Institutions, Protectionism, and Multinational Enterprises: Insights from Developing Economies.

A Dissertation

Presented by

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ABSTRACT

Institutions, Protectionism, and Multinational Enterprises:
Insights from Developing Economies.

A dissertation presented to the Faculty of the
International Business School of Brandeis University
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By Angela Oriana Montti Sosa

This dissertation lies at the intersection of international trade policy, international business, and political economy, focusing on developing economies. Guided by theory, I leverage rigorous empirical analysis to derive actionable insights and convey evidence-based policy and management recommendations.

My first line of research delves into institutional quality as a factor for Foreign Direct Investment (FDI). I address this in my chapter Reputational Shocks and Commitment Devices: Differential Effects on Foreign Direct Investment in Developing Economies, where I evaluate how reputational shocks affect FDI inflows in developing economies in the context of Investor-State Dispute Settlement.

My second line of research focuses on protectionism and economic tensions between China and the United States in a strategic industry. In my third chapter, Effects of Trade Barriers on Foreign Direct Investment: Evidence From Chinese Solar Panels, I find the effects of US anti-dumping and countervailing duties on FDI decisions by targeted Chinese firms in the solar panel industry. I follow up on chapter four, Unraveling Protectionism: Strategic Responses of Chinese Multinationals to US Trade Policy, documenting the financial impact of these trade barriers on the whole corporate family containing a targeted Chinese firm in the solar panel industry, and the strategies they develop as a response.

My research contributes to understanding how political economy and geopolitical factors shape international markets and impact developing economies and multinational enterprises in unstable global environments.

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CHAPTER 1.

INTRODUCTION

This dissertation lies at the intersection of international trade policy, international business, and political economy, focusing on developing economies. I study the consequences of protectionist policies on the global allocation of resources. In particular, how they modify multinational firms' production and investment decisions. I also analyze the role of domestic and international institutions in foreign direct investment in developing economies. Guided by theory, I leverage rigorous empirical analysis to derive actionable insights and convey evidence-based policy and management recommendations.

I delve into institutional quality as a factor influencing Foreign Direct Investment (FDI) in my second chapter, **Reputational Shocks and Commitment Devices: Differential Effects on Investments in Developing Economies**.

Why capital doesn't flow from rich to poor countries is a relevant but not at all new question. As such it has gotten many answers since it was first posted by Lucas in 1990. The literature has shown that institutional quality is a key factor in explaining this paradox. But how do investors find out about the quality of a country's institutions? I posit that Investor-State Dispute Settlement (ISDS), an institutional arrangement present in Bilateral Investment Treaties (BIT), works as a mechanism for revealing a country's institutional quality.

Having an ISDS case implies a negative reputational shock that should diminish the country's future FDI inflows even more if the country loses the dispute. Meanwhile, BITs function as a commitment device between the two signing nations. Since most disputes occur in the context of a BIT, the overall result should also include their effect.

I test this hypothesis and identify both the reputational and the commitment device effects by estimating a structural gravity equation using a Poisson pseudo maximum likelihood (PPML) method. Results for my benchmark model show a reputational shock that reduces FDI inflows by USD 20 million one year after a dispute. This is more than compensated by

the commitment device effect that increases these flows by USD 95 million.

My analysis of heterogeneous effects shows that negative results are driven by a subsample of countries with a large history of disputes. This shows that the reputational effects are small and that the interaction of the whole set of institutions promotes FDI in developing economies.

My second line of research focusing on protectionism and economic tensions between China and the United States in a strategic industry is addressed in the following two chapters.

The recent comeback of protectionism and industrial policy will affect the international allocation of resources beyond the short run, in my third chapter, **Effects of Trade Barriers on Foreign Direct Investment: Evidence from Chinese Solar Panels**, I rely on a historical episode to provide evidence that helps approximate these policies' short and medium-term consequences.

I show how trade barriers impact Foreign Direct Investment decisions by multinational firms in a context where a nationalist industrial policy clashes with international climate change commitments. I do this by evaluating the anti-dumping and countervailing duties (AD-CVDs) imposed by the United States against the import of solar panels from China in 2012. AD-CVDs are the most used form of protection and have been targeting China since it became a member of the World Trade Organization in 2001.

Leveraging the variation given by the policy's discriminatory nature, which assigns differential rates to Chinese firms in the same industry, I develop a difference-in-differences design. Given the large presence of zeros in the left-hand-side variable, I use a Poisson Pseudo-Maximum Likelihood method to estimate a multiplicative model of FDI. I examine greenfield investment amounts using monthly firm-level data on FDI announcements from 2009 to 2015. Since FDI can represent both greenfield and brownfield investments, I use data on mergers and acquisitions to estimate the effects of the policy on the probability of completing an M&A deal.

My findings show that in 2012, targeted firms increase FDI by 145 million dollars per

year, from a previous average of 9 million dollars. These results for greenfield investment do not carry over to cross-border mergers and acquisitions. Following this initial reaction, firms decrease their number of projects by 50% in the following two years.

I then devise several tests for evaluating several theoretical predictions regarding multinational firms' location choices for foreign direct investment. I do not find evidence to support the tariff-jumping hypothesis, meaning there is no increase in FDI by targeted firms in the US and I also do not find support for horizontal FDI in Europe. I find evidence for vertical FDI in 2015 when targeted firms increase their investment in Asia. I then test if industry activities impact the probability of investing in that region, finding evidence of production fragmentation. Finally, a descriptive analysis of the data shows that Asian countries that receive FDI after the policy become exporters of solar cells to the US in the medium run, showing support for the export-platform hypothesis.

Overall, the results in this chapter document FDI diversion that modifies investment patterns in the short run and eludes the trade barriers in the medium run, weakening the intended effects of the protectionist policy.

In a follow-up study, **Unraveling Protectionism: Strategic Responses of Chinese Multinationals to US Trade Policy**, I build on the discussion on how the recent shift in the global economy from openness to trade protectionism challenges international business (IB) practice and theory.

I develop a framework in which multinational enterprises face changes in international conditions under the World Trade Organization rules. I complement this institutional-based view of IB theory with a resource-based view, emphasizing the use of existing resources such as capital and technology, and the development of new ones by expanding their geographical scope.

I use this framework to analyze the impact on targeted multinational enterprises, examining the anti-dumping and countervailing duties implemented by the United States on the import of solar panels from China in 2012. Rather than focusing on the response of firms

targeted by the AD-CVDs as if they were stand-alone like I do in chapter three and is usual in this literature, I identify those that are part of larger corporate families and show how the whole structure reacts to an earnings shock to one of their members.

Using the Directory of Corporate Affiliations database and a difference-in-differences design, I document how this shock affects Chinese MNEs and which strategies they implement as a reaction. The descriptive data analysis and statistical results show this is a heterogeneous group. To address the internal sources of variation, I estimate the effects on the whole sample and different subsamples defined by MNE characteristics like availability of financial data and number of employees.

The empirical findings show that targeted MNEs experience a reduction in net income and return on assets the year the policy is implemented. They respond by restructuring their domestic units, increasing the regional dispersion of their foreign subsidiaries, and diversifying their industrial activities. I find large heterogeneity in these MNEs that condition their strategic responses and how they adapt to the changing environment.

These results provide three insights into the IB literature of multinational enterprises facing tensions such as a trade war. First, we find that MNEs are sensitive to industry-specific shocks that impact one firm in the corporate family. Second, US protectionism hurts Chinese MNEs only in the short run as negative financial results disappear after one year. Third, we contribute to analyzing managerial decisions in an unstable international context that hinders globalization by showing that these are dynamic corporations that adapt rapidly.

In conclusion, my research is shaped by a passion for understanding economic complexities in the global economy and applying systematic evidence to inform policy and management decisions. This dissertation contributes to understanding how political economy and geopolitical factors shape international markets and impact developing economies and multinational enterprises in unstable global environments.

CHAPTER 2.

REPUTATIONAL SHOCKS AND COMMITMENT DEVICES: DIFFERENTIAL EFFECTS ON FOREIGN DIRECT INVESTMENT IN DEVELOPING ECONOMIES

2.1 Introduction

Why capital does not flow from rich to poor countries is a very relevant but not at all new question. As such, it has gotten many answers since it was first posted thirty years ago when Lucas (1990) shows the data do not match the neoclassical prediction that countries with lower capital-to-labor ratio receive more capital inflows. Market imperfections, in particular, the existence of a "political risk" due to the lack of mechanisms to enforce contracts, explain this paradox. Low institutional quality is the main reason for the lack of capital inflows in poorer economies, and those looking to attract capital inflows should reduce corruption, increase government stability, and strengthen the protection of property rights (Alfaro et al. (2008)).

Poorer countries attempt to overcome this lack of trust in their institutions through mechanisms that legally bond their behavior and give a positive signal to foreign investors. International investment agreements are developed for this purpose. These commitment devices increase the cost of not acting according to the rule of law. They aim to reduce the perceived risk of expropriation for multinational firms, and the cost of capital for countries hosting foreign investments (Sykes (2005)). They also give firms the right to pursue legal action for compensatory damages if a host country engages in unlawful acts.

How do investors find out about the quality of a country's institutions when deciding where to locate their investment? Is there a reputational mechanism? In this paper, I analyze the role of Investor-State Dispute Settlement (ISDS) an institutional arrangement that gives foreign direct investors the right to take disputes with host governments to international arbitration and is present in Bilateral Investment Treaties (BITs) and other international investment agreements.

BITs, the most frequent of these agreements, are defined by the United Nations Confer-

ence on Trade and Development as "an agreement between two countries to promote and protect investments made by investors from respective countries in each other's territory" (UNCTAD, 2019).

I argue that ISDS is a mechanism where institutional quality is revealed. The mere fact of having a "case" sends a bad signal to the investors and gives the country of destination a bad reputation. After having a case, a country's foreign direct investment is negatively impacted. However, most ISDS disputes are based on BITs, which are international commitment devices, hence the overall result includes both opposite effects.

I extend this initial proposition by considering two additional effects. One is losing the case, meaning the international arbitration panel rules that the country breached the firm's contract. This should have a stronger negative reputational effect on future and current investors. The second is the existence of a complementarity between domestic institutions and international arrangements. I analyze heterogeneous effects by identifying countries with a "low-frequency" of cases as those with a total number of cases since 1987 of less than the sample mean. My robustness check removes China from the sample as it is the developing economy with the largest FDI amounts in the analysis period.

I use a gravity equation to investigate the reputational effect of ISDS and the commitment device effect of BITs on FDI flows and positions in developing economies. I estimate a multiplicative model of bilateral FDI using a Poisson pseudo maximum likelihood method (PPML) (Santos Silva and Tanreyro (2006)). I include fixed effects for the country of origin-year and country of destination-year to account for time-varying GDPs and multilateral price terms, and country pair fixed effects to control for endogenous characteristics of both countries that could impact the outcome of interest (Baier and Bergstrand (2007)).

I use several publicly available sources to construct my dataset which I arrange in a dyad form. I construct a bilateral dataset of inward direct investment positions with information from the International Monetary Fund's Coordinated Direct Investment Survey (CDIS). This source covers the years from 2009 to 2015 determining my analysis period. I obtain infor-

mation about all the BITs available from UNCTAD's International Investment Agreements Navigator. Finally, the data on ISDS cases comes Wellhausen (2015) and provides information on international investment arbitrations filed by foreign investors against states from 1987 to 2015.

Findings in my benchmark model suggest the overall effects of these international arrangements are positive and increase FDI inflows and positions in developing economies. There is variation in magnitudes, which are larger two years after a case, particularly for positions. When considering the composition of these overall positive effects, I find a negative reputational shock of 21 and 27 million dollars in bilateral FDI inflows one and two years after the case respectively. This is more than compensated by the positive effect of the interaction between a BIT and a case of 95 and 192 million dollars for each specification. Similarly, the negative effect of a case in FDI positions is about 65 million dollars while the interaction effect is 117 million dollars with a one-year lag and 185 with a two-year lag.

Both extensions to the benchmark model yield similar results. The first one includes the effects of losing the case. These results show a puzzling positive effect the first year after a case which is the largest of all the estimations. Nevertheless, in line with previous findings in the literature, I find a negative economic impact when considering FDI flows two years after the case, and FDI positions one year later. The second extension, the interaction with domestic institutions, shows similar results though different in magnitude. I find that the complementarity effect is the largest for FDI positions two years after a case, which is the most stable specification throughout models in terms of sign and magnitude.

