

# Does International Commercial Arbitration Promote Foreign Direct Investment?

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## Abstract

This paper explores the role that international commercial arbitration plays in facilitating foreign direct investment (FDI). International commercial arbitration is a system of private commercial law that enables firms to more effectively enforce contracts by allowing them to avoid inefficiencies that arise from domestic courts. As a result, access to international arbitration should foster FDI. To explain the effect of international arbitration on FDI, this paper develops a model to explain the use and effect of resolving international disputes through arbitration. The predictions of the model are tested empirically in a gravity framework. The results of this analysis suggest that access to arbitration leads to an increase in FDI flows. This increase largely occurs through a change in the volume of investment, with a much smaller effect on the number of investment projects. The effect of arbitration is greater for countries with weaker institutions and for larger projects.

## 1. Introduction

The majority of contracts that cross borders implement mechanisms to settle disputes through international commercial arbitration. In this system, disputes are adjudicated before private tribunals, and the resulting awards are enforced in domestic courts. The role that arbitration plays in the enforcement of international contracts suggests that it is likely to be an important mechanism for facilitating foreign direct investment (FDI).

Despite the widespread use of arbitration by multinational enterprises (MNEs),

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only a few papers discuss its impact on FDI. Consequently, economists have failed to fully explore several questions having to do with international commercial arbitration and FDI. For example, does access to arbitration affect the volume of FDI or the number of investment projects? What are the benefits of ratifying an international convention that aims to facilitate the use of arbitration? As a result, the link between arbitration and FDI remains largely unexplored, and its effects are unknown. This paper fills this gap.

This study relates to the extensive academic work on the importance of contract enforcement by the host's domestic courts. Contract enforcement by domestic courts is found to be particularly important for facilitating relationship-specific investments (Johnson, McMillan, and Woodruff 2002). Nunn (2007) posits that a country's ability to enforce written contracts is an important determinant of its comparative advantage. This result is based on the insight that improved contract enforcement leads to higher relationship-specific investments, which lead to the expansion of sectors in which these investments are particularly important (Nunn 2007). A more independent judiciary is found to attract FDI to the tertiary sector (Walsh and Yu 2010), and the effectiveness of contract enforcement is found to affect the location of US companies in China (Du, Lu, and Tao 2008).

This paper extends this literature by considering the role of international commercial arbitration in facilitating FDI. Few papers discuss the interplay between arbitration and FDI despite the widespread use of arbitration for international investment and trade. Berkowitz, Moenius, and Pistor (2006) find that international arbitration plays a role in the types of goods that countries export, where countries that have more effective international arbitration regimes are found to export more complex goods. Waglé (2011) finds a positive association between arbitration quality and FDI.

This paper develops a theoretical model to explain the effect of arbitration on FDI. We allow disputes stemming from incomplete contracts to be resolved either by domestic litigation or international arbitration. Arbitration affects FDI through two channels. First, arbitration displaces the Melitz entry productivity frontier, which increases the number of projects, or the extensive margin (Melitz 2003). Second, arbitration increases the size of investments, or the intensive margin.

To quantify the importance of international arbitration on FDI, this paper evaluates the effect of signing the Convention on Recognition and Enforcement of Foreign Arbitral Awards of 1958 (June 7, 1959, 330 U.N.T.S. 38; hereafter, NY Convention). The NY Convention facilitates the enforcement of arbitral awards and thus underpins international commercial arbitration. Countries that ratify the NY Convention commit to substantially improving their arbitration regime. Therefore, the impact of joining the NY Convention is an appropriate measure of the effect of a positive shock on a country's international arbitration regime.

The contributions of this paper are threefold. First, it provides a theoretical framework to explain how arbitration relates to FDI. Second, it estimates the effects of arbitration on FDI bilateral flows and the number of investments by

means of the gravity equation. Results suggest that increasing the access to international commercial arbitration has a positive effect on FDI. This effect is largely on the intensive margin: on the volume of investment rather than on the number of projects. This effect is greater in countries with weaker institutions and for larger projects. Third, the paper explores the FDI diversion that results when a country joins the NY Convention.

The remainder of the paper is organized as follows. Section 2 provides background on international commercial arbitration, Section 3 constructs a theoretical model, Section 4 describes the empirical methodology, Section 5 discusses the results, and Section 6 concludes with some implications for policy.

## 2. Background

Contracts that cross international borders tend to fall under the remit of international commercial arbitration. Disputes adjudicated through arbitration include those arising from distribution agreements, joint ventures, and agreements to provide goods and services (United Nations Commission on International Trade Law 2008). The resolution process is binding, nonjudicial, and private. Most arbitration cases arise under an agreement in the original contract to send all contractual disputes to arbitration (Mattli 2001). The arbitration proceedings tend to be broadly similar to those that would occur in a domestic court and often occur under the rules of an arbitration center. There are centers in many major cities, including Paris, Hong Kong, London, Stockholm, and Singapore.

Arbitration is reported to be the leading method to adjudicate contractual disputes, and thus enforce contracts, arising from international contracts. It is estimated that 80 percent of private international contracts include clauses that provide for disputes to be sent to arbitration. Indeed, the international business community considers arbitration to be the “normal means of settling disputes arising from international transactions” (Sanders, Schultz, and van den Berg 1982, p. 287), and thus “arbitration has achieved world-wide acceptance as the favoured and principal mechanism for resolving disputes arising out of international transactions” (Lew, Mistelis, and Kröll 2003, p. v). A survey of MNEs by Mistelis (2004) finds that 90 percent of respondents preferred arbitration over cross-border litigation.

Arbitration provides firms with access to a system for adjudicating disputes that is largely similar irrespective of where the dispute may arise. That said, there are aspects of the arbitration process that depend on the domestic legal system. Notably, the ease with which arbitral awards are enforced depends on the quality of countries’ arbitration regimes, including domestic laws, and how these are implemented by domestic courts. Many countries enforce arbitral awards as a matter of course. As a result, an international arbitration survey (PwC 2013) finds that the majority of arbitral awards are paid out voluntarily through a settlement and therefore do not ultimately require enforcement proceedings in domestic courts. Firms’ willingness to voluntarily comply with an award is partly due to the low likelihood that domestic courts in many jurisdictions will deny

enforcement of the award. A leading arbitration center, the International Chamber of Commerce (ICC) in Paris, reports that only 6 percent of all ICC awards have been challenged in domestic courts, with only .5 percent of awards set aside (Mattli 2001). However, there are countries whose arbitration regimes are not supportive of international commercial arbitration. Indeed, the World Bank's Investing across Borders initiative finds substantial variation in the quality of countries' arbitration regimes.<sup>1</sup> Furthermore, an international arbitration survey reports that in 5 percent of cases, parties settled the arbitration because of concerns that it would be difficult to enforce an arbitration award (PwC 2013). The reasons that respondents expect to face difficulties implementing international arbitration awards include hostility from domestic courts toward foreign awards, a lack of understanding among the local judiciary as to how arbitration works, and the perceived corruption of domestic judges and administrative personnel (PwC 2013).

An important benefit of international commercial arbitration is that it provides more flexibility than domestic courts. The parties can determine the number of arbitrators on the tribunal, the procedure for selecting arbitrators, the place of arbitration, the applicable law, and the tribunal's powers. This flexibility extends to arbitration centers, which are able to adjust their rules in response to the needs of firms using their services. These centers are reported to regularly respond to the needs of firms by creating new services and updating their rules (Mattli 2001). In contrast, a trial in a domestic court follows that court's rules, which may not be suited to the needs of one or more of the parties. Parties' ability to select the law, the arbitrator, and the rules means that rulings from international commercial arbitration can be expected to be more accurate.

The flexibility offered by arbitration allows for the parties to select arbitrators who specialize in commercial law. It can also "provid[e] for the appointment of industry-expert arbitrators, who can make many factual determinations more accurately . . . than a judge or jury" (Bernstein 2001, p. 1741). Industry-expert arbitrators arbitrate by themselves, or they can join an arbitration panel that includes lawyers (Onyema 2005). There are likely to be substantial benefits from being able to use specialized adjudicators as opposed to relying on generalist domestic courts. For example, in patent law the use of specialized adjudicators has been found to lead to more uniformity, expertise, and predictability in judicial findings (Gallini 2002), and in antitrust law there are indications that generalist judges cannot effectively evaluate economic evidence (Baye and Wright 2011).

A related benefit of arbitration is that it facilitates parties' choice of the law under which the contract is heard.<sup>2</sup> The majority of arbitrations reference En-

<sup>1</sup>See World Bank, Investing across Borders: Arbitrating Commercial Disputes (<http://iab.worldbank.org/data/exploretopics/arbitrating-commercial-disputes>).

