \ln \exp[\delta(z_{ijt} + \eta_{ijt})] - 1$, which in the context of the HMR model can be included in the second-stage estimation to control for bias associated with the influence of firm heterogeneity.

Table 9 presents the results of estimating the first-stage probits without (in column (3)) and with (in column (4)) the MR approximation terms. Column (5) presents the results from the second-stage Helpman et al. (2008) estimation procedure using the first-stage results from column (4), which include the MR terms. Because probits are non-linear, we report the 'marginal' effects (conditioned on the means), so these estimates have economic significance (unlike the actual probit coefficients).

We examine columns (3) and (4) by the three categories of variables, as performed earlier. First, we find that all four GDP and *per capita* GDP variables' coefficient estimates are economically and statistically significant. Home and host country GDPs have positive and significant marginal effects, as well as home country *per capita* GDP. Importantly, *host* country *j*'s *per capita* GDP coefficient estimate is statistically significant; this is important for identification in the second-stage regression. The negative coefficient suggests that being less developed increases the host country's probability of having a positive FDI inflow, consistent with the existence of vertical FDI. Second, all the bilateral barrier variables have expected signs for their marginal effects, and those for distance, adjacency and common colony are statistically significant. Third, four of the six WGI variables' coefficient estimates are statistically significant. Notably, *Voice and Accountability* in the host country has a positive and statistically significant marginal effect on the likelihood of FDI (*Prob*(*FDI*)). *Political Stability* and *Regulatory Quality* in the host also have positive and significant marginal effects on the probability of FDI. Finally, *Rule of Law* has a statistically significant negative effect on the probability of FDI in column (3); however, once we include MR terms in column (4), this marginal effect becomes insignificant. However, in column (4), we note that of the MR terms, only that for adjacency is statistically significant and that does not have the expected sign.

Column (5) reports the results of estimating the second-stage regression using the HMR methodology and omitting host country *j*'s *per capita* GDP, consistent with earlier evidence that this variable has no material impact on FDI levels. First, as before home and host GDPs have significant positive effects on FDI. Importantly, unlike corresponding estimates in Tables 7 and 8, the home country GDP elasticity is larger than the host country GDP elasticity, as theory in Bergstrand and Egger (2007) suggests. Home *per capita* GDP elasticity is positive and significant, as earlier. Second, regarding the time-invariant bilateral variables, distance has the expected negative relationship with FDI, while adjacency, language and colony have the expected positive relationships. While adjacency's coefficient estimate is similar to earlier ones, the standard error is large enough to preclude significance; however, both the language

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TABLE 9
Probit Regressions for FDI (Marginal Effects) and Second-stage HMR Regression

(1) *LHS Variables*	*(2)* *Expected Coeff Signs for Columns 3, 4, 5*	*(3)* *Prob(FDI_{ijt})*	*(4)* *Prob(FDI_{ijt}) with MR Terms*	*(5)* *Second-Stage HMR FDI > 0*
ln GDP_{it}	+	0.11***	0.10***	0.86***
		(12.81)	(11.16)	(17.07)
ln GDP_{jt}	+	0.20***	0.19***	0.72***
		(14.76)	(13.64)	(8.03)
ln $PCGDP_{it}$	?	0.19***	0.21***	1.33***
		(8.83)	(10.11)	(10.94)
ln $PCGDP_{jt}$	?	−0.07***	−0.06***	–
		(−3.52)	(−2.77)	
ln $DIST_{ij}$	–	-0.20***	−0.18***	−0.82***
		(−12.22)	(−6.10)	(−8.68)
ADJ_{ij}	?	0.41***	0.41***	0.37
		(8.95)	(3.92)	(1.14)
$LANG_{ij}$	+	0.03	0.07	0.57***
		(0.53)	(1.11)	(2.84)
$COLONY_{ij}$	+	0.25***	0.23***	0.65***
		(4.19)	(3.37)	(2.77)
VA_{jt}	+ / + / −	0.002***	0.002**	−0.011*
		(2.25)	(1.98)	(−1.73)
PS_{jt}	+	0.004***	0.003***	0.011**
		(3.32)	(2.86)	(2.47)
GE_{jt}	+	−0.001	−0.001	0.017*
		(−0.49)	(−0.54)	(1.82)
RQ_{jt}	+	0.005***	0.005***	0.022***
		(4.27)	(4.11)	(2.73)
RL_{jt}	+	−0.003*	−0.003	−0.022*
		(−1.99)	(−1.53)	(−1.88)
CC_{jt}	+	−0.001	−0.001	−0.009
		(−0.40)	(−0.25)	(−1.02)
ln $MRDIST_{ijt}$	+		−0.02	0.57***
			(−0.29)	(2.99)
ln $MRADJ_{ijt}$	?		1.94*	−3.80
			(2.87)	(−1.40)
ln $MRLANG_{ijt}$	–		−0.03	1.49**
			(−0.26)	(2.40)
ln $MRCOLONY_{ijt}$	–		−0.25	−0.87
			(−0.95)	(−0.73)
η estimate (selection)				1.37***
				(4.92)
δ estimate (firm heterog.)				0.07
				(0.38)
Constant				−25.09***
				(−9.80)
N		9,360	9,360	4,840
Pseudo-R^2		0.47	0.47	na