The analysis of heterogeneous effects shows positive economic impacts in FDI inflows and positions larger for the subsample of countries without a history of international disputes than for the whole sample. This suggests ISDS history matters for investors and there is no reputational shock for countries that do not have a large track of international arbitration with firms. A robustness check estimating the benchmark model removing China as an economy of destination finds similar positive effects in most specifications. However, for

FDI positions one year after the case results are negative, as in the model extensions. This suggests the reason the estimations for the benchmark model are not negative is a large positive China effect.

In sum, the negative reputational effect associated with an ISDS case is larger than the commitment device effect of a BIT for FDI inflows two years after the developing economy of the destination loses the case, and when it interacts with the quality of the domestic institutions. For FDI positions, this negative shock occurs one year after the case in all but the benchmark model. These effects are mostly driven by countries with a large history of international disputes showing that the mere presence of a case does not provide a bad reputation but rather a large track of them. In all models, negative results disappear two years after the dispute when considering the more stable measure of FDI bilateral positions.

This paper contributes to the multidisciplinary studies that analyze the effects of investor-state dispute settlement on developing economies' reputations through its impact on foreign direct investment. I extend this literature by developing a gravity equation to identify the effects of BITs, cases, and their interaction. This is relevant since both legal arrangements usually go together. In addition, using a PPML estimator overcomes many of the empirical challenges from the characteristics of FDI data such as heteroskedasticity, skewness, and the large presence of zeros.

Directly related to my paper, Allee and Peinhardt (2011) claims that the mere appearance of a government in international arbitration sets a negative shock to the country's reputation and discourages future FDI flow. Thus, BITs can increase foreign direct investment only if countries are not taken before an arbitration panel. If this happens, future flows of FDI diminish, even more, if the country loses the case. I extend this analysis by accounting for country pair flows and positions and developing a different estimation framework.

Similarly, Aisbett et al. (2018), using OLS to estimate a gravity equation for FDI flows in developing economies from 1980 to 2010, find that BITs signed before the host country faces a dispute have a positive impact on bilateral FDI flows. After a dispute, FDI flows

from BIT partners decrease more strongly than those from countries without this agreement. Furthermore, after a host country faces a dispute, the net impact on bilateral FDI flows from signing a new BIT is nearly zero. Their treatment of the "claim" variable is different from the one I use in this paper since it does not take into account which is the home country of the investor placing the dispute.

Host governments develop innovative institutions such as BITs to overcome political risks that discourage foreign investors. Tobin and Rose-Ackerman (2011) find these mechanisms do not substitute for weak local institutions, rather they complement each other. FDI reflects the investors' confidence in a country and BITs create commitments from host countries to an appropriate environment for foreign investment. They identify two channels for this: one is the financial costs that a country faces for violating the agreements. The other, which directly relates to the main topic of this paper, is that countries that violate a BIT face reputational costs that discourage future investors.

My use of a gravity equation to estimate the effect of BITs on bilateral FDI flows relates to Falvey and Foster-McGregor (2017) and their finding of non-linear effects. They show that the effectiveness of BITs on FDI is increasing in the difference in GDP (size) and GDP per capita (development) between the source and host countries. They argue this finding is consistent with the idea that BITs are more effective in promoting foreign direct investment when source and host countries have large institutional differences. The authors also find evidence supporting a complementary relationship between BITs and domestic institutions.

However, Berger et al. (2013) argues that the literature is not conclusive about the role of BITs in promoting FDI because it treats them as "black boxes", considering them as homogeneous while they are diverse. Part of this diversity reflects the modalities of the admission phase of FDI and dispute settlement mechanisms. This second factor refers to ISDS, a credible commitment from the home country against discriminatory measures to foreign investors after they are established in the country. The authors find this plays a minor role and that investors react more to guarantees in the admission phase before they

are established in the country. Hence to promote FDI, governments in developing economies should provide legal security and predictability in access conditions rather than ex-post mechanisms.

The results from this paper could inform the current efforts to reform ISDS that are taking place at the United Nations Commission on International Trade Law (UNCITRAL) and help develop a mechanism that is useful for firms and countries. Further research should incorporate another set of costs that ISDS has for countries. In particular, I do not consider the cost of awards, which have been increasing later making a case by legal authors against "crippling compensations". Similarly, I do not include the "regulatory chill" effects by which some governments stop implementing domestic regulations to prevent disputes.

The rest of this chapter is organized as follows: in section 2.2 I present background information on ISDS cases and venues, and in section 2.3 the economic framework I use for my analysis. In section 2.4 I explain the construction of the dataset and main variables of interest, and in section 2.5 my empirical framework and estimation method. In section 2.6 I present and discuss my results, and in section 2.7 the analysis of heterogeneous effects and robustness checks. I conclude in section 2.8.

2.2 Background on Investor-state Dispute Settlement

Investor-state dispute settlement procedures present in international investment agreements allow multinational firms to access arbitration panels that decide if the host state incurred a breach of contract or any other aspect of a treaty. ISDS has specific characteristics that differentiate it from trade dispute settlement procedures, as they are designed to solve different types of problems (Ossa et al. (2020)).

The economic motivation for ISDS is the holdup problem present in international investments (Stahler (2021)). If the investment is country-specific and there is a lack of complete contracts, investors foresee this issue and the host country may face underinvestment. While models for the holdup problem usually refer to a firm-to-firm activity, the fact that in this setting one of the actors is the government makes this a particular mechanism.

ISDS is a controversial tool. It can be seen as a good mechanism to promote FDI in poorer countries. Since its role is to guarantee the rule of law and give investors confidence against expropriations, it might attract investment in developing economies whose institutions may not be as reliable to investors from richer countries.

In a 2020 survey about investors' perceptions of ISDS, investors answered that they are mostly satisfied with the current system (Queen Mary University of London (2020). Furthermore, they prefer it to other mechanisms such as government negotiation or litigation in the host state's courts. Investors also claim that their investment decisions are positively influenced by the stability and predictability of the host state's legal framework. At the same time, the availability of ISDS and the host country's history in investor-state disputes also influence their investment decisions.

However, other actors see ISDS as a mechanism undermining a country's sovereignty. This was clearly expressed in October 2017 when 230 Law and Economics professors sent a public letter to former president Trump urging him to remove ISDS from NAFTA (now the United States–Mexico–Canada Agreement) and to avoid including such mechanisms in any future trade or investment treaty. They claimed that "The inclusion of ISDS in U.S. trade

and investment deals (...) threatens to dilute constitutional protections, weaken the judicial branch, and outsource our domestic legal system to a system of private arbitration that is isolated from essential checks and balances."[1] This characteristic of ISDS is particularly relevant in areas such as public health or the environment. By taking a lax definition of what constitutes an expropriation, many of these policies can be challenged by foreign firms.

Venues

There are several venues for international arbitration between states and firms. Some of them are the United Nations Commission on International Trade Law (UNCITRAL); the Permanent Court of Arbitration (PCA) in The Hague, Netherlands; and the Arbitration Institute of the Stockholm Chamber of Commerce (SCC). However, the most widely used venue is the International Centre for Settlement of Investment Disputes (ICSID) from the World Bank.[2]

Its goal is to provide an impartial international venue for resolving disputes between states and foreign investors. It was established in 1966 by the ICSID Convention, and the first case was registered in 1972. It has more than 160 signatory and contracting states. Each member state participates in the administrative council, which elects the secretary-general in charge of the daily operations. Being a member of this institution can be one of the most effective bonding mechanisms for a developing economy since not respecting an ICSID decision can have reputational consequences for countries and possibly compromise future support from the World Bank group.

The geographical distribution of these cases shows that less developed economic regions like East Europe and South America have more cases than more developed ones like North America. This fact goes in line with the argument that foreign investors in economies with weaker institutions, like the transition economies in East Europe, are those who benefit the most from the existence of ISDS. ICSID also reports that the tribunal decided 66% of the disputes in 2019, while 34% were settled or discontinued.

[1] Available at here
[2] See ICSID

An Illustrative Case

An interesting is the case "Phillip Morris v. Uruguay".[3] In 2010 the multinational tobacco company Phillip Morris failed a dispute against Uruguay based on the Switzerland-Uruguay BIT. The firm alleged that Uruguay violated the bilateral investment treaty through regulatory measures in the tobacco industry and demanded a compensation of 25 million dollars. These measures were part of an important series of anti-tobacco regulations that the Uruguayan government had promoted since 2005 and made Uruguay the first Latin American country to be smoke-free in public spaces (Green (2021)).

Phillip Morris challenged the adoption of a single presentation requirement, obliging tobacco manufacturers to sell only one variant of cigarette per brand family, and an 80% increase in the size of graphic health warnings on cigarette packages. The allegation was that, by banning many of the cigarette variants and substantially diminishing the value of the remaining ones, Uruguay was expropriating the firm's brand assets, including intellectual property, without compensation.

The dispute won international recognition for being the first case of its kind and having the potential to set jurisprudence. The World Health Organization, the Pan American Health Organization, MERCOSUR, and many anti-tobacco organizations supported Uruguay's position.

After six years, ICSID dismissed Phillip Morris' claims in a widely celebrated resolution by the international public health community. This case is relevant for this paper because it is hard to guess if this dispute would generate a negative reputational effect. Is the presence of an ISDS case per se a bad reputational shock?

[3]More information here

2.3 Economic Framework

Structural Gravity Equation and FDI

With the development of the theoretical foundations of the gravity equation, the structural gravity model was developed and its use became suitable for other types of flows, such as FDI. Head and Ries (2008) develop a gravity theoretical equation for FDI as acquisitions motivated by international corporate control. Head and Mayer (2021) argue that modern gravity models allow estimating the underlying costs of cross-border movement for different types of flows where each type is the outcome of a discrete choice problem. For capital, they argue is an asset owner looking to sell to the highest bidder. In this paper, I follow an approach similar to the one used to evaluate the economic impact of Economic Integration Agreements (EIA), but for the case of BITs.

Conceptual Approach

Developing countries that want to promote inward FDI sign BITs as a binding mechanism. In this way, they become "institutionally closer" to the richer economies from where they want to attract investment. Later, the presence of a dispute might make those two countries "institutionally more distant". This can be seen in stages.

In the first stage, a developing economy (A) wanting to increase its inward FDI signs a BIT with a richer country (C) to signal a commitment to the rule of law. A profit-maximizing firm from country C deciding to invest in a developing economy analyzes the costs of investing in A and another similar country, B. Country B does not have a BIT with country C. In this framework the main cost is the risk of expropriation, which is lower in country A due to the BIT, so the firm decides to invest there. Holding everything else equal, the hypothesis suggests that investment from country C should go more to country A than to B.

In the second stage, a multinational firm from country C files an international dispute against country A through the ISDS instrument in the BIT. This is a revealing mechanism of the true type of institutions present in country A. It signals to the rest of the investors that the country in question might have committed an unlawful act against the foreign firm. This

increases the cost of investment through the risk of expropriation. If the dispute is resolved in favor of the firm, it explicitly reveals the "bad type" of the host country's institutions. Investors identify such cases as a negative signal regarding property rights and stability in that country and should be less willing to invest or might even leave the country.

Hence, whenever two countries sign a BIT, most of which include ISDS, they are signaling their willingness to abide by its regulations. However, the real behavior of the country and whether it is the type that respects contracts will not be revealed until an investment dispute arises against the sovereign.

ISDS and BIT operate in two ways for developing economies. First, it reduces expropriation risk when the treaty is in force making the two economies closer through a commitment device effect. When there is a dispute, the perception of expropriation risk increases for other firms from the investor's home country. This is a negative reputational shock that might make the two economies institutionally more distant. Therefore we should expect fewer firms to be willing to invest there, even some firms disinvesting, and expected FDI inflows and positions to diminish. This can be expressed in a gravity equation form:

$$E[F_{do}] = exp[C_{do} * R_d - D_{do}]M_d S_o \tag{1}$$

Where $E[F_{do}]$ is expected foreign direct investment; C_{do} is the commitment device between the country of destination d and country of origin o; R_d is the reputational shock on the country of destination. These are the main parameters to estimate. As is usual in gravity models, this expression means that expected FDI in the country of destination from the country of origin depends negatively on the distance between the two countries $-D_{do}$, and on the sizes of economies of destination and of origin M_d, S_o.