<sup>2</sup>Arbitration facilitates the choice of law by allowing the parties to choose an arbitrator familiar with the law governing the underlying contract. Therefore, if a contract between a German company and a Venezuelan company is governed by English contract law, the parties can select an arbitrator familiar with that body of law. Parties can choose to have English law govern a contract and have this enforced in a domestic court. In this example, they would then have the contract dispute heard

English or New York State law (School of International Arbitration 2010), which are common-law jurisdictions with established bodies of precedent. This precedent should provide greater predictability as to the outcomes of arbitrations over commercial disputes (Landes and Posner 1976). Another attribute of arbitration is that the proceedings and the award can be kept confidential, and thus the parties can avoid the reputational costs of public hearings and the possible release of commercially sensitive information (Mattli 2001). In addition, the use of arbitration reduces the extent to which either company has a home-court advantage (Bhattacharya, Galpin, and Haslem 2007).

A further advantage of arbitration is that the cost of engaging in nuisance suits is substantial because arbitrations tend to use the English system, in which the losing side pays all or a proportion of the winning side's costs (Anjomshoaa 2007). In contrast, parties are more likely to take poor-quality cases to court when domestic courts use the American system, in which the parties bear their own costs of litigation. The American system provides companies with a low probability of winning an incentive to litigate purely in the hope that the other side will pay them to settle, whereas the other side may well do this to avoid bearing further legal costs from extended litigation (Rosenberg and Shavell 1985).

Using arbitration to adjudicate disputes tends to be more expensive than using domestic courts, which are the main alternative for formally enforcing contracts.<sup>3</sup> Mistelis's survey of MNEs found that respondents preferred arbitration and that the main disadvantages of arbitration are its high costs and lengthy proceedings (Mistelis 2004). This result is supported by the lawyers responsible for litigation costs at GE Oil and Gas, a division of General Electric that sells equipment and services to the oil and gas industry and has around 44,000 employees and \$19 billion in revenue. GE Oil and Gas enters into hundreds of thousands of purchase and sales contracts of vastly different sizes and equipment types across most countries in the world, with values contracts ranging from a few hundred dollars up to as much as half a billion. It has found that arbitration is substantially more expensive than the cost of litigating in most domestic courts. For example, its in-house lawyers noted that in most civil law and developing countries, routine commercial disputes seldom cost more than \$30,000 to resolve in the courts.<sup>4</sup> By contrast, resolving the same disputes by either domestic or international arbitration is likely to cost from five to 30 times as much, depending on how the cases are resourced and the nature and complexity of the dispute. The lawyers noted that while arbitration may not be more expensive than litigating disputes in high-income common-law countries—namely, the United States, the United

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in a German or Venezuelan court. However, if they were to do this, the judge is highly unlikely to know English contract law sufficiently well to judge the case effectively, and the parties would largely lose the benefits of using English contract law.

<sup>3</sup> Arbitration can be conducted relatively cheaply for certain disputes, such as those related to the delivery of goods. These disputes can often be resolved through online dispute-resolution systems. For example, in the cotton industry disputes are often adjudicated for around \$1,000 (Bernstein 2001).

<sup>4</sup> This figure is the cost for routine commercial disputes. For particularly large and complex disputes, parties can, and do, spend more than this in domestic courts.

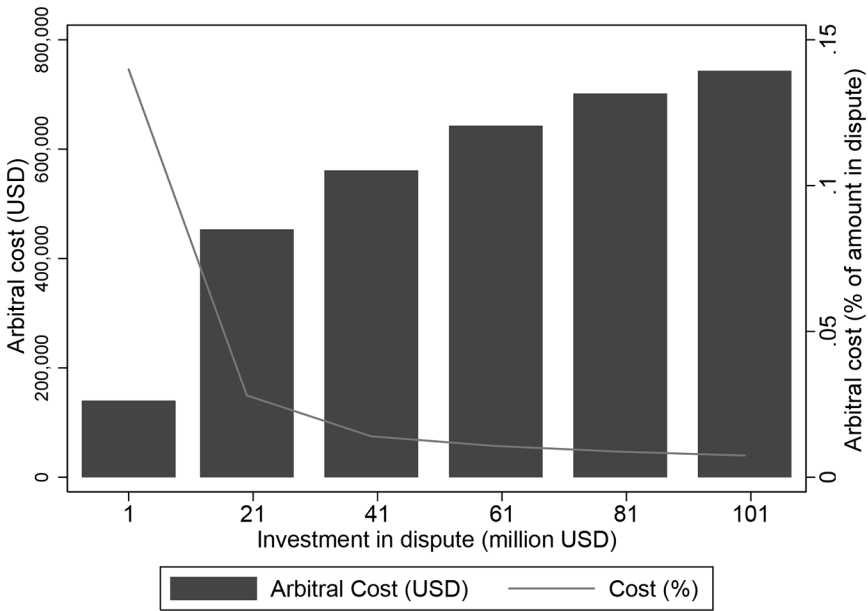


Figure 1. Arbitral costs

Kingdom, Australia, and Hong Kong—current arbitration practice is not likely to be substantially cheaper.<sup>5</sup>

Because of the high cost of arbitration, studies such as Casella (1996) suggest that parties tend to use arbitration only for disputes over large amounts. This high cost of arbitration results from a number of factors. The parties often need to pay for lawyers and witnesses to travel to hearings in a third country, which tends to increase the costs of arbitration above those of a case of comparable length and complexity in a domestic court. Disputes over contracts that reference New York or English law tend to use lawyers who specialize in this law and are typically located in New York or London, which are two of the most expensive legal markets (*Economist* 2014). In contrast to domestic courts, parties need to pay for the arbitrators’ fees and various administrative expenses. For example, the fees charged for arbitrations at the ICC can exceed the total cost of routine contract disputes in many countries’ domestic courts. The ICC estimates that its fees and those of the arbitrators will be around \$60,000 for a \$300,000 claim. These fees are in addition to other expenditures such as those on lawyers, experts, and travel. The fees increase less than proportionately with the value of the claim, as can be seen

<sup>5</sup>Lawyers in the legal department of GE Oil and Gas noted that cost is rarely the only item that drives a preference for one forum or the other. In most cases, the company’s preference for arbitration are driven by considerations of the quality of dispute resolution that can be obtained through the available fora, especially with regard to predictability and neutrality. This view is consistent with the findings of the theoretical model we discuss later.

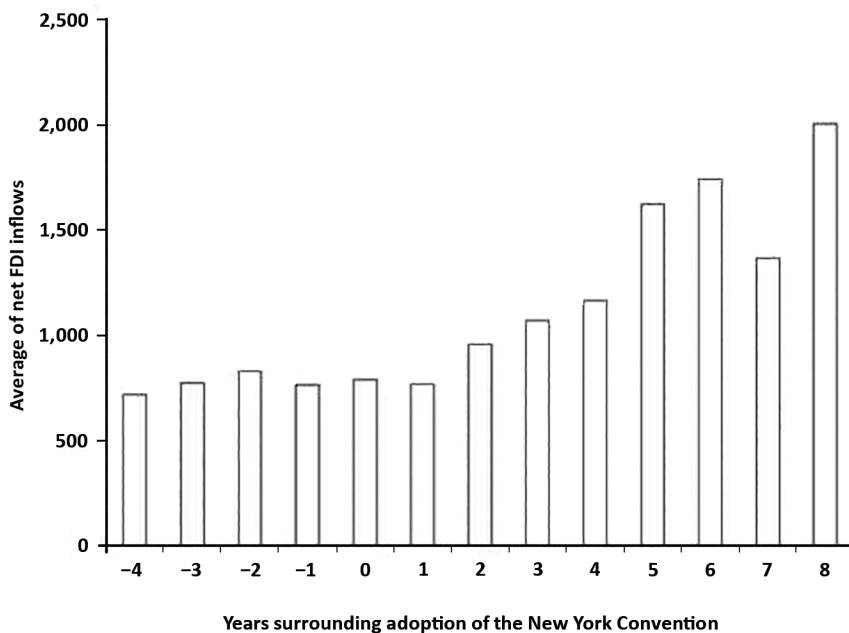


Figure 2. Foreign direct investment inflows before and after a country joins the NY Convention.

in Figure 1.<sup>6</sup> For instance, for a \$100 million dispute, the ICC expects that fees will come to more than \$700,000.