Notes:
(i) FDI, foreign direct investment; LHS, left-hand-side.
(ii) *,**, and *** denote statistically significant in two-tailed *t*-test at the 10, 5 and 1 per cent levels, respectively, using clustered standard errors (clustered on destination variables). Results were also materially the same including year dummies.

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and colony dummies' coefficient estimates are statistically significant. Third, of the WGI variables, as earlier *Voice and Accountability* is negatively related to FDI *levels* and is statistically significant at the 10 per cent level. However, VA_{jt} is statistically significantly positively related to the likelihood of FDI. *Political Stability* and *Regulatory Quality* are not just positively related significantly to the probability of FDI, but also to the level of FDI. *Rule of Law* still has an unexpected negative relationship with the level of FDI and is significant at 10 per cent. Fourth, *MRDIST* now has a *positive* and significant relationship with the level of FDI, in contrast with earlier results; this is consistent theoretically with the negative effect for bilateral distance. *MRADJ* and *MRCOLONY* both have negative effects with FDI, as we expected; however, neither variable's coefficient estimate is significant. *MRLANG* has a positive and significant effect on FDI, which is inconsistent with the positive effect for the bilateral language dummy variable. Finally, similar to Egger et al. (2011) for trade flows, the Heckman selection variable, η, has a positive and statistically significant effect, and the index for firm heterogeneity, δ, has no significant effect. Consequently, adjustment for selection bias is important indicating the relevance of the two-stage estimation procedure for levels. However, potential bias from firm heterogeneity may have little empirical relevance.

Finally, for robustness, we also examine the cross-sectional results for each of the five years. Table 10 presents these results. To conserve space, we focus only on the coefficient estimates for the six WGI variables; the remaining coefficient estimates are consistent with the pooled results already presented in Table 9 and are available on request. The first-stage results are comparable to the pooled results in column (4) of Table 9; the second-stage results correspond to the pooled results in column (5) of Table 9. The most notable outcome from the cross-section analysis is that the coefficient estimates are largely consistent across years with the pooled estimates. Coefficient estimates for VA_{jt} are positive and (in three years) statistically significant for the probability of FDI, and negative and (in two years) statistically significant for the level of FDI, consistent with Table 9. PS_{jt} has a positive and statistically significant impact on the likelihood of FDI in all five years and a positive and (in three years) statistically significant impact on the level of FDI, consistent with Table 9. RQ_{jt} has a positive and statistically significant effect on the probability of FDI in all five years, and a positive and (in four years) statistically significant effect on the level of FDI. For the three remaining WGIs, there are no systematic patterns of significant effects on the probability or level of FDI. Finally, statistically significant (in four years) coefficient estimates for η suggest that country-selection bias and correction for it is important. Moreover, for three years, evidence suggests based upon δ estimates in Table 10 that correction for firm-heterogeneity bias is also important.

6. CONCLUSIONS

Unlike the large literature on 'democracy and trade', there is a much smaller literature on the effect of the level of democracy in a nation on the level of foreign direct investment (FDI). Moreover, of these few studies, only one has used a gravity-equation methodology to explore the impact of democracy on bilateral FDI flows, many studies have not explored the potentially conflicting effects of the numerous dimensions of 'democracy' on FDI, and no study has explored how different dimensions of democracy influence the selection of countries into bilateral FDI outflows to host countries.