2.4 Data

In this section, I describe the different publicly available sources I use to build my dataset. I arrange all the data in a dyad form to include the relevant variables for each country pair in the sample.

Bilateral FDI

I construct a bilateral dataset of inward direct investment positions using the International Monetary Fund's Coordinated Direct Investment Survey (CDIS). I take the difference in the yearly positions within each country pair for the FDI flow variable.

The survey compiles positions by the immediate direct investor, by counterpart economy, for net equity and net debt instruments, by the end of December of each year (IMF (2015)). It constitutes direct investment when an investor residing in one economy has 10% or more of the voting power in a company resident in another economy. This operationalizes the concept of having "control or a significant degree of influence" on the firm management.

The dataset contains levels of FDI equal to zero when this is the reported value, negative values, and missing information (including data reported as confidential). The period covers the years from 2009 to 2015.

I define developing economies as those not classified as high-income in 2009 by the World Bank Analytical Classifications presented in WorldBank (2021). Operationally, this means leaving out of the IMF sample destination countries that had a GNI per capita greater than USD 12,195 in 2009.[4]

Hence, this leaves 165 economies of destination and 126 economies of origin (full list in Table A6 in the Appendix).

Figure 1 reflects that, during the period covered by the sample, FDI inward positions in developing economies fluctuate. In the beginning, there is a sharp increase following the 2008 financial crisis. This however diminishes from 2010 to 2012, after which it starts growing again. The final years show a relative stagnation in our main variable of interest.

[4] A few countries that changed category during the period and became classified as high-income are part of the sample

Bilateral Investment Treaties

I obtain information about all the BITs available, which are more than 3000, from *International Investment Agreements Navigator | UNCTAD Investment Policy Hub* (2021). Since the data need to be gravity-type, each of the two countries signing the BIT is included both as country of destination and country of origin. The source provides two dates, one when the treaty was signed and the other when it was enforced. I use this second date for the estimation.

Table 2 shows the number of BITs in force for the 10 developing economies in the sample with more BITs in 2015. It reflects that these economies are recurring to bilateral investment treaties as an active form to foster foreign investment in their economy.

Cases

I use publicly available data on Investor-State Dispute Settlement (ISDS) from Wellhausen (2015). The dataset provides information on international investment arbitrations filed by foreign investors against states from 1987 to 2015.

I merge it with my previous data and create the variable "case" which equals 1 for each year a country pair has a case, and zero otherwise. I obtain a total of 90 cases.[5] Of those cases, 81 were between a country pair that also had a BIT in force that year, the rest of the cases were based on other types of international investment agreements.

Some features of the data are relevant for the analysis in this paper. The same number of cases in the sample were won by investors than by states (44), with 2 cases being settled. The most represented economic sectors in the disputes are Mining (20%), Manufacturing (18%), Utilities (14%), and Oil (10%). I make a sub-classification of countries defining as "high offenders" those that had more than the average number of cases considering the information from 1987 to 2015. Countries that had 9 or more ISDS cases are included in this category. Finally, the most used venue for the cases in the sample is ICSID (66 cases),

[5]This is one case per year and country pair, except for El Salvador and the US which have two cases in 2009, Turkmenistan and Turkey with two cases in 2010, and Venezuela and The Netherlands three cases in 2011.

followed by PCA (11) and UNCITRAL (6).

Considering the income level of the country pairs involved in terms of the World Bank classification, in 90% the country of origin of the investment is a rich economy. The great majority (92%) of the destination economies are middle-income (either Upper or Lower). The full information is in Table A5 in the Appendix.

Domestic Institutions

To test Tobin and Rose-Ackerman (2011) proposition that BITs do not substitute for weak local regulation but rather complement them, I include a variable to capture this local institutional effect.

From the Doing Business project (WorldBank (2020)), I get the variable *Score-enforcing contracts* (DB04-15 methodology) that captures the procedures, time, and cost for resolving a commercial dispute through a local first-instance court. It measures the gap between an economy's performance and the regulatory best practice on the Enforcing Contracts indicator components. It is calculated as the simple average of the scores for Time (days), Cost (% of claim value), and Procedures (number). The score ranges from 0 to 100, where 0 represents the worst regulatory performance and 100 the best regulatory performance.

I construct a dummy variable *Domestic* that equals one if the country of destination has a score equal to or larger than the sample mean plus one standard deviation of *Score-enforcing contracts*, and zero otherwise. Thus, countries having an indicator of one in this variable rank high for enforcing contracts, reflecting a good quality of domestic institutions.

Summary Statistics

The summary statistics for the dataset I constructed as described above are displayed in Table 3. This represents all FDI inward positions from 2009 to 2015 with "non-rich" economies as destination countries. The 139,216 observations represent 19,888 undirected country pairs through the seven years in the sample.

2.5 Empirical Framework and Estimation Method

I use a gravity equation to investigate the reputational shock of ISDS and the commitment device effect of BITs, on FDI positions and flows in developing economies. As proposed Baier and Bergstrand (2007), I include fixed effects for country of origin-year, country of destination-year, and country pair. The first two types of fixed effects account for time-varying GDPs and multilateral price terms. The third type controls for unobservable time-invariant characteristics between the country pair.

The authors use this approach to estimate the effects of Economic Integration Agreements and prove that, given that its determinants are slow-moving, estimations through gravity equations could use panel techniques and data to avoid endogeneity bias and find the correct Average Treatment Effects (ATE). I argue that the same is true for BITs and this estimation strategy is also useful in my specification.

I use a double interaction between the country pair having a case and BIT to capture my main hypothesis that both mechanisms have simultaneous effects. I obtain the effect of cases (treatment) on country pairs with BITs (treated), in a similar way as Baier et al. (2018) introduce interaction terms to estimate Average Treatment Effects on the Treated (ATT) differentiating treatments and types of treated countries.

I follow the Santos Silva and Tanreyro (2006) approach to estimate gravity equations and other multiplicative models. The authors claim that when these models are log-linearized and estimated by OLS, the parameters are biased estimations of elasticities in the presence of heteroskedasticity. This is an implication of Jensen's inequality that states $E[ln(y)] \neq ln[E(y)]$. To overcome this, they suggest estimating the models in their multiplicative form using a Poisson pseudo-maximum-likelihood (PPML) estimation method.

PPML addresses the issue of heteroskedasticity and the presence of 0 values in the dependent variable, which is very common in FDI data. With this specification, the data does not need to be Poisson. The only requirement for the consistency of the estimator is that the mean is correctly specified: $E[y_i/x] = exp(x_i\beta)$. Still, inference must be performed based on

robust standard errors since the estimator does not account for all heteroskedasticity.

In addition, Fally (2015) finds that estimating gravity equations using the PPML estimator with fixed effects is consistent with the introduction of the "multilateral resistance" terms proposed by Anderson and Wincoop (2003).

Benchmark model: Reputation and Commitment

I use a PPML estimation method with high dimensional fixed effects (Correia et al. (2019)). This specification only allows for non-negative numbers on the left-hand side, therefore negative inward positions (liabilities) are not included. The gravity equation to be estimated corresponds to the following econometric specification:

$$FDI_{do,t} = exp[\beta_1 BIT_{do,t} CASE_{do,t-n} + \beta_2 BIT_{do,t} + \beta_3 CASE_{do,t-n} + \gamma_{dt} + \delta_{ot} + \alpha_{do}]\varepsilon_{od,t}. \tag{2}$$

Where $FDI_{do,t}$ represents the bilateral FDI inward position or flow (in current million dollars) into destination country d from origin country o in year t; $BIT_{do,t}$ equals to 1 all the years there is a BIT in force between the country-pair and zero otherwise; $CASE_{do,t-n}$ equals to 1 if there is a case between the country pair in the previous n years (n=1, 2) and zero otherwise; γ_{dt} is country of destination-year fixed effect; δ_{ot} is country of origin-year fixed effect; α_{do} is the country pair fixed effect; and $\varepsilon_{od,t}$ is the error term. The economic motivation for including one and two-year lags is that the potential effects of a reputational shock are less likely to materialize immediately.

Losing a Case

The assumption of an ISDS case revealing the destination country's institutional characteristics relies on the fact that cases are resolved by an independent panel that analyzes the dispute impartially. If this panel finds that the investor was correct in its claim, meaning that the country loses the dispute, it should have a stronger negative shock to the country's reputation, as found by Allee and Peinhardt (2011). Thus, negative results from cases

have information that, when revealed to the market, may deteriorate a country's reputation beyond just having a case.

I test for this by including the indicator *Lost* as a third interaction into the benchmark model of equation 2. This variable equals 1 if the investor wins the dispute and zero otherwise.

I estimate the following equation.

$$FDI_{do,t} = exp[\beta_1 BIT_{do,t} CASE_{do,t-1} Lost_{d,t-1} + \beta_2 BIT_{do,t} + \beta_3 CASE_{do,t-1} + \beta_4 Lost_{d,t-1} + \gamma_{dt} + \delta_{ot} + \alpha_{do}]\varepsilon_{od,t}. \quad (3)$$

Domestic Institutions Complementarity

A complementarity with domestic institutions implies that BITs successfully attract foreign investors to poorer countries when interacting with good-quality domestic regulations. Both types of institutions interact, and the international commitment device does not substitute poor quality in local laws (Tobin and Rose-Ackerman (2011)).

I extend my benchmark model to test this hypothesis. I modify equation 2 to introduce a triple interaction with a variable that reflects the quality of the domestic regulations for investors. The indicator *Domestic* equals 1 if the country of destination ranks above the sample mean plus one standard deviation in its score for enforcing contracts as measured by the indicators collected by the World Bank, and zero otherwise.

$$FDI_{do,t} = exp[\beta_1 BIT_{do,t} CASE_{do,t-1} Domestic_{d,t} + \beta_2 BIT_{do,t} + \beta_3 CASE_{do,t-1} + \beta_4 Domestic_{d,t} + \gamma_{dt} + \delta_{ot} + \alpha_{do}]\varepsilon_{od,t}. \quad (4)$$

2.6 Results and Discussion: Commitment and Reputation

In this section, I present and discuss my results, estimated as described in Section **??**. First for my benchmark model, then for losing a case, and finally for the complementarity of international and domestic institutions. The estimated coefficients can be converted into semi-elasticities by computing $(e^{\hat{\beta}_i} - 1)$*100. I apply this conversion to the coefficients that are statistically different from zero and then evaluate them at the mean FDI of the sample to obtain the economic impact.

Commitment Devices Compensate Reputational Shocks

I test my hypothesis of the presence of two opposed effects in ISDS and BITs: a negative reputational shock after a dispute, and a positive effect given by the commitment device that is the international agreement. Table 4 shows the estimated coefficients for my benchmark model in Panel A, and the overall effects and economic interpretation in Panel B.

The reputational shock is captured by *Country pair has a case*, a dummy variable that equals to one all the years after there is an ISDS case between a country pair. The variable is lagged by one and two years after the dispute. The variable *BIT* captures the commitment device. It equals one if a bilateral investment treaty is in force between the country pair and zero otherwise. The interaction between the two variables and the individual effects capture the overall effect.

Columns 1 and 2 display the estimation results for FDI flows. The first one includes the case variable lagged one period, and in the second it is lagged two years. Similarly, columns 3 and 4 show results for FDI positions between the country pair, after one and two years of having a case respectively.

In column 1 of Panel A, the coefficient on the BIT indicator is not statistically significant. The coefficient of the existence of a case between the country pair in the previous year is negative and statistically significant at 10% level, with a point estimate of -1.180. The semi-elasticity for this reputational effect is -69%, which evaluated at the sample mean represents a 21 million dollar negative impact in FDI inflows. The estimated coefficient for the interaction

of the two variables is 1.435 and statistically significant at the 5% level. The semi-elasticity is 320% meaning a positive economic effect of USD 95 million.