The legal cornerstone of arbitration is the NY Convention. The NY Convention requires signatories to recognize and enforce awards made in international arbitration proceedings unless certain relatively restrictive conditions are met. Joining the convention thus facilitates access to cross-border arbitration. By facilitating the enforcement of arbitration awards, the NY Convention underpins the use of international commercial arbitration. Indeed, large-scale use of arbitration can largely be traced to the establishment of the NY Convention in the late 1950s (Casella 1996). There is no treaty comparable to the NY Convention for decisions made by domestic courts, which makes it difficult to enforce awards made by domestic courts in foreign jurisdictions.<sup>7</sup> This also makes it difficult to use domestic courts against MNEs whose assets are located in other countries.

The importance of the NY Convention suggests that joining it may well increase FDI flows into a country. The data in Figure 2 are consistent with this hypothesis. It shows United Nations Conference on Trade and Development

<sup>6</sup>Figure 1 is based on data from International Chamber of Commerce, Cost Calculator (<http://www.iccwbo.org/products-and-services/arbitration-and-adr/arbitration/cost-and-payment/cost-calculator/>).

<sup>7</sup>There are certain regional initiatives such as those in the European Union that allow decisions to be enforced in other countries in the region.

(UNCTAD) data for net FDI inflows for a balanced panel of countries that joined the NY Convention in the period 1975–2003. Foreign direct investment is higher in the years after joining the NY Convention. In the 4 years prior to signing the NY Convention, the growth in average FDI inflows is just over 2 percent. The growth is 10 percent for the 4 years after joining the NY Convention and 11 percent for the full 8 years after joining the NY Convention. In light of this discussion, Section 3 presents a model that explains the effect of arbitration on FDI.

### 3. Theoretical Framework

In the model, global firms invest abroad and establish contracts with local suppliers (Antràs and Helpman 2004; Van Assche and Schwartz 2013). There is a potential for the parties to engage in ex post expropriation of the other party through rent-seeking litigation. They have two ways to resolve the resulting disputes: through domestic courts or arbitration. The model shows the impact on the size and number of investments when parties gain access to the use of arbitration.

The setup starts with an MNE from the home country (*i*) that invests in a host country (*j*) in sector *z* and produces variety *b*. The home and the host countries are populated by a unit measure of consumers with identical preferences:

$$U = v_0 + \frac{1}{\mu} \sum_{z=1}^Z V_z^\mu, \tag{1}$$

where  $v_0$  is the consumption of a homogenous good and aggregate consumption is represented by index *V* in sector *z* with parameter  $\mu \in (0, 1)$ . Aggregate consumption in the sector is a function of the different varieties produced;  $v_z(b)$  is defined as

$$(2) \quad V_z = \left[ \int v(b)^\alpha db \right]^{1/\alpha}, \tag{2}$$

where the elasticity of substitution is  $1/(1 - \alpha)$ , with  $\alpha > \mu$ , and so goods in the sector are more substitutable with each other than with goods from another sector. The MNE (*m*) faces an isoelastic demand curve for its output *q* of variety *b* in sector *z*. This is described by the inverse demand curve:

$$p_b = V_z^{\mu-\alpha} q_b^{\alpha-1}. \tag{3}$$

The production of *q* requires two complementary inputs: foreign capital inputs *k* that are produced only by MNEs from the home country and inputs *x* that are produced only by local suppliers (*s*) in the host country. Thus, both parties need to enter into a contract in order to produce end good *q*. The MNEs produce *k* 1 period prior to production. Final good *q* is produced using a Cobb-Douglas production function:

$$q(b) = \theta \left\{ \left[ \frac{k(b)}{\eta} \right]^\eta \left[ \frac{x(b)}{1-\eta} \right]^{1-\eta} \right\}^\sigma, \tag{4}$$



where  $\eta \in (0, 1)$  is a sector-wide parameter that describes the intensity with which  $k$  is used in the production of  $q$ . The term  $\sigma$  is a parameter for economies of scale in the sector. It is less than 1 in sectors that have decreasing returns to scale; when it is equal to 1 there are constant returns to scale, and when it is more than 1 there are increasing returns to scale. The term  $\theta$  is a firm-specific productivity parameter. Combining equations (3) and (4), we see that the investment by the MNE generates revenues for 1 period of

$$R(b) = V^{\mu-\alpha} \theta^\alpha \left\{ \left[ \frac{k(b)}{\eta} \right]^{\sigma\alpha\eta} \left[ \frac{x(b)}{1-\eta} \right]^{\sigma\alpha(1-\eta)} \right\}. \quad (5)$$

When the MNE enters the market, it receives a signal describing its level of productivity (Helpman, Melitz, and Yeaple 2004; Melitz 2003). If it decides to invest, there are fixed costs of production for the MNE of  $f_m^p$  and for the supplier of  $f_s^p$ . For simplicity, in what follows we suppress the sectoral reference  $b$ .

The MNE and the domestic supplier either resolve their disputes through international arbitration (A) or through the host's domestic courts (D). The choice of forum for resolving disputes affects the up-front fixed costs of the investment and the variable cost of rent-seeking litigation (as discussed below). The firm treats all non-rent-seeking legal expenses as a fixed cost, which can be thought of as a retainer or insurance payment. To reflect the higher cost of arbitration, there are additional fixed legal costs for both firms ( $f_m^A$  and  $f_s^A$ ) when disputes arising from the contract are resolved through arbitration.

The rent-seeking litigation occurs after the revenue has been generated. At this point both parties engage in rent-seeking litigation actions to capture a proportion of revenues  $r_a^Q$ , where  $a \in [m, s]$ ,  $Q \in [D(j), A]$ , and  $r_a^Q \geq 0$ . These actions could include expenditure on litigation, informal approaches such as lobbying the courts, or even bribery (Antràs and Helpman 2004; Van Assche and Schwartz 2013). It is assumed that capturing larger amounts of revenue becomes more difficult. This is reflected in the convex cost function  $L(r_a^Q)$  for gaining a percentage of the project's revenue through rent seeking  $r_a^Q$ :

$$L(r_a^Q) = e^{r_a^Q/y^Q(\rho^Q, l^Q)}. \quad (6)$$

The parameter  $y^Q(\rho^Q, l^Q)$  captures how open the legal system is to rent-seeking actions. A legal system that is more open to rent seeking has a higher  $y^Q$ . The legal system operates equally on both parties ( $y^Q$  is the same for both parties), and its effectiveness is a function of  $\rho^Q$  (the likelihood that rent-seeking litigation will be successful) and  $l^Q$  (a measure of the variable costs entailed in rent-seeking actions). Legal systems are more open to rent seeking when rent-seeking litigation is more likely to be successful (a higher  $\rho^Q$ ) and there are lower variable costs (a lower  $l^Q$ ). In contrast, when courts or tribunals more accurately distinguish rent-seeking actions, and the cost of these actions is higher,  $y^Q$  is lower. As discussed in Section 2, it can be expected that arbitration proceedings will be more effective than domestic courts at inhibiting rent-seeking actions ( $y^{D(j)} > y^A$ )

for reasons that include the ability to choose the law under which the contract is written, the flexibility in selecting procedures and arbitrators, and the higher variable cost of litigation actions when arbitration is used. While the effectiveness of legal systems is assumed to vary across countries, it is assumed that the effectiveness of arbitration is the same across countries as long as the country has adopted the NY Convention.<sup>8</sup>

The model is solved in four stages using backward induction. In the first stage, the MNE has a one-off opportunity to enter the market and observe its level of productivity  $\theta$ . It decides whether to resolve disputes through arbitration or the domestic courts and whether to enter into production. In the second stage, the MNE offers the supplier a take-it-or-leave-it contract. In the third stage, the MNE produces  $k$  units 1 period before the supplier produces  $x$ , and the level of  $k$  is not observed by the supplier until after it produces  $x$ . In the fourth stage, firms decide on the deviation from the contract and the share of revenue that they aim to achieve from rent seeking. This provides a basis for describing the impact of joining the NY Convention on FDI, which leads to a number of predictions that are tested in Section 4.

### 3.1. Contract Enforcement through Arbitration

In the fourth stage of the game, the MNE and the local supplier engage in rent-seeking activities that aim to claim revenues from the other party. These claims can exceed the value of the revenues generated by the project, which presumes that the parties are able to make claims against assets outside of the project. They treat the revenue from the investment as fixed and noncooperatively select the level of  $r_a^Q$  that solves

$$\max_{r_m} \pi_m = (1 + r_m^Q - r_s^Q)R - L(r_m^Q) \quad (7)$$

and

$$\max_{r_s} \pi_s = (r_s^Q - r_m^Q)R - L(r_s^Q). \quad (8)$$

The solution to these problems yields

$$r_a^{Q*} = y^Q \ln(y^Q R) \quad (9)$$

and

$$L(r_a^{Q*}) = y^Q R. \quad (10)$$

The resulting  $r_a^{Q*}$  is equal for both parties, and so they offset each other, with the

<sup>8</sup>The assumption that effectiveness of arbitration is the same across countries is a simplification. This simplification is consistent with the notion that adjudication under arbitration is largely the same across countries, and most arbitration awards are settled. However, as discussed in Section 2 aspects of the domestic legal system do impact the effectiveness of arbitration. This suggests that the effectiveness of arbitration will be positively correlated to some extent with domestic legal institutions.

result that neither party successfully achieves an increase in revenue. However, both parties end up spending  $y^Q R$  on rent-seeking actions. In the third stage, the firm starts earning revenue  $\pi$ .