This study has focused on three contributions. We examined the effects of the (six) World Bank's Worldwide Governance Indicators (WGIs) – which allow separating the effects of plu-

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TABLE 10
Cross-section Results

Variables	*1998*		*2000*		*2002*		*2003*		*2004*	
	Prob	*OLS*	*Prob*	*OLS*	*Prob*	*OLS*	*Prob*	*OLS*	*Prob*	*OLS*
VA_{jt}	0.01	−0.016*	0.003*	−0.018***	0.002	−0.008	0.002**	−0.005	0.003***	−0.011
	(0.56)	(−1.95)	(1.73)	(−3.04)	(1.31)	(−1.11)	(1.97)	(−0.69)	(3.14)	(−1.54)
PS_{jt}	0.003**	0.005	0.003**	0.020***	0.003***	0.011**	0.003*	0.011*	0.003***	0.006
	(1.97)	(0.91)	(2.09)	(3.74)	(2.68)	(2.00)	(1.78)	(1.75)	(2.92)	(0.92)
GE_{jt}	0.007***	0.009	0.002	0.007	−0.000	0.009	−0.006***	0.009	−0.008***	0.022
	(2.94)	(0.47)	(0.86)	(0.43)	(−0.02)	(0.75)	(−2.63)	(0.73)	(−3.19)	(1.38)
RQ_{jt}	0.004**	0.024***	0.005**	0.035***	0.006***	0.025**	0.008***	0.024*	0.007***	0.014
	(2.34)	(3.02)	(2.32)	(4.16)	(2.61)	(1.92)	(3.67)	(1.71)	(3.59)	(0.91)
RL_{jt}	0.000	−0.023	−0.006***	−0.014	−0.004**	−0.015	−0.001	−0.028**	0.001	−0.018
	(0.09)	(−1.16)	(−2.74)	(−0.95)	(−1.97)	(−0.95)	(−0.37)	(−1.98)	(0.66)	(−1.33)
CC_{jt}	−0.005*	0.002	0.002	−0.024**	−0.001	−0.014	−0.001	−0.001	−0.001	−0.002
	(−1.86)	(0.11)	(1.14)	(−2.17)	(−0.60)	(−1.34)	(−0.47)	(−0.07)	(−0.54)	(−0.11)
$\hat{\eta}$	–	0.719	–	1.147***	–	1.689***	–	1.610***	–	1.340***
		(1.59)		(3.34)		(5.27)		(4.81)		(3.70)
$\hat{\delta}$	–	0.652	–	0.328	–	0.009***	–	0.002***	–	0.001***
		(1.21)		(1.09)		(7.52)		(18.25)		(22.43)
Pseudo-R^2	0.57		0.50		0.49		0.44		0.44	
N	1,679	773	1,857	947	1,966	1,050	2,033	1,143	1,825	927

Note:
*,**, and *** denote statistically significant in two-tailed t-test at the 10, 5 and 1 per cent levels, respectively, using clustered standard errors (clustered on destination variables). Results were also materially the same including year dummies.

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ralism and political stability from those of four other good governance measures – on bilateral trade, FDI and FDI-relative-to-trade flows using state-of-the-art gravity specifications motivated by the general equilibrium knowledge-and-physical-capital model in Bergstrand and Egger (2007, 2010, 2013a). We found strong evidence that – after accounting for host governments' effectiveness in various roles of good governance – a higher level of pluralism as measured by the WGIs' *Voice and Accountability* index reduces trade levels (likely by increasing the 'voice' of more protectionist less-skilled workers), decreases FDI levels, but increases the probability of FDI into the host. In contrast, greater political stability in a host decreases trade, but increases both the probability of and level of FDI inflow. Finally, stronger regulatory quality increased the level of trade, the level of FDI and the probability of FDI. Thus, different governance indicators affected trade and FDI differentially. We accounted for firm heterogeneity alongside a large number of zeros in bilateral FDI flows using recent advances in gravity modelling. Distinguishing between the intensive and extensive margins, we provided evidence that pluralism (as measured by *Voice and Accountability*) affects FDI inflows negatively at the (country) intensive margin, but positively at the extensive margin.

Future research needs to explore in more detail the effects of different dimensions of democracy on selection into versus levels of trade and FDI. In aiming to include measures of democratic institutions computed systematically – WGIs – we have had to forego a longer time dimension in our pooled cross-section time-series analysis. Further work needs to explore in a more comprehensive panel the effects of such institutional dimensions on trade and FDI, and subsequently their impacts on economic growth.

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