In Panel B, I present the overall effects by adding the three coefficients. The total coefficient is 0.255, which converts into a semi-elasticity of 29%. This means that the negative effect of the reputational shock gets more than compensated by the commitment device effect of the bilateral investment treaty. Evaluated at the sample mean of USD 30 million, it represents an increase of 9 million dollars in FDI flows one year after having an ISDS case.

It is important to notice that because this is an exponential model, the sum of the effects of each coefficient considered separately does not equal the effect of the coefficients considered together. In my framework, the overall effect is the most important since it captures the interaction between the commitment device and the reputational shock.

In column 2 of Panel A, the coefficient for BIT is positive and statistically significant at the 10% level, with a point estimate of 1.141. This is a semi-elasticity of 213%, with an economic impact of 63 million dollars in FDI inflows. The coefficient for the country-pair having an ISDS case two years prior is -2.320, significant at the 5% level. This semi-elasticity of -90% is equivalent to a negative economic shock of 27 million dollars, slightly larger than the one-year lag. The interaction of these two variables estimates a coefficient of 2.010 with a significance level of 10%. As in the previous column, the interaction is also positive showing that the existence of a BIT compensates for the negative effect of the case.

The average treatment effects on the treated reflected in Panel B show an overall coefficient of 0.831. This equals a semi-elasticity of 130% and a positive economic impact of 39 million dollars on FDI flows two years after the existence of a case between the country of destination and a firm from the country of origin.

In column 3 of Panel A, we see no statistically significant effects for the BIT variable. The case variable lagged one year yields a point estimate of -0.498 with a 10% statistical significance, this represents a -39% effect on FDI positions, equivalent to a 65 million dollars loss one year after the case. Meanwhile, the interaction coefficient is 0.536, also statistically

significant at the 10% level. This semi-elasticity of 71% represents a positive effect of 117 million dollars. These estimations show less statistical power than flows since they are significant at the 10% level.

The overall effects in Panel B show the sum of coefficients is 0.038, which represents a semi-elasticity of 4%, and an economic impact of 6 million dollars, evaluated at the sample mean for FDI positions of 165.65 million dollars.

Finally, column 4 in Panel A shows the coefficient for the BIT variable is not statistically different from zero. For the case variable lagged two years, the point estimate is -0.490, with a statistical significance of 10%. The semi-elasticity of -39% represents an economic loss of 64 million dollars in bilateral FDI positions two years after the country has a case. The coefficient for the interaction of the two variables is 0.749, which is a 111% semi-elasticity and 185 million dollar impact.

In column 4 of Panel B, the overall effects for positions two years after a case show a coefficient of 0.259, a 30% semi-elasticity, and an economic impact of USD 49 million.

In sum, the sole existence of a BIT might have a positive impact on FDI flows but not on positions in destination developing economies. Having a case between the country pair shows a negative effect on flows and positions, which is larger for flows as they are more vulnerable to changes in the economic environment. The largest effects occur on FDI inflows two years after having a case. This suggests a reputational shock on developing economies that face an international dispute with a foreign firm that takes time to materialize. However, the interaction term and the sum of all the effects are positive in all specifications, reflecting that an international commitment device such as a bilateral investment treaty compensates for the negative reputational effect of an international dispute.

These results might also reflect that investors trust the system and that ISDS is positive for them, as reflected in the survey by Queen Mary University of London (2020). Even though a case might signal a bad reputation for the country of destination (as the estimated coefficients show), the overall protection given by the international regulation system seems

to be satisfactory for investors' decisions.

Negative Effects of Losing the Case

I estimate equation 3 to study if the negative reputational effect of an ISDS dispute does not come from the mere fact of having a case but rather from losing it. To facilitate the economic interpretation of the estimations, in Panel A of Table 5, I present the average treatment effects on the treated with the overall impact and leave the full set of estimations in Table A1 in the Appendix.

In Panel A, column 1 of Table 5, we see the effects for FDI flows one year after the country pair has a case. The sum of all the statistically significant coefficients is 2.055, which translates into a semi-elasticity of 681%. This represents an economic impact of 203 million dollars. So in this specification, we see an economic effect that is even larger than the USD 9 million from the benchmark model.

In column 2, the overall effects are negative, The sum of coefficients is -0.423, representing a semi-elasticity of -34%, and an economic loss of 10 million dollars. We see that reputational effects negatively affect FDI inflows in a developing economy one year after losing an international investment dispute with a foreign investor.

Column 3 shows the results for FDi positions one year after the country-pair has a case. Here we also see negative effects with the sum of the coefficients being -0.503, a semi-elasticity of -40%, and an economic loss of 65 million dollars. This result could represent disinvesting from the company's country of origin into the destination-developing economy as a result of the investor winning the international dispute.

Finally, column 4 reflects the overall results on FDI positions two years after the country-pair faces an international dispute. The coefficients sum to 0.250, which represents a semi-elasticity of 28%, and an economic impact of 47 million dollars. These results are similar to the same specification in the benchmark model, reflecting that after two years the reputational effect of having a case is the same as losing it.

In sum, I find evidence of a negative reputational effect on FDI inflows in a developing

economy two years after losing a case, and on FDI positions after one year. When considering the estimations for each variable in Table A1, the sole fact of an investor winning a case does not provide enough information for a reputational effect. The interaction of the whole set of variables, that represent different institutional devices, provides a clearer picture of the developing economy of a destination's reputation for investors.

Domestic Institutions Complement International Devices

I estimate equation 4 to study if there is a complementarity effect between bilateral investment treaties and the quality of domestic institutions. In Panel B of Table 5, I present the average treatment effects on the treated with the overall impact and the full set of estimations in Table A2 in the Appendix.

In Panel B, column 1 of Table 5, we see the effects for FDI flows one year after the country pair has a case. The sum of all the statistically significant coefficients is 0.234, which converts into a semi-elasticity of 26%. This represents an economic impact of 8 million dollars, similar to the USD 9 million from the benchmark model.

In column 2, I show the results for FDI flows two years after the country pair has a case. The overall effects are negative, with the sum of coefficients being -2.338, representing a semi-elasticity of -90%, and an economic loss of 27 million dollars. Two years after having a case, its interaction with the quality of domestic institutions reflects a negative reputational effect, similar to what I find when the destination country loses the case but in a larger magnitude.

Moving into the impact on bilateral FDI positions, column 3 shows negative effects one year after having a case. The sum of all non-statistically zero coefficients is -0.729, with a semi-elasticity of -52%, and an economic loss of USD 86 million. These results are also the same in sign but larger in magnitude than those I find for losing a case.

Finally, column 4 reflects the results on FDI positions two years after having a case. In this specification, the results are positive, as in the analysis for losing a case. The total coefficient is 0.453, with a semi-elasticity of 57%, and an economic impact of 95 million

dollars.

Overall, the interaction of international and domestic institutions provides a similar negative result to the investor winning the dispute. Except for the impact on flows one year after the case, domestic institutions' quality parallels the reputational shock of losing a case providing an effect of the same sign but larger magnitude.

2.7 Heterogeneous Effects & Robustness Checks

In this section, I estimate the benchmark model in two different subsamples. First, I remove "high-frequency" countries to estimate heterogeneous effects. Then, I remove China from the sample as a robustness check.

Heterogeneous Effects - "Low Frequency" Countries

It might be that a country that has a history of international disputes is impacted differently by having a new case than a country that is rarely involved in them.

I have data on cases since 1987 that provide information on the history of international disputes for the countries in the sample before the period covered by the FDI data. Using this, I classify countries as "high frequency" if they have more cases than the sample average (9 cases), and "low frequency" otherwise.

The "high frequency" developing economies are Argentina, Czech Republic, Ecuador, Egypt, Kazakhstan, Mexico, Ukraine, and Venezuela. I estimate the benchmark model from equation 2 without them in the sample, thus only for the "low frequency" countries. The estimation results are in Table A3. In Panel A of Table 6, I present the average treatment effects on the treated with the overall impact for this subsample.

In column 1, we see the coefficients for FDI flows one year after the country pair has a case. The sum of all the statistically significant coefficients is 1.724, representing a semi-elasticity of 461%. This implies an economic impact of 137 million dollars, significantly larger than the benchmark model effect of 9 million dollars.

In column 2, the effects for FDI flows two years after the country pair has a case are similar to the one-year lag. The sum of coefficients is 1.687, representing a semi-elasticity of 440%, and an economic effect of 131 million dollars. These results are also significantly larger than the benchmark model effect of 39 million dollars. Thus, when considering flows, countries in the "low-frequency" subsample receive larger FDI inflows than the overall sample one and two years after having a case.

In column 3, the impact on bilateral FDI positions one year after a case shows no statis-

tically significant effects. In this specification, countries on the "low-frequency" subsample are not impacted either positively by the presence of a BIT or negatively due to a case.

Finally, column 4 presents the results on FDI positions two years after having a case. The total coefficient is 0.274, with a semi-elasticity of 32%, and an economic impact of 52 million dollars. These results are slightly larger than the 49 million dollars from the benchmark model. This suggests that for the more stable specification of FDI positions two years after a case, the effects for the "low-frequency" and "high-frequency" countries are similar.

These results show that when we leave countries with a large history of international disputes out of the analysis, the ISDS mechanism does not operate as a negative reputational shock.

Robustness Check - Sample without China

A relevant characteristic of the FDI data is its skewness. This reflects that a few countries receive most of the investment, in my sample, this is the case of China.

If I remove China from the sample, the mean of positive FDI bilateral positions drops from 166 to 108 million dollars. More impressively, the maximum value for FDI positions is 17% the maximum when including China. Thus, it might be the case that the extraordinary level of investment received by this country is driving the main results.

As a robustness check, I repeat the estimations from the benchmark model in equation 2 removing China from the sample. The results for all estimations are in Table A4. In Panel B of Table 6, I present the average treatment effects on the treated with the overall impacts.

Column 1 in Panel B displays the effects on FDI flows one year after a case for the benchmark model estimations in the sample without China. The total coefficient sum of 0.497 converts into a semi-elasticity of 64%, with an economic impact of 19 million dollars. These results are larger than the overall sample, 9 million dollars, though the magnitude is not as large as in Panel A for the "low-frequency" countries.

Meanwhile, I do not find statistically significant effects for this subsample in FDI flows two years after the case.

Moving to positions one year after a case, in column 2, I find negative effects. The sum of the statistically significant coefficients is -0.458. This represents a semi-elasticity of -37%, an economic impact of -11 million dollars. This is a change from the benchmark model where the result for this specification is 6 million dollars. It is of the same sign, though smaller in magnitude, than the extensions of the model presented in Table 5. Hence, it might be the case that a large positive China effect is preventing the results of the benchmark model from being negative. This suggests that overall, the effects on FDI positions one year after the dispute are negative, with varying magnitude.

Finally, the results for FDI positions two years after facing a dispute are in column 4. The positive effects have an overall coefficient of 0.120, which implies a semi-elasticity of 13% and an economic valuation of 21 million dollars. These effects are smaller than the benchmark effects of 49 million dollars and are aligned with the overall stability of the results for this specification.

2.8 Summary and Concluding Remarks

Developing economies aim to attract foreign direct investment to overcome their lack of local domestic capital and promote growth. Institutional barriers that prevent an efficient international capital allocation are a vast and ever-growing interest in the literature.

In this paper, I approach this topic using Investor-State Dispute Settlement (ISDS), an institutional arrangement present in bilateral investment treaties (BITs), as a mechanism that reveals a developing economy reputation towards foreign direct investment. I focus on developing economies since they are expected to be more beneficiated by these international commitments devices that signal a stable institutional environment for foreign investors.

ISDS is expected to be an impartial international committee providing an objective decision about a dispute between a country and a foreign direct investor, thus operating as a mechanism where institutional quality is revealed. If this is true, having a case would imply a negative reputational shock that dampens future FDI in the developing economy of the destination. On the other hand, BITs work as a commitment device and should have a positive effect on attracting FDI. Since most of the time, these two institutional arrangements go hand in hand, their overall effect must be captured together. That is the main argument of this paper.

Findings in my benchmark model suggest that the overall effects of these international arrangements are positive and increase FDI flows and positions in developing economies. There is variation in magnitudes, which are larger two years after a case, particularly for positions.