In the second stage of the game, the MNE offers a take-it-or-leave-it contract to the supplier. Each unit of  $k$  has unit cost  $c(1 + r)$ , where  $c$  is the cost of production and  $(1 + r)$  reflects the MNE's cost of capital. Local firms produce  $x$  for immediate use. Each  $x$  has unit cost  $w$ , where  $w$  reflects local wage rates. The contract offered to the supplier maximizes the MNE's profits subject to the supplier's participation constraint. The MNE has an incentive to set the payment to the supplier at the lowest level that still satisfies the participation constraint to ensure that  $\pi_s = 0$ . This allows us to calculate that the MNE's investment generates operating profit

$$\pi_m^Q = (1 - 2y^Q)^{1/(1-\sigma\alpha)} \frac{V^{(\mu-\alpha)/(1-\sigma\alpha)} \theta^{\alpha/(1-\sigma\alpha)} (1 - \sigma\alpha)}{\{(1 / \sigma\alpha)[c(1 + r)]^n (w)^{(1-n)}\}^{\sigma\alpha/(1-\sigma\alpha)}} - (f_m^Q + f_s^Q), \quad (11)$$

where the fixed costs under either arbitration or domestic courts are referenced as  $f_m^Q$ . The term  $1 - 2y^Q$  shows that the MNE's profits are reduced by its own rent-seeking activities, as well as those of its supplier. The reason for this is that the MNE has to compensate the supplier for its costs of rent seeking to induce the supplier to enter into the contract in the first place. The superscript term  $1/(1 - \sigma\alpha)$  suggests that the impact on profitability of rent-seeking litigation is accentuated in more competitive sectors with more consumer substitution (higher  $\alpha$ ), and the effect is accentuated by the presence of economies of scale (larger  $\sigma$ ).

### 3.2. The Effect of Enforcing International Commercial Arbitration

In choosing to use arbitration or domestic courts to adjudicate its contract with the domestic supplier, the MNE faces a trade-off because arbitration is more effective at inhibiting rent-seeking litigation actions but entails higher fixed legal costs. This is demonstrated in Figure 3, which shows firms' profitability when they use arbitration or domestic courts.

Figure 3 shows how the benefit of access to international commercial arbitration varies with the MNE's productivity ( $\theta$ ). The profitability of the investment is shown on the vertical axis, and productivity  $\theta^{\alpha/(1 - \sigma\alpha)}$  is shown on the Y-axis. Operating profit given the use of arbitration ( $\pi_m^A$ ) or the domestic courts ( $\pi_m^{D(j)}$ ) is linearly increasing in  $\theta^{\alpha/(1 - \sigma\alpha)}$ .

The intercept of  $\pi_m^A$  is lower than  $\pi_m^{D(j)}$  by the additional fixed costs of using arbitration ( $f_m^A + f_s^A$ ). However, the slope of  $\pi_m^A$  is steeper than  $\pi_m^{D(j)}$  because arbitration leads to a smaller proportion of revenue being spent on rent seeking ( $y^A < y^{D(j)}$ ). The crossing point between  $\pi_m^A$  and  $\pi_m^{D(j)}$  determines for which projects companies will select to use arbitration rather than domestic courts. These will tend to be higher-productivity projects and so have larger investments.

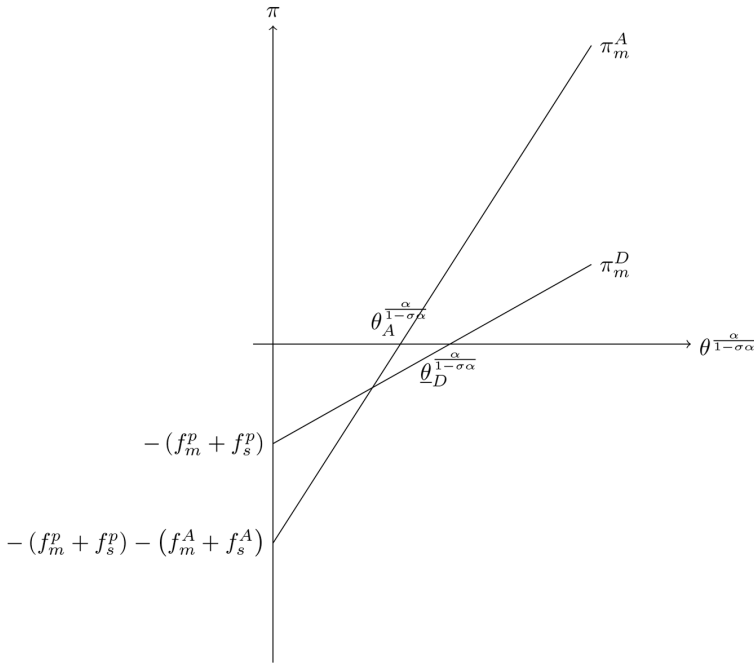


Figure 3. Firms' profitability when using arbitration or domestic courts

Enforcing arbitration (for example, joining the NY Convention) gives firms effective access to arbitration to adjudicate contractual disputes, and thus access to more effective contract enforcement. As shown in Figure 3, the benefit of this access varies with the MNE's productivity ( $\theta$ ). Given a uniform distribution for  $\theta \in [0, \bar{\theta}]$ , we can evaluate the impact of joining the NY Convention on the size and number of investments in the sector. As shown in Figure 3, the model suggests that enforcing arbitral mechanisms increases the number of investments in the sector by reducing the minimum productivity threshold at which the MNE invests ( $\underline{\theta}_{D(j)} > \underline{\theta}_A$ ). The result is

$$\text{Percentage } \Delta Q_k = \begin{cases} \frac{\underline{\theta}_{D(j)} \{ [1 - ((f_m^p + f_s^p) + (f_m^A + f_s^A)) / (f_m^p + f_s^p)]^{(1-\sigma)/\alpha} [(1 - 2y^{D(j)}) / (1 - 2y^A)]^{1/\alpha} \} \underline{\theta}_{D(j)}}{1 - \underline{\theta}_{D(j)}} - 1 & \text{if } \underline{\theta}_A \leq \underline{\theta}_{D(j)} \\ 0 & \text{otherwise} \end{cases} \quad (12)$$

The increase in the number of projects from having access to arbitration is the result of two offsetting effects. Higher fixed costs from using arbitration increase the threshold  $(f_m^p + f_s^p) + (f_m^A + f_s^A) / (f_m^p + f_s^p)$  and thus reduce the increase in the number of investments from joining the convention. This is offset by a

reduction in the minimum threshold from reduced rent seeking ( $(1 - 2y^{D(j)})/(1 - 2y^A) < 1$ ) because arbitration is more effective than the domestic courts at inhibiting rent seeking.

The change in the volume of investments ( $K$ ) in the range where  $\underline{\theta}_A \leq \underline{\theta}_{D(j)}$  is

$$\text{Percentage } \Delta K = \left[ \left( \frac{1 - 2y^A}{1 - 2y^{D(j)}} \right)^{1/(1-\sigma\alpha)} \times \int_{\underline{\theta}_A}^{\bar{\theta}} \theta^{\alpha/(1-\sigma\alpha)} d\theta \right]. \quad (13)$$

Equations (12) and (13) are used to derive a number of predictions that are tested in Section 4. In those equations, the increase in investment from being able to use arbitration is driven by the ratio of  $1 - 2y^{D(j)}$  to  $1 - 2y^A$ . This ratio is likely to be greater than 1 because of the benefits of arbitration discussed above. This suggests that arbitration could increase the volume of investment and the number of investment deals made. Whether the benefits of arbitration translate into increased investment will depend on whether firms have an incentive to adopt arbitration, something that cannot be taken for granted given the high cost of using arbitration.