When considering the composition of these overall positive effects, I find a negative reputational shock of 21 and 27 million dollars in FDI inflows one and two years after the case respectively. This is more than compensated by the positive effect of the interaction between a BIT and a case of 95 and 192 million dollars for each specification. Similarly, the negative effect of a case in FDI positions is about 65 million dollars while the interaction effect is 117 million dollars with a year lag and 185 with a two-year lag.

The first extension to the model includes the effects of losing the case. These results show a puzzling positive effect the first year after a case with an increase in FDI flow of 203 million dollars, the largest of all estimations. Nevertheless, in line with previous findings in the literature, I find a negative economic impact when I consider FDI flows two years after the case, and FDI positions one year later. With a two-year lag, FDI bilateral positions are again positive and of similar magnitude to those in the benchmark model.

The interaction of international and domestic institutions shows an effect similar to losing a case, but different in magnitude. The main difference is the estimation of FDI inflows one year after a case, which in this case is similar to the benchmark model. This extension yields the largest effect for FDI positions two years after a case. The complementarity effect is thus more relevant in this specification, which is positive in all models.

The analysis of heterogeneous effects shows positive economic impacts in FDI flows and positions larger for the subsample of countries that do not have a history of international disputes than for the whole sample. Furthermore, I do not find negative effects in any of the specifications, though my estimations for positions with a one-year lag are not statistically significant. This suggests there is no reputational shock for countries that do not have a large history of international arbitration with firms. Hence, dispute history matters for investors, as captured in the investor survey on the perception of ISDS mentioned before.

As a robustness check, I estimate the benchmark model removing China as an economy of destination, since it is the largest FDI recipient in the sample. Similar to the benchmark model, the effects on flow one year after a case is positive, though larger in magnitude. I do not find statistically significant effects for inflows in the two-year lag specification. The negative effects in positions one year after the case for this subsample, as well as for the model extensions, suggest the reason estimations for the benchmark model are positive is a large positive China effect. Finally, the results for positions two years after the case are positive, though smaller than in all previous estimations.

When considering the composition of these general effects, the individual coefficient for

BIT only yields statistically significant results in some of the specifications. Thus, I do not find strong evidence that a bilateral investment treaty by itself attracts FDI in developing economies. The case coefficient is negative and statistically significant in all specifications except for the “low-frequency" subsample. This reflects the reputational cost of facing an international dispute, mostly driven by countries with a large history of cases.

Meanwhile, the joint effect of having a case and a BIT is positive, suggesting that both mechanisms grant investors a reliable institutional environment in developing economies. Thus, the existence of a bilateral dispute does not always translate into a larger institutional distance between the two countries involved. On the contrary, the mechanisms at work might be positively received by the investors.

In sum, the negative reputational effect associated with an ISDS case is larger than the commitment device effect of a BIT for FDI inflows two years after the developing economy of the destination loses the case and when it interacts with the quality of the domestic institutions. For FDI positions, this negative effect occurs one year after the case in all but the benchmark model. These results are mostly driven by countries with a large history of international disputes showing that the mere presence of a case does not provide a bad reputation but rather a large track of them. In all models, the negative results disappear two years after the dispute when considering the more stable measure of FDI bilateral positions.

This topic is part of a wide area of research that interacts with academic fields outside of economics, making it very rich. Further research should try to incorporate another set of costs that ISDS has for countries. In particular, I do not consider the cost of awards, which have been increasing later making a case by legal authors against “crippling compensations". Similarly, I do not include the “regulatory chill" effects by which some governments stop implementing domestic regulations to prevent disputes.

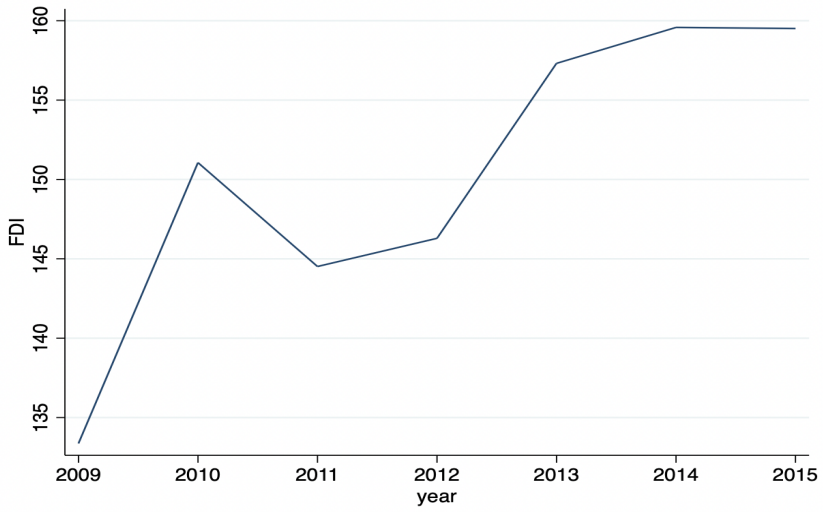
The results from this paper could inform the current efforts to reform ISDS that are taking place at UNCITRAL and help develop a mechanism that is useful for firms and states.

Table 1. Distribution of Cases Registered in 2019 by Region

Region	Percentage
East Europe & Central Asia	25
South America	21
Middle East & North Africa	17
Sub-Saharan Africa	11
Western Europe	10
Central America & the Caribbean	8
South & East Asia & the Pacific	6
North America	2

Source: 2019 ICSID Annual Report

Figure 1. FDI inward positions, average by year (USD millions)



NOTE: This figure plots the average by year of FDI inward positions in the sample for 2009-2015.

Table 2. Top 10 developing economies with more BITs in force (2015)

Country	Number of BITs
China	140
Egypt	114
Romania	88
Turkey	86
India	78
Ukraine	74
Bulgaria	72
Malaysia	71
Indonesia	66
Belarus	66

NOTE: This table shows the number of BITs in force for the 10 developing economies in the sample with more BITs in 2015.

Table 3. Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
FDI bilateral inward position*	60,339	165.65	4,154	0	390,522
FDI inflow*	40,330	29.77	469.67	0	55,774
BIT in force	139,216	0.15	0.36	0	1
Case	139,216	0.00	0.03	0	1
Investor	139,216	0.00	0.02	0	1
Domestic	139,216	0.34	0.48	0	1

NOTE: *Current million dollars This table shows the number of observations, mean, standard deviation, maximum, and minimum values for all the variables used in the estimation. The period covered is from 2009 to 2015. Countries included are those not classified by the World Bank as “high income" in 2009.

Table 4. Reputational Shocks and Commitment Devices

Panel A: Estimation of coefficients (PPML)				
	(1)	(2)	(3)	(4)
	FDI flow	FDI flow	FDI position	FDI position
BIT	1.108	1.141*	-0.383	-0.382
	(0.689)	(0.673)	(0.261)	(0.256)
Country pair has a case (t-1)	-1.180*		-0.498*	
	(0.645)		(0.266)	
BIT× Country pair has a case (t-1)	1.435**		0.536*	
	(0.724)		(0.315)	
Country pair has a case (t-2)		-2.320**		-0.490*
		(0.990)		(0.191)
BIT × Country pair has a case (t-2)		2.010*		0.749*
		(1.026)		(0.306)
Observations	10786	10786	20704	20704
Pseudo R-squared	0.965	0.965	0.991	0.991
All models include: Constant, country of origin-year FE, country of destination-year FE, and country pair FE.				
Panel B: Average Treatment Effects on the Treated				
Sum of significant coefficients	0.255	0.831	0.038	0.259
Semi-elasticities (%)	29	130	4	30
Economic impact (million USD)	9	39	6	49

NOTE: Panel A of this table shows the results of the PPML estimations based on equation 2. The dependent variable in the first two columns is the FDI flow in the developing economy of the destination from the economy of origin. In columns 3 and 4 the dependent variable is FDI positions. In columns 1 and 3, *Country pair has a case (t-1)* equals to one all the years after the economy of destination faces an ISDS case from a firm from the country of origin, lagged one year. In columns 2 and 4, *Country pair has a case (t-2)* considers two lagged years. *BIT* equals one if a BIT is in force between the country pair and zero otherwise. Standard errors (clustered by country pair) are in parentheses. *, **, *** represent statistical significance at the 10%, 5% and 1% level, respectively. Panel B shows the Average Treatment Effects on the Treated (ATT). It includes the sum of the estimated PPML coefficients statistically different from zero in Panel A and its conversion into semi-elasticities computed as $(e^{\hat{\beta}_i} - 1)$*100. The economic impact is evaluated at the sample mean FDI flows (USD 29.77 million) or positions (USD 165.65 million).

Table 5. Extensions: Losing a Case & Domestic Institutions

Average Treatment Effect on the Treated	(1) FDI flow (case t-1)	(2) FDI flow (case t-2)	(3) FDI position (case t-1)	(4) FDI position (case t-2)
Panel A: **Effects of Losing a Case**				
Sum of Coefficients	2.055	-0.423	-0.503	0.250
Semi Elasticities (%)	681	-34	-40	28
Economic Impact (million USD)	*203*	*-10*	*-65*	*47*
Panel B: **Domestic Institutions Complementarity**				
Sum of Coefficients	0.234	-2.338	-0.729	0.453
Semi Elasticities (%)	26	-90	-52	57
Economic Impact (million USD)	*8*	*-27*	*-86*	*95*
Benchmark Economic Impact	*9*	*39*	*6*	*49*

NOTE: This table shows the Average Treatment Effects on the Treated (ATT) for the estimations of equation 3 in Panel A, and equation 4 in Panel B. Estimation results are displayed in Table A1 and Table A2 respectively. It includes the sum of the estimated PPML coefficients statistically different from zero and its conversion into semi-elasticities computed as $(e^{\hat{\beta}_i} - 1)$*100. The economic impact is evaluated at the sample mean of FDI flows (USD 29.77 million) or positions (USD 165.65 million).

Table 6. "Low Frequency" Countries & Sample without China

Average Treatment Effect on the Treated	(1) FDI flow (case t-1)	(2) FDI flow (case t-2)	(3) FDI position (case t-1)	(4) FDI position (case t-2)
Panel A: **"Low Frequency" Countries**				
Sum of Coefficients	1.724	1.687		0.274
Semi Elasticities (%)	461	440		32
Economic Impact (million USD)	*137*	*131*	*0*	*52*
Panel B: **Sample without China**				
Sum of Coefficients	0.497		-0.458	0.120
Semi Elasticities (%)	64		-37	13
Economic Impact (million USD)	*19*	*0*	*-11*	*21*
Benchmark Economic Impact	*9*	*39*	*6*	*49*

NOTE: This table shows the Average Treatment Effects on the Treated (ATT) for the estimations of equation 2. In Panel A the estimation sample only includes countries with less than nine cases ("Low Frequency"), and in Panel B the estimations are for the sample without China. Estimation results are displayed in Table A3 and Table A4 respectively. It includes the sum of the estimated PPML coefficients statistically different from zero and its conversion into semi-elasticities computed as $(e^{\hat{\beta}_i} - 1)$*100. The economic impact is evaluated at the sample mean of FDI flows (USD 29.77 million) or positions (USD 165.65 million).

CHAPTER 3.
EFFECTS OF TRADE BARRIERS ON FOREIGN DIRECT INVESTMENT: EVIDENCE FROM CHINESE SOLAR PANELS

3.1 Introduction

A return to protectionism involving large economies, important increases in tariffs, and retaliations in a wide range of economic sectors has taken place since 2018 (Fajgelbaum et al. (2020)). On top of that, industrial policy is back on the scene (Aiginger and Rodrik (2020)). Many of the industrial policies implemented by developed nations are in the form of non-tariff barriers, which require granular evidence and a deep institutional context to have an adequate measurement of their effects (Lane (2020)). This paper uses a US protectionist policy on solar panels from China in 2012 to examine the effects of trade barriers in the short and medium term.

The United States put a 30% tariff rate on solar panels and washing machines in early 2018, propelling the beginning of what has been labeled the "Trade War" with China. Yet, this was not the first time the US solar panel industry received protection from its Chinese competitors. In 2012, the US imposed anti-dumping and countervailing duties (AD-CVDs) against the import of Chinese solar cells and modules (panels) in what is now known as one of the largest remedy cases in the US and the first one involving the renewable energy sector. This policy achieved its expected immediate result of decreasing US imports of solar cells from China. However, it also motivated different strategies by targeted Chinese multinationals in the solar panel industry that had consequences in the global allocation of resources.