While arbitration is expensive, the discussion in Section 2 suggests that many MNEs do have an incentive to use arbitration despite its high cost. With this in mind, equations (12) and (13) suggest that access to arbitration should lead to an increase in the number and volume of investments (prediction 1). The ratio of  $1 - 2y^{D(j)}$  to  $1 - 2y^A$  will be greater in countries whose domestic legal regimes are less effective at inhibiting rent seeking because less effective institutions would correspond to a lower value for  $1 - 2y^{D(j)}$  and so a higher ratio. This suggests that the impact of access to arbitration will be larger in countries with weaker institutions (prediction 2). The effect of a larger ratio of  $1 - 2y^{D(j)}$  to  $1 - 2y^A$  is accentuated by more intense competitive pressure (higher  $\alpha$ ) and greater scale economies (larger  $\sigma$ ). Equation (12), considered in light of equation (13), indicates that the impact of arbitration on the volume of investments could be quite different from its impact on the number of investments. For access to arbitration to affect the number of investments (equation [12]), it must reduce the minimum productivity threshold at which firms are willing to invest. This would suggest almost universal adoption of arbitration. In contrast, arbitration can increase the volume of investments (equation [13]) even if only a minority of firms adopt it. This suggests that it is quite plausible that there would be a larger increase in the volume of investments than in the quantity of investments (prediction 3).

To summarize, the theoretical discussion thus leads to three main predictions:

**Prediction 1.** Commitment to the NY Convention should lead to an increase in investment by MNEs.

**Prediction 2.** The increase in investment and projects will be greater for countries with weaker institutions.

**Prediction 3.** The effect of arbitration on the volume of investments will be greater than its impact on the number of investments.

We test these predictions in Section 4.

#### 4. Empirical Methodology

The three predictions are tested on a country-pair-by-year panel using the gravity equation, which is the empirical workhorse for analyzing bilateral flows. The gravity equation is widely used in international economics and explains a variety of factor movements, such as FDI, financial equities, migration, tourism, employment, and commodity flows (Anderson 2011; Bergstrand and Egger 2011; Griffith 2007; Paniagua and Sapena 2015). Since Anderson (1979), the gravity model for international trade has been fully grounded in theory. The theoretical foundations of the gravity model for FDI are more recent (Bergstrand and Egger 2007; Kleinert and Toubal 2010). Below we describe our approach to treating the major empirical gravity caveats, namely, omitted-variable bias, self-selection bias, endogeneity, and firm heterogeneity.

Table 1 presents summary statistics and definitions of the variables. Detailed data sources, descriptions, and countries used in the analysis are in the Appendix.

##### 4.1. Gravity Equation for a Country-Pair Dynamic Panel

The gravity model from the prepanel data cross-sectional era of FDI relates bilateral trade flows (in logs) to economic size (gross domestic product [GDP]), distance, and other factors affecting FDI barriers. However, theoretical developments of the gravity equation since the initial formulation of Tinbergen (1962) for international trade show that the benchmark equation is misspecified because of the omission of fixed-effects terms. In a country-pair dynamic panel, all the time-invariant country-pair variables (for example, distance, border, colony, common language, same country, religion, and landlocked) are controlled by country-pair fixed effects (CPFE). The advantage of this specification is that the CPFE dummies take care of any unobserved constant heterogeneity at the country-pair level. Therefore, our panel specification of country-pair per year is the following augmented gravity equation:

$$\text{FDI}_{ijt} = \exp[\beta_1 \ln(Y_{it} \times Y_{jt}) + \beta_2 \text{BIT}_{ijt} + \beta_3 \text{FTA}_{ijt} + \beta_4 \text{NYC}_{ijt} + \beta_5 \text{NYCI}_{ijt} + \lambda_{ij} + \lambda_{i,3t} + \lambda_{j,3t} + \lambda_t] + e_{ijt}, \quad (14)$$

where  $\text{FDI}_{ijt}$  is the aggregate investment between home country  $i$  and host  $j$  in year  $t$ . The equation controls for market demand through  $Y$ , which denotes the GDP. To measure the applicable legal regime, BIT (bilateral investment treaty) is a dummy that takes a value of one if the country pair has a bilateral investment treaty in force, and FTA (free trade agreement) is a dummy that indicates if both countries have a free-trade agreement in force. The variable  $e_{ijt}$  represent a stochastic error term (clustered by country pair).

Table 1  
Variable Definitions and Summary Statistics

Variable	Definition	Mean	SD	Min	Max
$FDI_{ijt}$	Volume of foreign direct investment in constant 2005 US dollars	125.24	690.76	0	33,094.14
$N_{ijt}$	Number of projects (extensive margin)	1.96	11.9	0	920
$\ln(Y_{it} \times X_{jt})$	Gross domestic product in constant 2005 US dollars	24.35	2.45	12.36	32.94
$FTA_{ijt}$	Dummy variable that indicates if the parties have a free trade agreement	.27	.44	0	1
$BIT_{ijt}$	Dummy variable that equals one if the parties have a bilateral investment treaty	.42	.49	0	1
$NYC_{ijt}$	Dummy variable that equals one if both parties are signatories to the New York Convention	.82	.38	0	1
$NYC_{1t}$	Dummy variable that equals one if one party is a signatory to the New York Convention	.98	.10	0	1
$NYC_{2t}$	Dummy variable that equals one if the source country is a signatory to the New York Convention	.96	.19	0	1
$NYC_{jt}$	Dummy variable that equals one if the host country is a signatory to the New York Convention	.88	.31	0	1
$Rights_{it}$	Legal rights index measuring the quality of the source country's legal institutions	6.36	2.49	0	10
$Rights_{jt}$	Legal rights index measuring the quality of the host country's legal institutions	5.62	2.61	0	10

Our variables of interest indicate if a country has ratified the NY Convention. The variable  $NYC_{ijt}$  equals one if both countries in the pair have done so in or before a particular year and equals zero otherwise. The variable  $NYC1_{ijt} = \max(NYC_{it}, NYC_{jt})$  equals one if only one country in the pair is a signatory. With this measurement, we are able to identify a differential impact depending on whether both or just one of the countries in a pair were members of the agreement. In particular, a negative coefficient associated with  $NYC1_{ijt}$  would indicate the diversion of FDI from outsiders to signatories of the NY Convention.

#### 4.2. Fixed Effects

Empirical equation (14) includes a full set of fixed effects ( $\lambda$ ). Since Anderson and Van Wincoop's (2003) seminal solution to McCallum's (1995) border puzzle, country fixed effects (CFEs) are standard in all gravity specifications, including gravity estimates of bilateral FDI (Anderson 2011). For trade, CFEs capture multilateral resistance or the sellers' incidence of trade costs from origin  $i$  and the buyers' incidence from destination  $j$ . The key insight behind multilateral resistance is that all bilateral trade costs in the world contribute to the bilateral trade between country pairs. This effect might otherwise be picked up by other variables in the equation, like the border dummy.

Country characteristics, however, may vary over time. Therefore, multilateral resistance terms should capture a country's time-varying factors in a panel setting, and similar studies include the interaction of year (or group of years) and CFE dummies (Bergstrand and Egger 2007). The specialized literature refers to these estimates as country-year fixed effects (CYFEs), and we use the variables  $\lambda_{i,3t}$  and  $\lambda_{j,3t}$  for source and destination CYFEs, respectively. We interact countries and years in three groups: 2003–5, 2006–8, and 2009–12. This grouping assumes parsimonious country dynamic characteristics that reduce harmful collinearity among dummy variables. In addition, we control for the trade collapse in 2009 and for any common trend in world's FDI with time dummies represented by  $\lambda_t$ . These fixed effects, however, do not eliminate completely the unobserved bilateral heterogeneity owing to ignoring other dyadic variables that might affect bilateral FDI. That is, the CYFEs do not completely eliminate omitted-variable bias. Recognizing this, researchers supplement dynamic gravity panels with CPFEs represented by  $\lambda_{ij}$  in equation (14).

#### 4.3. Zeros

For many country pairs there is no bilateral investment occurring in one or both directions, and these zeros bias log-linear ordinary least squares (OLS) estimates of the baseline gravity equation. Furthermore, heterogeneous firms decide to invest abroad depending on their relative productivity (Helpman, Melitz, and Yeaple 2004). Zeros show which firms surpass the FDI productivity threshold and so contain information on firms' heterogeneity (Anderson 2011). Hence, OLS estimates incur a self-selection bias, as the sample considers only the most



productive firms (or countries) in a certain year. The literature has recently addressed how to treat zeros appropriately, but not without discrepancies (Helpman, Melitz, and Rubinstein 2008; Silva and Tenreyro 2006).