In this paper, I document this previous US experience implementing non-tariff barriers in a strategic economic sector. I examine how these measures impact Foreign Direct Investment (FDI) decisions by multinational firms in a context where a nationalist industrial policy clashes with international climate change commitments. Specifically, I study how the AD-CVDs imposed by the US modified FDI decisions by targeted Chinese firms and test for the

economic motives explaining the firms' reactions that I document.

AD-CVDs are frequently used forms of administered protection. The Anti-Dumping Agreement (Agreement on Implementation of Article VI of the GATT 1994), defines dumping as "the introduction of a product into the commerce of another country at less than its normal value" (World Trade Organization). Meanwhile, the Agreement on Subsidies and Countervailing Measures allows countries to launch their investigation and charge an extra duty (countervailing duty) if they find that subsidized imports are hurting domestic producers (World Trade Organization).[6] Both mechanisms aim at a particular product from a specific exporter. This characteristic makes them a "leaky form of protection" (Irwin (2019)), and creates an interesting setting to analyze differential effects on firms. Most of the literature focuses on the effect of these types of barriers on trade flows. Less is known about their impact on FDI decisions at the firm level.

I fill this gap by examining how AD-CVDs affect foreign direct investment announcements by Chinese firms in the solar panel industry. I exploit the fact that the policy targets companies in the same industry with two different rates to develop a difference-in-differences design. This design has specific characteristics due to China being a non-market economy for the US anti-dumping law. The legal framework assumes that all Chinese firms are under government control unless proven otherwise. Firms that show their independence are granted a specific anti-dumping duty rate. All others in the industry are assigned a general rate (PRC-wide) greater than the specific rate. My analysis of export activity by the two groups of firms shows that those granted a specific rate are the larger exporters and hence have more presence in the US domestic market. Thus, the different AD-CVD rates reflect the differential exposure to the US trade policy, with firms receiving the specific - lower - rate being the most exposed. I leverage this variation given by the policy's discriminatory nature to compare the changes in foreign direct investment decisions before and after the policy by targeted firms, granted a specific rate, relative to the non-targeted group, assigned

[6]See more information for AD and CVD.

the PRC-wide rate.

Motivated by the fact that there is a large presence of zeros in the left-hand-side variable, I use a Poisson Pseudo-Maximum Likelihood method (PPML) to estimate a multiplicative model of FDI. I examine greenfield investment amounts using monthly firm-level data on FDI announcements from 2009 to 2015, considering three years before and after the policy change. I also evaluate if the policy affects the number of projects by firms that make more than one announcement per year. Since FDI can represent both greenfield and brownfield investments, I use data on mergers and acquisitions to estimate the effects of the policy on the probability of completing a cross-border M&A deal.

I then devise various tests for evaluating several theoretical predictions regarding multinational firms' location choices for foreign direct investment. These include tariff-jumping, horizontal, vertical, and export platform FDI. Although not mutually exclusive, each hypothesis suggests different location and industry choices for foreign investments. I use logit and linear probability models (LPM) to test for these motivations by estimating if the likelihood of investing in different regions changes by year as a reaction to the 2012 US policy. I use LPM to estimate the impact of industry activities on location choices to find evidence for production fragmentation. To understand if this behavior is specific to targeted firms, I fit a model of location choice using conditional logit.

Tariff-jumping FDI is described by Blonigen (2002) as multinational firms locating a manufacturing plant in the country that imposes a trade barrier to provide to the domestic market. I test this by estimating the probability of investing in the US by targeted Chinese firms in this industry. The literature defines horizontal FDI as investments in production facilities to serve the consumers in the foreign market. This is efficient for a multinational firm when the cost of installing and operating a new facility is lower than the trade costs (Helpman et al. (2004)). I test this hypothesis for Europe assuming it could represent a substitute market for the US. Meanwhile, vertical FDI involves cross-country production fragmentation and is driven by differential factor prices between the home and the host country. The affiliate

abroad assumes part of the production process and sells to the final market, instead of the parent company. I test for this motivation by estimating the probability of investing in Asia and the impact that different industry activities have in deciding to locate in this region. Finally, export-platform FDI is a decision that depends on the differential costs of exporting and establishing a plant in the desired market. In the context of this paper, exporting costs include the trade barrier. I also test this motivation to the location choice in Asia and use a descriptive analysis of FDI and trade data to find support for this hypothesis.

My results show that targeted firms increase FDI by 145 million dollars in 2012, the year the policy is implemented. This finding is statistically significant and economically relevant since the average FDI before the policy for this group is 9 million dollars per year. These results are robust to considering anticipation by the firms, and to including financial controls for a sub-sample of publicly traded firms. Following this initial reaction to the policy, there is a decrease in the number of projects in the next two years. Targeted firms that announce more than one project per year reduce their projects by 53% in 2013 and 2014. Since these estimations are for greenfield investments, I rely on a different dataset to determine if this result is also salient in the mergers and acquisitions (M&A) of the targeted firms. I find a negative and statistically significant result in 2012 for completed domestic and cross-border deals. This means that after the policy, targeted firms have a lower probability of completing an M&A deal than non-targeted firms, both in the Chinese domestic market and abroad.

I do not find evidence to support the tariff-jumping hypothesis, meaning there is no increase in FDI by targeted firms in the US. I also do not find support for horizontal FDI in Europe, on the contrary, I find that these firms decrease their investment in the region in 2015. I find evidence for vertical FDI in 2015 when targeted firms increase their investment in Asia. I then test if industry activities impact the probability of investing in that region, finding evidence of production fragmentation. Finally, a descriptive analysis of the data shows that Asian countries that receive FDI after the policy end up becoming exporters of solar cells to the US in the medium run, showing initial support for the export-platform

hypothesis.

Since these firms produce solar cells and modules, whether assembled on solar panels or not, my results show how a change in bilateral trade policy can reshape multinational production. This can be motivated by multinational firms' need for efficiency gains after facing a negative external shock, as well as exporting to the desired final market from a different country. Overall, my results document FDI diversion that modifies investment patterns in the short run and eludes the trade barriers in the medium run, weakening the intended effects of the protectionist policy.

My paper contributes to the literature on the response of multinational firms to changes in bilateral trade conditions, specifically anti-dumping duties. I differentiate from previous work that documents trade diversion in that my focus is on FDI. Flaaen et al. (2020) use ADDs against South Korea, Mexico, and China to estimate the price effect of US import restrictions on washing machines. Using country-level trade flows and firm-level import data, the authors find small changes in US prices explained by firms' production relocation strategies. They also show that the "country-hopping" behavior of the affected firms prevented the ADDs' objective of reducing imports. I depart from their approach in that I use an empirical strategy to test changes in FDI decisions at the firm level as a response to AD-CVDs and document large and significant increases in greenfield FDI by targeted firms, confirming there is an important investment diversion.

Other work in this literature also focuses on the effects of temporary trade barriers implemented by the US. A study of US ADDs on Chinese imports by Bown et al. (2022) uses an instrumental variable approach to show the effects on supply chains. They find that this protection decreases imports and raises prices in targeted industries, harming domestic jobs due to the increasing costs for downstream producers. Bown and Crowley (2007) show that the US imposition of anti-dumping duties against Japan creates trade deflection, increasing Japanese exports of the same product to a third country. In contrast, the imposition of these measures against a third country depresses trade, decreasing Japanese exports of that

product to a third country. Meanwhile, Bown and Crowley (2010) find that using the China safeguardby the US and the EU did not result in growing Chinese exports to third markets. Blonigen and Prusa (2015) provide a review of the effects of dumping and anti-dumping literature and find that trade diversion is the most common unintended effect of ADDs. A previous paper analyzing the effects of ADD on FDI is by Blonigen (2002). His results suggest that only multinational firms from industrialized countries can afford to engage in tariff-jumping FDI.

This paper speaks to the growing literature on empirical analysis of industrial policy by analyzing the effects of a temporary trade barrier whose main objective is to protect a domestic industry from import competition. Lashkaripour and Lugovskyy (2023) discusses the efficacy of trade and industrial policy in distorted open economies and finds that welfare increases only when they are implemented with international coordination. Identifying the causal effects of these policies is challenging given that, by design, the intervention is non-random and its targets are defined by political economy reasons (Juhász et al. (2023)). My research design carefully addresses these concerns and provides causal estimates with deep institutional background.

My findings add to the studies of FDI location choice by multinational firms. In this case, as a consequence of trade barriers, examining which hypotheses hold for the location choice decision of firms affected by the imposition of protectionist policies. As defined in Tintelnot (2017), firms with export-platform affiliates face fixed costs of foreign investment. My empirical results show that the increase in trade costs and the loss of a relevant market can compensate for the restriction of the high costs of establishing a foreign affiliate. By including cross-border M&A I provide a comprehensive approach to FDI and how multinational firms decide to serve a foreign market. This is highlighted by Nocke and Yeaple (2007) who show that cross-border M&A is done by the most efficient firms in industries where the source of firm heterogeneity is their mobile capabilities, i.e. advertising. This is not the case in industries where firms differ mostly in non-mobile capabilities, which aligns with my results.

My paper also contributes to the growing empirical literature on US-China trade relations. By including non-tariff trade barriers, I show a broader picture of the US trade policy regarding China. As Bown (2021) describes, China has been a target for AD-CVDs from the US for a long time. Before the 2018 trade war, more than 7% of Chinese imports in the US were covered by AD-CVDs. Similar to Fajgelbaum et al. (2021), my findings show a global reallocation of resources and the creation of new investment patterns due to a US-China trade conflict. I provide an in-depth analysis of a strategic economic sector such as the renewable energy industry.

The structure of this chapter is the following: section 3.2 provides background on the Chinese solar panel sector and the 2012 imposition of solar trade barriers by the United States. Section 3.3 describes the data and provides the summary statistics. Section 3.4 presents the empirical framework. Section 3.5 details the results. Section 3.6 provides the robustness checks. Section 3.7 concludes.

3.2 Background: Chinese Solar Panels & the 2012 US Trade Barriers

In this section, I describe the photovoltaic value chain, the main characteristics of China's solar manufacturing industry, and the US imports of solar cells and modules during the period under analysis. I also provide an overview of the trade barriers enacted by the Obama Administration in 2012. I then argue that this setting presents several advantages for estimating the impact of trade barriers on FDI decisions by multinational firms.

The Photovoltaic Value Chain

Figure 2 shows the different stages of the Photovoltaic (PV) value chain. The primary raw material in the production process of solar panels is silica sand. This sand goes through a chemical process to obtain the high-purity silicon required for solar energy generation. The purified silicon is melted and formed into cylinders or bricks called ingots, which are then sliced into thin wafers. The process continues by adding metal conductors to the wafers' surface and creating the solar cell. Cells are soldered together and encapsulated in glass sheets to form a module. Combining the modules with equipment such as connectors and batteries constitutes a system.

The AD-CVDs under study apply to photovoltaic cells "whether or not assembled into modules." This implies that solar panels made by these cells are also subject to the duties.

Solar Panel Manufacturing in China

To contextualize the Chinese solar panel manufacturing industry in the period under analysis, Figure 3 shows the evolution of different performance indicators. The chart in the top left-hand side shows the evolution of revenue and total assets. This reflects an overall positive economic performance for the industry. The slump in 2012, after the protectionist measures in the US, is followed by a recovery that outperforms previous years. The chart in the top right-hand side presents the evolution of exports and domestic demand. The pre-policy growth in exports is impressive, as is the decline after 2012. There is a recovery after 2013 but values do not go back to previous levels during this period. This aligns with previous findings on how Chinese exporters respond to U.S. antidumping investigations that show

that AD investigations significantly decrease the total export volume (Lu et al. (2013)).

Domestic demand, however, grows rapidly in the post-policy period becoming more relevant than exports. This suggests a potential change in the companies' strategies regarding which markets they focus on after being hit by the US barriers. This is captured by some of the firms' quotes mentioned in Section and Appendix A2.

The two charts at the bottom reflect that the evolution in the number of employees (on the left), slightly decreases after the policy but recovers and continues its ascending path afterward. Similarly, the number of enterprises (on the right) has an overall positive slope that only decreases in 2012 but promptly recovers.

This description shows a few relevant characteristics of the Chinese solar panel industry for the context of this paper. There is an important growth, especially in the level of exports, in the years leading to the US protectionist measures. In 2012, the Chinese industry is negatively affected but it manages to recover very rapidly, reflecting different strategies, including the Chinese domestic market playing a new role.

US Imports of Solar Cells

To provide context to the policy and my findings, I show in Figure 4 the US imports of subject products during the period of analysis. The left-hand side chart shows the quantities in million units, while the right-hand side chart the customs value in billion dollars.

After reaching its highest point in 2011, imported quantities of solar cells in the US decreased and did not reach their previous levels. This shows the motivation for US firms to seek protection, the imported quantities in the domestic market had been rapidly growing. The number of imports from China decreased by 50% from 2011 to 2012, the year the duties were imposed. These quantities remained below half the 2011 peak for the rest of the period. This reflects that the imposition of the AD-CVDs had their intended effect of reducing the quantity of import competition from China.

The value of US imports of solar cells, on the other hand, increased by 260% between 2009 and 2015. Although there was a reduction from 2012 to 2013, values recovered and

surpassed previous levels by the end of the period. Since quantities decreased during this time, this suggests an overall increase in the prices of imports. When considering only those from China, values increased until 2011 and declined afterward. Hence, the rise in the overall prices was due to the imports that substituted Chinese cells.

The 2012 Solar Trade Barriers in the US

Figure 5 shows the timeline for the policy procedure. On October 19, 2011, SolarWorld Industries America (the petitioner) starts a petition for AD-CVDs on the import of crystalline silicon photovoltaic (CSPV) cells from China. Twenty days later, the US Department of Commerce (USDOC) initiated its investigations to determine the existence of dumping and subsidies (United States Department of Commerce (2011)). This was followed by an examination by the US International Trade Commission (USITC), an independent agency, of whether the domestic industry is materially injured. The results of the USITC's preliminary determination showed "reasonable indication" of injury due to imports from China of CSPV cells and modules "that are alleged to be sold in the United States at less than fair value and subsidized by the Government of China" (United States International Trade Commission (2011)). This allowed for the rest of the process to continue. The scope of the investigation defined by Commerce covered modules, laminates, and panels produced in a third country from solar cells made in China. However, it did not include modules, laminates, and panels produced in China from solar cells made in a third country.

The USITC final determination found that the US industry was "materially injured" because of imports of CSPV cells and modules from China that the USDOC determined were subsidized and sold in the United States at less than fair value. The investigation showed that the US domestic industry faced a decline in market share due to the increasing import competition from China sold at low prices. Furthermore, despite a growth in demand and reductions in costs, the domestic industry still did not make a profit, showed a decline in many performance indicators, and reported, among other difficulties, the closure of production facilities. The investigation found a "causal nexus" between subject imports and the poor

condition of the domestic industry (United States International Trade Commission (2012)).

The preliminary determinations for the countervailing case were issued on March 26, 2012, and for the anti-dumping case on May 25, 2012. In October a final determination was issued for the anti-dumping case. On December 7, 2012, the USDOC issued an amended final duty order for the anti-dumping case (United States Department of Commerce (2012a)) and a final determination for the countervailing duty order on crystalline silicon photovoltaic cells whether or not assembled into modules imported from China (United States Department of Commerce (2012b)). The details for HTSUS codes included in the determination are in Appendix Table A7.

AD-CVD orders are in place for five years after which the Department of Commerce conducts a sunset review to determine whether the order should remain in effect. In this case, the USDOC found that the revocation of the duties would lead to dumping margins of up to the maximum rate, hence the orders remain in place (United States Department of Commerce (2018)).

Determination of the Differential Rates

For purposes of the US anti-dumping and countervailing duty laws, the USDOC defines China as a non-market economy (NME). This means that the country does not operate on market principles of cost or pricing structures (Section 771(18) of the Tariff Act of 1930). This has a direct impact on the dumping investigation process. In general, dumping is found when the price of the product in the importing country is less than the price of the same product in the exporting country. Because China is an NME, the US administration relies on information on cost and price structures from a third country. In the case studied in this paper, the surrogate country is Thailand, as proposed by the petitioners. Chinese firms argued in favor of India, which was the petitioner's initial proposal.

Another relevant implication of the NME status of China is the determination of the dumping duty rates. For these types of economies, the USDOC presumes that all companies within the country are subject to government control. Hence, they are all assigned a single

rate unless they demonstrate sufficient independence from the government. If that is the case, the firm is granted a separate rate.[7]

In the case under study, 61 companies were granted a separate rate. Two of them were the mandatory respondents chosen by the USDOC, Trina Solar and Wuxi Suntech. The rates for these two companies were 18.32% and 29.14% respectively and were estimated based on the companies' data. Meanwhile, the other 59 companies were granted a rate of 24.48%, calculated as the weighted average of the two mandatory respondents. When the AD-CVD determinations are published in the federal register, it includes a list with the names of these companies. I refer to this group as the targeted firms.

Most of the companies listed by the Department of Commerce were named in the petition. This makes them part of the investigation and allows them to submit the required information. Firms that are active in this process need sufficient resources to afford it. Moreover, those with more interest in the US market, and thus more to lose from not complying, are usually actively participating in the investigation.

Meanwhile, all other Chinese firms in this industry that are not specifically listed, referred to as the PRC-wide entity, received an anti-dumping duty rate of 249.96%. The determination of this rate was based on what is called "Adverse Facts Available" (AFA) because the PRC-wide entity did not respond to the USDOC requests for information. It is the policy of the Department of Commerce in cases in which entities do not cooperate, to establish a rate high enough "that the party does not obtain a more favorable result by failing to cooperate than if it had cooperated fully." The Department selected as AFA the highest margin alleged in the petition by Solar World Americas (United States Department of Commerce (2012c).

The other investigation started by the petition resulted in the USDOC determining that countervailable subsidies were provided to Chinese producers and exporters of CSPV cells. The investigation covered 31 government programs during the year 2010. The results were CVD rates of 15.4% on average.

[7] In a regular anti-dumping case, firms in the same industry that are not named in the petition are not restrained. The fact that they are in this case is explained by China being an NME.

In summary, considering both the anti-dumping and the countervailing duties, an average 40% rate was charged to the targeted firms, those granted a separate rate, while the PRC-Wide entity had a total of approximately 265%.

This differential exposure to the policy is the basis of the research design in this paper. As discussed in Section , firms granted a specific rate are the larger exporters and hence have more presence in the US domestic market. Thus, the different AD-CVD rates reflect the differential exposure to the US trade policy, with firms receiving the specific - lower - rate being the most exposed.

Advantages of this Policy Setting

The evaluation of the causal effects of trade policy faces many methodological challenges, such as measurement of trade policy, endogeneity, and other identification concerns (Goldberg and Pavcnik (2016)).

This policy presents several advantages for the study of FDI decisions by multinational firms. First, the fact that there were specific duties for some firms makes this an ideal setting to study the effect of targeted protectionist policies. The discriminatory (and targeted) nature of the policy allows me to analyze the characteristics of the targeted firms relative to other Chinese firms in the same sector, and to examine whether the former, as a response, modifies investment choices in a differentiated way relative to themselves in the past and relative to the control group (the non-targeted group of solar panel firms in China).

Second, changes in AD-CVDs can be interpreted as economically exogenous. These duties were determined by the US responding to the interest of American solar panel companies, thus they were determined outside the realm of commercial relations between Chinese solar panel firms and their FDI destination countries. As I discuss in Section the trends in FDI of treated (i.e., the targeted) and control firms are not different before the AD-CVDs were imposed. This provides support for the validity of this difference-in-difference research design. This identification strategy helps overcome the endogeneity of trade policy, a key empirical challenge in estimating the causal impacts of trade barriers.

It also helps identify how the geography of production can restructure after a shock. The production process of solar panels has differentiated stages that allow for analyzing cross-country production fragmentation as a response to an external shock.

Given that more than a decade has passed since the imposition of these measures, this setting allows me to estimate the medium and long-term effects of trade barriers, something that the studies of the recent US-China trade war are still unable to assess. This time frame contributes to the study of foreign direct investment since these are large projects that generally have a long maturity process.

Furthermore, anti-dumping duties are a very common tool used by most members of the World Trade Organization. A better understanding of its direct and indirect effects helps to have a comprehensive knowledge of trade policy: "In terms of trade policy, AD is where the action is" Blonigen and Prusa (2015).

3.3 Data

I use four main data sources to construct empirical tests for the effects of AD-CVDs on the investment strategies of Chinese solar panel firms after 2012. The key dependent variable is data on announcements of greenfield investments. I also study if mergers and acquisitions had a significant change after the duties are imposed. Finally, I collect a variety of financial and trade data to create the empirical setting.

FDI: Greenfield Investments

The source for Foreign Direct Investment information is fDi Markets. This dataset tracks announcements on cross-border greenfield investment, defined as a new physical project or expansion of an existing one that creates jobs and capital investment. It includes monthly data on projects' variables at the firm level across all sectors and countries. These variables are: Project Date, Investing Company, Parent Company, Source Country, Source State, Source City, Destination Country, Destination State, Administrative Region, Destination City, Industry Sector, Sub-Sector, Cluster, Industry Activity, Capital Investment, Capital Investment Estimated (Yes or No), Jobs Created, Jobs Created Estimated (Yes or No), Project Type (New or Expansion). The Capital Investment and Jobs Created variables are estimated when the information is not released by the investing company.

I use announcements from 2009 to 2015 by firms based in China in the solar cell industry as defined in Section and characterized by Cluster, Industry Sector, and Sub-Sector shown in Table 7. This table reflects that the vast majority of the projects are new, as opposed to expansions of existing plants. It also presents the activities that I use to test the production fragmentation hypothesis, as well as the region where the projects are located that I use in my location choice models.

The original dataset presents an observation for a firm when it makes an investment announcement. I modify this to organize the data as a panel where each firm appears every month of every year. If it does not make an announcement, the FDI variable is set to zero. This is because not making an FDI announcement for firms that usually have this activity,

is economically relevant and gives information for the estimations. In Table 8, I present the summary statistics for this data arrangement for the variables used in my estimations. I create the variable projects by counting the number of announcements per firm per month.

Figure 6 shows the difference in projects before and after the policy in 2012. The first chart is for the number of projects and the second is for FDI amounts. Some interesting patterns arise showing that there is a change in the geography of these investments. Other regions, which group Africa, Latin America and the Caribbean, and Oceania, receive more FDI from the firms in the sample after the policy. Meanwhile, North America decreases the number of projects received. Europe slightly increases the number of projects and, considering the FDI amounts, the change after the policy is quite large. Interestingly, there is an important rise in the number of projects and FDI amounts in Asia after the policy. These facts motivate my empirical tests in the location choice section.

Targeted and Non-Targeted Firms

The firms targeted by the Department of Commerce are published in the Federal Register during the different stages of the determination process. The list includes the set of firms granted a specific rate of anti-dumping duties, which are exporters and producers of solar cells and modules. The list has 61 targeted (unique) firms, but it is longer because it includes subsidiaries. The published list of firms was the same during the whole investigation process, meaning firms were not entering or exiting the policy. All other Chinese firms in the same industry not included in that list are granted a general duty, the PRC-wide rate.

I refer to targeted firms as those companies that face specific rates. I find that 25 out of the 61 targeted firms in the fDi Markets database have FDI activity between 2009 and 2015 (i.e., 40% of the firms listed in the Federal Register). This constitutes my treatment group. Thus, I exclude from my analysis firms that are targeted but that do not engage in FDI during my period of analysis.

Then, I define a set of Chinese solar panel firms as a control group. I look in the fDi Markets database for Chinese firms that operate in the same economic activities as the targeted

firms according to the cluster, industry, sub-sector, and industry activity classification (see table 7). This approach yields a control group with 52 companies that the Federal Register did not list but is as similar as possible to the targeted firms regarding industry and FDI activity.

The final dataset contains 185 monthly investment announcements by 77 unique firms. Once I fill in the months in which there are no FDI announcements, the total observations in my sample go to 6468 (i.e., 77 firms x 12 months x 7 years).