To overcome firm or country selection bias due to zeros in the data set, we follow similar empirical studies (for example, Kleinert and Toubal 2010) and adopt the nonlinear variant of the FDI gravity equation. In particular, we use the pseudo-Poisson maximum likelihood (PPML) estimator proposed by Silva and Tenreyro (2006), which offers several advantages over other nonlinear estimators. First, it offers consistent estimates with zeros, since it does not require a log-linearization of the variables. Second, it is robust to heteroskedasticity in the error term. Third, it assures convergence of the maximum likelihood estimation via a previous inspection of the data.<sup>9</sup> In addition, Baltagi, Egger, and Pfaffermayr (2015) argue that the PPML estimator is appropriate for panel gravity data with a large number of country pairs and a small number of country periods.

#### 4.4. *Endogeneity*

One of the main concerns regarding the estimation of FDI bilateral data is endogeneity bias (Aisbett 2009; Bergstrand and Egger 2013). Following the reasoning behind the endogeneity of FTA in bilateral trade (Baier, Bergstrand, and Mariutto 2014; Baier and Bergstrand 2009), agreements that promote FDI (for example, economic integration agreements, BITs, and the NY Convention) might be governed by similar underlying determinants as FDI. Therefore, gravity estimates of the impact of arbitration on FDI might be biased.

To mitigate the effect of the endogeneity of joining the NY Convention, we adopt a generalized method of moments (GMM) estimator. A GMM estimator performs two simultaneous equations, one in levels with lagged first differences of the dependent variable as instruments and one in first differences with lagged levels of the independent variables as instruments. In particular, we use the system GMM estimator, which is appropriate for linear dynamic panel-data CPFE models (Arellano and Bond 1991). Busse, Königer, and Nunnenkamp (2010) remark on an additional benefit of the system GMM estimator over other techniques (for example, lagging the endogenous variable by 1 period): the GMM estimator takes care of the other potentially endogenous variables in our equation, in particular BIT.

#### 4.5. *Quantiles*

Quantile regression is suited to solve the bias toward firm heterogeneity. This is especially relevant in our context because of the high costs of arbitration. Our previous discussion highlighted that arbitration is costly and therefore convenient for larger FDI projects. Consequently, the estimates of the effect of signing the NY Convention might be biased toward the higher levels of FDI. Quantile re-

<sup>9</sup>It has the drawback of dropping observations.

gression is therefore suited to inspect the possibility that international arbitration has a differential impact on different sizes of FDI projects. It is popular for interpreting results of skewed data like international trade (Baltagi and Egger 2016) and FDI (Paniagua, Figueiredo, and Sapena 2015).

Standard linear regression techniques summarize the average relationship between a set of regressors and the outcome variable using the conditional mean function  $E(y | x)$ , which is assumed to be normal and symmetrically distributed. This provides a biased view of the relationship, especially when most of the data are concentrated at different points in the conditional distribution of the dependent variable. Quantile regression provides that capability (Koenker and Bassett 1978). We follow Baker's (2014) procedure to fit a censored quantile regression model. This procedure is appropriate for our purpose since it is compatible with zeros and country fixed effects.

## 5. Results and Discussion

Overall, the results from the regression analysis suggest that joining the NY Convention has a positive effect on FDI. This result is reasonably robust to the selection of different specifications and the inclusion of control variables.<sup>10</sup>

### 5.1. Investment Volumes

The estimation begins in column 1 of Table 2 with the analysis of the impact of the NY Convention on aggregate FDI flows with the baseline gravity specification (14) (with a full set of country-year and country-pair fixed effects). The gravity equation performs well in explaining more than 60 percent of the variation in bilateral FDI flows. Focusing on our variables of interest, we find a positive (.984) and statistically significant coefficient (to the 10 percent level) for  $NYC_{ijt}$ . On average, bilateral FDI flows are 2.6 times higher when both countries are signatories than otherwise (that is, when neither or only one country is a member). The coefficient of  $NYC1_{ijt}$  is also positive (1.395) and significant, which means that on average the investment flows of country pairs with no members are four times lower than when at least one of the countries is a signatory. The net effect with respect to the base category (country pairs with no members) is divided into two groups. The FDI flows between country pairs with only one member are 51 percent higher than pairs with no members.<sup>11</sup> Similarly, FDI flows between country pairs with two members are 77 percent higher than pairs with no members.<sup>12</sup> These results suggest that the positive effect of joining the NY Convention on

<sup>10</sup>In the online appendix, we present additional robustness tests. In particular, we reduce the number of fixed effects in the regression and use the usual time-invariant gravity control variables (distance, border, colony, common language, same country, religion, and landlocked) instead. The results do not deviate significantly from the structural panel estimation. In addition, with this specification we are able to estimate the independent home and host effects of arbitration on foreign direct investment.

<sup>11</sup>This is calculated as  $[\exp(1.395 - .984) - 1] \times 100$  percent.

<sup>12</sup>This is calculated as  $[\exp(.984 - .411) - 1] \times 100$  percent.

FDI applies when both countries in the pair are members and when one of the countries in the pair is a member. However, the effect is greater when both are members.

With regard to our control variables, the joint evaluation of GDPs and trade agreements does not reveal any significant effect on FDI flows. The counterintuitive negative sign for BITs may rest on firm heterogeneity and endogeneity biases of our baseline specification, which is treated in subsequent estimates. That said, the negative effect of BITs is consistent with previous findings (Gil-Pareja, Llorca-Vivero, and Paniagua 2013; Tobin and Rose-Ackerman 2011). Paniagua, Figueiredo, and Sapena (2015) argue that the firm heterogeneity bias is responsible for this discrepancy and advocate for the use of quantile regressions to overcome this bias.

Column 2 of Table 2 repeats the same exercise with per capita measures of FDI flows (and GDPs). The PPML estimator should be robust to heteroskedasticity in the error term. Moreover, weighting FDI by the population product of the country pair reduces the weight of highly populated outliers in the regression. The results confirm the positive effect of joining the NY Convention on FDI (measure in per capita terms). However, the coefficients appear to overestimate the effect of arbitration on FDI. Furthermore, the  $R^2$  is considerably lower (.36), which suggests that the gravity equations fit better when estimated in levels rather than when using per capita measures.

In columns 3, 4, and 5 we test the time properties of the effect of arbitration on FDI by adding to the contemporaneous effect of  $NYC_{ijt}$  a lag of 1, 2, and 4 years, respectively. The lagged variable is positive and significant until 4 years after the ratification of the NY Convention (that is,  $NYC_{ijt-1}$  and  $NYC_{ijt-2}$  are significant, while  $NYC_{ijt-4}$  is not). This result is consistent with the distributed lag observed in Figure 2.

Although the PPML CYFEs estimation should eliminate most of the gravity biases, the effect of the NY Convention might be absorbing the effect of other variables (for example, legal rights) at the country level. Furthermore, the specification does not embrace the interaction of arbitration with the countries' legal system or its effects on FDI's transaction costs, as predicted by the model. However, we cannot directly introduce country fixed variables in our baseline equation owing to perfect collinearity with the CYFE. Therefore, to gain some intuition on the effect of arbitration at the country level, we drop CYFEs in columns 6 and 7. This allows us to differentiate between host ( $NYC_{jt}$ ) and source ( $NYC_{it}$ ) effects<sup>13</sup> and to introduce a new set of variables in columns 6 and 7.

The variable  $NYC_{jt}$  equals one if the home country has joined in or before a particular year and equals zero otherwise. The construction of  $NYC_{jt}$  follows the same pattern for the host country. As in Berkowitz, Moenius, and Pistor (2006), with this specification we are able to distinguish between source and destination effects of the NY Convention. The variable Rights measures the quality of the

<sup>13</sup>Time-varying country effects like  $NYC_{jt}$  are perfectly collinear with country-year fixed effects and cannot be included in equation (14).

Table 2  
Pseudo-Poisson Maximum Likelihood Estimation Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\ln(Y_{it} \times Y_{jt})$	-.011 (.36)	-.799 (.65)	-.043 (.22)	-.040 (.25)	.613* (.29)	-.120 (.24)	.010 (.26)
FTA <sub>ijt</sub>	.207 (.13)	-.008 (.25)	.417** (.15)	.459** (.15)	.121 (.19)	.329** (.11)	.240* (.12)
BIT <sub>ijt</sub>	-.516** (.16)	.092 (.31)	-.430* (.21)	-.335 (.25)	-.464 (.35)	-.448* (.20)	-.382* (.20)
NYC <sub>ijt</sub>	.984* (.59)	1.750* (.86)	-.461 (.79)	.091 (.60)	1.826** (.67)		
NYC1 <sub>ijt</sub>	1.395* (.74)	3.024** (.99)					
NYC <sub>ijt-1</sub>			.608* (.32)				
NYC <sub>ijt-2</sub>				.681** (.24)			
NYC <sub>ijt-4</sub>					.099 (.22)		
NYC <sub>it</sub>						.502 (.49)	1.171 (1.40)
NYC <sub>jt</sub>						.534* (.25)	2.075** (.46)



countries' legal institutions. As in Berkowitz, Moenius, and Pistor (2006), we interact the rights index with the NY Convention variable. These authors argue that ratifying the NY Convention substitutes for poor domestic institutions and reduces the host's bias against foreigners. Furthermore, our model predicts that arbitration alleviates transaction costs between foreign markets. Thus, we introduce the interaction between distance and NY Convention to measure the differential effect of distance if a country has ratified the NY Convention.

We present in column 6 the results of the effect of arbitration at the country level. We observe that the effect of arbitration is positive and significant only when the host country is a signatory. That means (with the precaution of not controlling for multilateral resistance) that host countries may increase their FDI inflows by enhancing arbitral processes.

The results shown in column 7 of Table 2, which includes legal rights and distance, are in line with economic intuition.<sup>14</sup> Turning our attention toward the variables of interest, we observe that the legal rights index of the host country has a positive effect on bilateral FDI. As expected, the NY Convention reduces this positive effect of the host's institutions on FDI.

The positive and significant effect of the host's domestic legal institutions (.388) is eliminated completely by the interaction of the NY Convention and legal rights (-.424). This suggests that investors are less sensitive to local institutions when the host has ratified the NY Convention. This implies that the NY Convention, and by implication the use of arbitration, could substitute for the host's domestic institutions. Thus, arbitration may be a useful mechanism for low-income countries that exhibit lower levels of judicial quality (Rigobon and Rodrik 2005). Furthermore, the NY Convention has no significant effect on the impact of distance, a measure of transaction costs. This suggests that the effect of arbitration is at the institutional level rather than at the transaction cost level (for example, transportation costs).

## 5.2. Extensive Margin

To evaluate the effect of arbitration on the number of investments, we regress the count of international projects on the same independent variables. The effect on the quantity of investments differs from our previous estimates. Table 3 reports the estimation results. As usual, the gravity equation performs well in explaining 90 percent of the variation of investment projects. Focusing directly on the variables of interest in column 1, we observe a null effect of the NY Convention in most regressions. However, omitting the multilateral resistance terms (columns 2 and 3), we do observe a positive effect of arbitration at the country level. Again, we must interpret these estimates with caution owing to the known biases. Moreover, the effect of arbitration on the number of projects is an order of magnitude smaller than on FDI capital flows. The PPML CFEs estimation in column 3 is also significantly lower than for aggregate FDI flows. Similarly, the in-

<sup>14</sup> For a detailed discussion of the effect of legal rights, see Paniagua and Sapena (2014).

Table 3  
Pseudo-Poisson Maximum Likelihood Estimation  
Results: Extensive Margin

	(1)	(2)	(3)
$\ln(Y_{it} \times Y_{jt})$	-.058 (.17)	-.339 (.30)	-.159 (.25)
$FTA_{ijt}$	.183 <sup>+</sup> (.09)	.048 (.07)	.0140 (.08)
$BIT_{ijt}$	.050 (.06)	.022 (.12)	.023 (.11)
$NYC_{ijt}$	-.039 (.27)		
$NYCI_{ijt}$	-.305 (.33)		
$NYC_{it}$		.679** (.22)	1.039* (.51)
$NYC_{jt}$		.454** (.10)	1.094** (.251)
$Rights_{it}$			.129 (.10)
$Rights_{jt}$			.0839 <sup>+</sup> (.05)
$Rights_{it} \times NYC_{it}$			-.116 (.10)
$Rights_{jt} \times NYC_{jt}$			-.180** (.05)
$\ln(D_{ij}) \times NYC_{it}$			.0981 (.18)
$\ln(D_{ij}) \times NYC_{jt}$			-.188 (.17)
<i>N</i>	38,279	39,263	34,630
<i>R</i> <sup>2</sup>	.911		
Country $\times$ year (3 years) fixed effects	Yes	No	No

Note. Robust standard errors (clustered by country pair) are in parentheses. All regressions include year and country-pair fixed effects.

<sup>+</sup>  $p < .10$ .

\*  $p < .05$ .

\*\*  $p < .01$ .

teraction effect between arbitration and legal rights on projects shown in column 3 is smaller than on the number of projects (-.180 versus -.424). These results are consistent with the findings from the theoretical model.

### 5.3. Quantile Regression

The estimation results are not complete owing to the fact that relative arbitration costs are not captured by the standard gravity equation. Section 2 shows that arbitration entails substantial costs, and so it is plausible that it has a different effect on smaller investments. Furthermore, the effect of arbitration is expected

Table 4  
Results of Quantile Regression

	10% (1)	25% (2)	50% (3)	75% (4)	90% (5)
$\ln(Y_{it} \times Y_{jt})$	.378** (.00)	.417** (.00)	.457** (.00)	.500** (.00)	.563** (.00)
$FTA_{ijt}$	-.038+ (.02)	.013** (.00)	-.059** (.00)	-.023* (.01)	-.186** (.01)
$BIT_{ijt}$	-.126** (.01)	-.066** (.01)	-.119** (.00)	.067** (.00)	.011* (.01)
$NYC_{ijt}$	.041** (.01)	.131** (.01)	.164** (.00)	.204** (.01)	.192** (.00)
$NYC1_{ijt}$	-.093** (.01)	-.112** (.01)	-.023** (.00)	-.081** (.01)	.043** (.01)
Average project (US\$millions)	4.54	13.99	27.9	61.09	78.99

**Note.** Bootstrap standard errors are in parentheses. All regressions include country pair, country  $\times$  year (3 years), and year fixed effects. The dependent variable is  $\ln(\text{FDI} + 1)$ .  $N = 39,393$ .

+  $p < .10$ .

\*  $p < .05$ .

\*\*  $p < .01$ .

to be greater when there are economies of scale suggesting that larger investments will be more affected. To test for this possibility, we use quantile regression to measure the incidence of arbitration across levels. Furthermore, quantile regression eliminates the bias stemming from firm heterogeneity (Paniagua, Figueiredo, and Sapena 2015).

The results reported in Table 4 show the varying incidence of the gravity variables in FDI. Overall, the quantile results are in line with our expectations for the impact of arbitration on smaller investments. Focusing on the variables of interest, we see that the effect of arbitration is clearly greater in the upper levels of FDI. The effect of the NY Convention on FDI, for both home and host countries, is more noticeable in the upper levels of FDI, where projects are larger. Arbitration has an effect on the lower levels, but its magnitude is lower.

Results for the quantile regressions in Table 4 shed light on the relative costs of arbitration versus the project size. The larger positive impact of arbitration is highest for projects above \$60 million (in constant 2005 US dollars). We also observe FDI diversion for investments under \$79 million. That is, investors invest smaller amounts in nonsignatory countries for projects below this threshold. We observe a positive effect on third countries only when the bilateral FDI relationship is particularly intense. A strong FDI relationship counterbalances the negative third-country effects. This suggests that new signatories' FDI is diverted from nonmember countries with low levels of bilateral investment toward members (regardless of their FDI level) and nonmembers with high bilateral FDI. This result has interesting policy implications since it suggests that countries have an incentive to increase arbitral quality to prevent FDI diversion of smaller projects.

Moreover, these results unravel some puzzling results of previous estimations.



Table 5  
System Generalized Method of Moments Results of Endogeneity Tests

	Foreign Direct Investment Flows		Extensive Margin	
	(1)	(2)	(3)	(4)
$\ln N_{ijt-1}$			.073** (.01)	.062** (.01)
$\ln FDI_{ijt-1}$	.063** (.01)	.054** (.01)		
$\ln(Y_{it} \times Y_{jt})$	.969** (.15)	.853** (.07)	.374** (.04)	.400** (.02)
$FTA_{ijt}$	-.503** (.19)	-.383* (.18)	-.021 (.05)	.0117 (.04)
$BIT_{ijt}$	-.221 (.17)	-.194 (.17)	-.072* (.04)	-.0425 (.03)
$NYC_{ijt}$	.432* (.17)		.087* (.04)	
$NYC1_{ijt}$	-.252 (.27)		-.123+ (.07)	
$NYC_{it}$		.353 (.24)		.0159 (.04)
$NYC_{jt}$		.378+ (.19)		.116* (.05)
Dependent variable	$\ln(FDI + 1)$	$\ln(FDI + 1)$	$\ln(\text{Projects} + 1)$	$\ln(\text{Projects} + 1)$

Note. Robust standard errors (clustered by country pair) are in parentheses. All regressions include year and country-pair fixed effects.  $N = 35,421$ .

+  $p < .10$ .

\*  $p < .05$ .

\*\*  $p < .01$ .

For example, BIT is associated with lower levels of FDI for levels below the median and has a positive sign in the upper quantiles. This result is compatible with the view that multinational corporations use more complex institutional agreements for larger investments. Conversely, belonging to an FTA is barely significant in column 1, is positive in column 2, and has a negative sign above the median in column 3.<sup>15</sup> Our results suggest that the happy few MNEs in the upper levels of FDI face lower transaction costs than reported in previous studies (Mayer and Ottaviano 2008; Paniagua, Figueiredo, and Sapena 2015), as some commercial risks are offset by arbitration.

#### 5.4. Endogeneity

It is a fair assumption that the results presented in Table 2 are not free from endogeneity. This section applies standard system GMM techniques to overcome this problem.<sup>16</sup> The results suggest that the NY Convention has a causal impact on FDI. The results are only suggestive because it is difficult to distinguish be-

<sup>15</sup>In the online appendix, we also show that the effect of distance is higher for the median and the 75 percent quantile than for the upper and lower percentiles.

<sup>16</sup>A robustness check using instrumental variables is in the online appendix.

tween the hypothesis that joining the NY Convention causes an increase in FDI from the alternative hypothesis that unobservables that lead countries to benefit from joining the NY Convention induce them to join the NY Convention.

Table 5 shows the results from the system GMM estimation. Column 1 reports the results for the effect of arbitration at the country-pair level. Since the system GMM panel estimation is not compatible with zeros, we follow Busse, Königer, and Nunnenkamp (2010), who add 1 to FDI to identify zeros.

The results suggest that the effect of the NY Convention is significant and positive after controlling for endogeneity with this method. Moreover, GMM estimation seeks to eliminate additional endogeneity bias in the rest of the independent variables. Hence, BIT's estimated coefficient is not significant. In addition, FTAs have a negative impact on FDI, as expected in a trade-FDI substitute scenario. However, the effect of arbitration on third countries is not robust (that is, the coefficient captured by  $NYCI_{ijt}$  is not significant). The results at the country level in column 2 confirm that the effect of arbitration is positive and significant only for hosts, regardless of the membership of the source country. Table 3 repeats the exercise for the extensive margin, and the results are very similar to those of the volumes invested. In line with our previous results, our findings suggest that arbitration leads to larger international projects rather than more projects. For example, the estimated coefficient for the host's NY Convention membership (.087) is lower than that for FDI flows (.432).

## 6. Concluding Remarks

This paper has explored the role that international commercial arbitration plays in FDI by examining its theoretical mechanisms and testing its effects on bilateral data. This research provides several contributions to the literature: it explains the mechanisms by which arbitration affects FDI; it suggests that countries' arbitration regimes have a positive effect on FDI—that is, the positive shock to countries' arbitration regimes from joining the NY Convention increases the levels of bilateral FDI; it shows that the effect of arbitration reduces costs associated with domestic judicial systems; it demonstrates that the improvement in countries' arbitration regimes tends to have a larger effect on the volume of FDI investments rather than the number of foreign projects; it finds that the effect of arbitration is greater in higher FDI levels; and it indicates that a positive shock on a country's international arbitration diverts FDI from nonmembers with low bilateral FDI. The main policy implications are that countries can increase FDI volumes and prevent FDI diversion by strengthening their arbitration regimes. They can do this, for example, by improving the domestic laws that pertain to international commercial arbitration and assuring their effective enforcement by domestic judiciaries.

## Appendix

### Data Description

#### *A1. Data*

The *Financial Times* cross-border investment monitor fDiMarkets is the source of the FDI data.<sup>17</sup> Investment counts (that is, the extensive margin) are measured in firm-level project counts and capital flows in constant 2005 dollars. The data set covers bilateral firm-level greenfield investments from 2003 to 2012, aggregated between 190 countries. The list of countries is shown in Section A2.

Other types of FDI (for example, joint ventures or mergers) may also make use of arbitration to settle disputes. However, the effect of improved contract enforcement on mergers or joint ventures is ambiguous because improved contract enforcement allows firms to align incentives with a smaller equity stake. The reduction in equity investment required can offset the increase in total investment from improved contract enforcement, which leads on net to a smaller investment by MNEs. Therefore we focus on greenfield investments, for which contract enforcement has a less ambiguous impact on the size of investment and a host's policies are expected to have a significant effect (Nocke and Yeaple 2007; Qiu and Wang 2011). For a detailed description, see Paniagua and Sapena (2014). Overall, the database is heavily unbalanced, with 70 percent zero observations, which means that not all countries received investments in all years. The data set was built following the procedure in Paniagua (2016) to construct gravity data sets with abundant zeros.

The World Bank is the source for data on legal rights and GDP, measured in constant 2005 US dollars.<sup>18</sup> The variable Rights measures the strength of legal rights with an index ranging from 0 (weakest) to 10 (strongest). This index has been maintained by the World Bank since 2004 and measures the degree to which domestic laws protect the rights of borrowers and lenders in the countries in the sample.

Institutional agreements such as FTAs and BITs reduce the uncertainty in foreign investments (Bergstrand and Egger 2013). The BIT value is manually constructed with data from UNCTAD.<sup>19</sup> The source of the FTA data is Head, Mayer, and Ries (2010), complemented with UNCTAD data. The data for the NY Convention are from the Convention on the Recognition and Enforcement of Foreign Arbitral Awards.<sup>20</sup>

<sup>17</sup> See fDiMarkets (<http://www.fdimarkets.com>).

<sup>18</sup> See World Bank, World Bank Open Data (<http://data.worldbank.org>).

<sup>19</sup> See United Nations Conference on Trade and Development, International Investment Agreements (<http://investmentpolicyhub.unctad.org/IIA>).

<sup>20</sup> See New York Arbitration Convention, Contracting States—List of Contracting States (<http://newyorkconvention.org/list+of+contracting+states>).

*A2. Countries in the Data Set*

Afghanistan	Denmark	Lesotho	Saint Vincent
Albania	Djibouti	Liberia	São Tomé
Algeria	Dominica	Libya	Saudi Arabia
Angola	Dominican Republic	Lithuania	Senegal
Antigua	Ecuador	Luxembourg	Serbia
Argentina	Egypt	Macedonia (former	Seychelles
Armenia	El Salvador	Yugoslav	Sierra Leone
Aruba	Equatorial Guinea	Republic of	Singapore
Australia	Eritrea	Macedonia)	Slovakia
Austria	Estonia	Madagascar	Slovenia
Azerbaijan	Ethiopia	Malawi	Somalia
Bahamas	Fiji	Malaysia	South Africa
Bahrain	Finland	Maldives	South Korea
Bangladesh	France	Mali	Spain
Barbados	French Polynesia	Malta	Sri Lanka
Belarus	Gabon	Martinique	Sudan
Belgium	Gambia	Mauritania	Suriname
Belize	Georgia	Mauritius	Swaziland
Benin	Germany	Mexico	Sweden
Bermuda	Ghana	Moldova	Switzerland
Bhutan	Greece	Monaco	Syria
Bolivia	Greenland	Mongolia	Taiwan
Bosnia-Herzegovina	Grenada	Montenegro	Tajikistan
Botswana	Guadeloupe	Morocco	Tanzania
Brazil	Guatemala	Mozambique	Thailand
Brunei	Guinea	Myanmar (Burma)	Timor-Leste
Bulgaria	Guinea Bissau	Namibia	Togo
Burkina Faso	Guyana	Nepal	Trinidad and
Burundi	Haiti	Netherlands	Tobago
Cambodia	Honduras	New Caledonia	Tunisia
Cameroon	Hong Kong	New Zealand	Turkey
Canada	Hungary	Nicaragua	Turkmenistan
Cape Verde	Iceland	Niger	Turks and Caicos
Cayman Islands	India	Nigeria	Uganda
Central African	Indonesia	North Korea	Ukraine
Republic	Iran	Norway	United Arab
Chad	Iraq	Oman	Emirates
Chile	Ireland	Pakistan	United Kingdom
China	Israel	Panama	United States
Colombia	Italy	Papua New Guinea	Uruguay
Comoros	Jamaica	Paraguay	Uzbekistan
Congo (Democratic	Japan	Peru	Venezuela
Republic of the	Jordan	Philippines	Vietnam
Congo)	Kazakhstan	Poland	Yemen
Costa Rica	Kenya	Portugal	Zambia
Côte d'Ivoire	Kuwait	Qatar	Zimbabwe
Croatia	Kyrgyzstan	Romania	
Cuba	Laos	Russia	
Cyprus	Latvia	Rwanda	
Czech Republic	Lebanon	Saint Lucia	

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