To understand how these two groups compare in terms of FDI, my outcome of interest, Table 10 shows the results for the means differences test in the data: FDI amount, jobs created by the project, and the total number of projects per month. The panel on the left shows the differences in means for the three variables between non-targeted and targeted firms before the policy, as well as the t-statistic for this difference. The results for this test show that the only variable in which these two groups have a statistically significant difference before the policy is in the number of projects (the absolute value of the t-statistic for this difference is 3.70). The panel on the right shows the differences in the same variables between the two groups after the policy. In this case, all three variables have a statistically significant difference at least at the 10% level, with the targeted group having a larger average than the non-targeted in all cases. This provides evidence for the similar characteristics of the two groups before the policy and how they changed afterward.

I analyze the share of China's exports to the world in 2011.[8] As a proxy for the subject products in the AD-CVDs, I consider exports for HS code 854140, defined as "Electrical apparatus; photosensitive, including photovoltaic cells, whether or not assembled in modules or made up into panels, light emitting diodes." More than 2800 Chinese companies exported to the world products in this classification in 2011, and 95% of them have shares of Chinese exports below 0.04%. This shows this is a very skewed industry in terms of exports. I then look at the firms at or above the 95th percentile in Chinese exports of this product to the

[8] I am grateful to Professor Judith Dean for supplying this export share data. The shares were constructed from China Customs data (firm-level trade at the HS 6-digit level).

world to see how my two groups of firms are represented in these higher exporters sub-sample. I find that firms in the targeted group are nearly all in the 99th percentile of Chinese exports and are significantly larger exporters than the non-targeted firms in my control group. Firms in the non-targeted group are small exporters to the world in this aggregated industry, and I assume that a similar pattern applies to the imports in question.

This analysis of the export activity by the two groups of firms reflects that the targeted group is more exposed to the US trade policy than the non-targeted group. Even though the non-targeted group has the larger AD-CVD rate, they are not affected by them since they are not relevant exporters. Thus, the different AD-CVD rates reflect the differential exposure to the US trade policy, with firms receiving the specific - lower - rate being the most exposed.

Mergers and Acquisitions

I use data from Thomson and Reuters covering the period from 2009 to 2014 to analyze the impact of the AD-CVDs on mergers and acquisitions. I identify in this dataset 71 deals done by 12 targeted firms and 9 non-targeted firms as defined in the fDi Markets sample. I construct a firm-month-year panel with 1512 observations (i.e., 21 firms x 12 months x 6 years).

Panel A in Table 9 shows that 68% of the M&A activity by these firms has China as a target country. This means that Chinese multinationals are increasing their domestic presence. When considering cross-country M&A, Hong Kong is the most frequent target country with 10% of the deals, followed by the US with 7%.

To understand if this is horizontal or vertical M&A, Panel B in table 9 shows the industry activities by acquirer and target company. The most frequent types of deals share the same activity, Electronic and Electrical Equipment, indicating a horizontal integration of firms. The most common vertical integration is done by Investment and Commodity firms that target companies in Electronic and Electric Equipment activities.

Financial Statements

I use Refinitiv to find the financial summaries for the publicly traded firms in my fDi Markets sample. To compare the targeted and non-targeted groups of firms, and for some robustness checks, I compile the annual financial data for these firms and call them "financial subsample". The database has financials for 26 targeted firms and 14 non-targeted firms, all obtained from Refinitiv. I collect variables such as Capital Expenditure (CapEx or CapExAs if it is divided by assets); Gross Profit Margin; Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA; or EBITDA/A if it is divided by assets); Return on Average Total Assets (ROAA); Total Debt Percentage of Total Assets (DEBTA); and Log of Assets.

In Table 11 I show the results for the means differences test for the financial data. The left panel in the table shows statistically significant differences at the 10% level between the two groups in ROAA, with non-targeted firms having the larger average. After the policy, there is a statistically significant difference at the 10% level in EBITDA/A, with non-targeted firms having larger values, and DEBTAm, which is larger for targeted firms. I consider some of these variables as controls in my robustness checks.

3.4 Empirical Framework

In this section, I discuss my empirical strategies to estimate the effect of trade barriers on FDI decisions by firms. I also analyze the threats to identification from this approach.

Estimation Strategy: FDI

Using data on FDI announcements from 2009 to 2015, I leverage the variation given by policy's discriminatory nature to estimate their impact on firms. I develop a difference-in-differences design where the treatment is given by the AD-CVD rate the US imposed on the imports of Chinese solar cells and modules in 2012. The different AD-CVD rates reflect the differential exposure to the US trade policy, with firms receiving the specific rate being more exposed compared to the firms receiving the PRC-wide rate.

Motivated by the large presence of zeros on the left-hand-side variable, my specification is a multiplicative model and I estimate the coefficients using a Poisson Pseudo-Maximum Likelihood (PPML) method as proposed by Santos Silva and Tanreyro (2006). The authors show that in the presence of heteroskedasticity and zero values, such as FDI data, the results from log-linearized models estimated by OLS are biased estimations of elasticities. Similarly, Chen and Roth (2023) suggest using Poisson regression instead of the log-transformation log(1+Y) when Y can equal zero. Under the correct specification of the conditional mean[9], the data do not have to be Poisson (count data) for the estimator to be consistent (Wooldridge (2010), Gourieroux et al. (1984)). By the same token, Wooldridge (2023) shows that a difference-in-differences design with nonlinear alternatives only requires the specification of a conditional mean function. For the Poisson regression estimator, it is an exponential mean function. Thus, my multiplicative model of FDI is as follows:

[9] $$E[y_i|x] = exp(x_i\beta).$$

$$Y_{it} = exp[\sum_{s=2009}^{2015} \delta_s(D_{it} \times 1[y = s]) + \beta \boldsymbol{X}_{it} + \gamma_i + \lambda_t]\eta_{it}. \quad (5)$$

Where Y_{it} is the outcome of interest: FDI in levels, aggregation is yearly, for a firm i in period (month-year) t; D_i is the indicator for targeted firms; X_{it} are control variables such as the number of projects, jobs created, or financial variables; γ_i are firm fixed effects; λ_t are time fixed effects (month-year); and η_{it} is the error term. Robust standard errors are clustered at the firm level.

To test for a change in announcements, I use the same specification as in equation 5 and modify the dependent variable for the number of yearly projects for firms that make more than one announcement per year. When considering mergers and acquisitions, the left-hand-side variable is the existence of a M&A acquisition deal.

Threats to Identification

The key assumption for the difference-in-differences research design is the parallel trends assumption. This means that the pre-treatment trajectories for treated and control groups are parallel. Another necessary assumption is that the treatment is not endogenous. When this is the case, it is possible to claim that the treatment group would not have changed its trajectory with respect to the control group in the absence of treatment (Cunningham (2021)).

My main supports for the parallel trend assumption are the event study plots in Figure 7 for FDI amounts, Figure 7 for the number of projects by firms that make more than one announcement per year, and Figure 7 for cross-border M&A deals. In all cases, the estimated coefficients show no statistically significant effects in the pre-policy period. This implies that the difference-in-differences between both groups of firms had similar trends before 2012.

When the treatment is endogenous its assignment depends on the potential outcomes. In my specification, the potential outcomes are given by the foreign direct investment activity

of targeted firms after the policy. The treatment is the specific AD-CVD rate assigned by the Department of Commerce which, by targeting the largest exporters, approximates Chinese solar panel firms' exposure to US trade policy (see discussion in section). An endogenous treatment in this case would mean that the assignment of the specific AD-CVD rate depends on firms' FDI activity. I provide evidence that this is not the case in Table 10, showing that the results for the means difference tests are not statistically significant before the policy. Similarly, the plot of the raw data in Figure A1 reflects the variation in outcomes after the policy.

This evidence contributes to supporting the identification assumption that in the absence of treatment, the mean outcome for firms in the treated group would have evolved parallel to that of the control group. In the context of this paper, the differences in targeted and non-targeted firms' mean FDI amounts, number of projects, and cross-border M&A deals after 2011 can be explained by being granted specific AD-CVDs.

Estimation Strategy: Location Choice

Motivated by the changes in patterns shown in figure 6, I study the location choice over time. I use a logit model to estimate equation 6 with my fDi Markets sample from 2009 to 2015. A similar approach using linear probability models is shown in Appendix A1.

$$Pr(y = 1|x) = G(\boldsymbol{x\beta}) \tag{6}$$

Where:

$$y_{it} = I(region)_{it},$$

$$\boldsymbol{x'_{it}\beta} = \beta_0 + \sum_{s=1}^{7} \beta_s \times \boldsymbol{Year} + \beta_8 X_{it} + \epsilon_{it}.$$

The error term ϵ_{it} has a standard logistic distribution (Wooldridge (2010), hence function

$G(\boldsymbol{x\beta})$ in equation 6 is:

$$G(\boldsymbol{x\beta}) = \frac{exp(\boldsymbol{x\beta})}{1 + exp(\boldsymbol{x\beta})}.$$

$I(region)_{it}$ is in an indicator for each of the six regions in the data, for a project announced by firm i in period t (month-year); **Year** is a vector of dummy variables from years 2009 to 2015; X_{it} controls for FDI amounts, number of projects, or jobs created, or firm. Robust standard errors are clustered at the firm level.

To have a better understanding of firms' location choice decisions, I estimate a conditional logit model as in McFadden (1974). In this model, individuals - firms - choose the option with the greatest utility from a set of alternatives. Firms' choices are at least in part explained by the observable characteristics of the alternatives. In this case, the alternatives are given by the regions in the dataset: j=1,...,6. Following Wooldridge (2010), the specification for the random utility faced by the firms is presented in equation 7:

$$y_{ij}^{*} = \boldsymbol{z}_j\boldsymbol{\gamma} + \boldsymbol{w}_i\boldsymbol{\delta}_j + a_{ij}. \tag{7}$$

Where y_{ij}^{*} is the firm's i random utility from choosing to invest in the region j; $\boldsymbol{z}_j$ is a vector of characteristics of the regions that influence FDI location (GDP per capita, inflation rate, rule of law); $\boldsymbol{w}_i$ are firm-specific characteristics (if it is a targeted firm); $\boldsymbol{\delta}_0 = \mathbf{0}$ as a normalization; a_{ij} are unobservables that affect the firm's location choice. This error term is assumed to be of independent random variables with a type I extreme-value distribution so the probability of investing in each region is given by:

$$P(y_i = j|\boldsymbol{z}) = \frac{exp(\boldsymbol{z}_j\boldsymbol{\gamma})}{\sum_{h=1}^{J} exp(\boldsymbol{z_h\gamma})}. \tag{8}$$

I modify the original structure of my fDi Markets sample to fit this model and estimate equations 7 and 8. For every month-year, each firm has six options for where to invest:

Asia, Europe, North America, Africa, Latin America, or Oceania. In the few cases where a firm makes more than one investment per month, I order the projects by FDI amount and number of jobs created. The region of the project with the larger magnitude gives the location choice. Robust standard errors are clustered at the firm level

Finally, to investigate if the type of industry activity developed by the new projects impacts the probability of investing in a particular region, I estimate the equation 9 using a Linear Probability Model.

$$Y_{it} = \delta \mathbf{Activity}_{it} + \beta X_{it} + \gamma_i + \upsilon_{it}. \tag{9}$$

Where Y_{it} is the probability of investing in a particular region by firm i in period t; $\mathbf{Activity}_{it}$ is a vector of dummy variables for the industry activities in the dataset presented in Table 7; and X_{it} controls for FDI amounts or the number of projects; γ_i are firm fixed effects; υ_{it} is the error term. Robust standard errors are clustered at the firm level.

3.5 Results and Discussion: Effects of Trade Barriers on FDI

In this section, I describe my empirical findings using a PPML method for estimating equation 5. In my specification of the exponential model, the dependent variable is measured in levels and the right-hand-side treatment variable D is an indicator taking the value zero or one. In the difference-in-differences interpretation, the first difference is between the two groups of firms in the setting: the targeted firms (those granted a specific AD-CVD rate) and the non-targeted firms (those assigned the PRC-wide rate). The second difference is before and after the duties are applied. Thus, variable D equals one for targeted firms in the year 2012 and after, and zero otherwise. The coefficients δ are the semi-elasticities estimated overtime where the percentage change is given by 100*(exp(δ)-1)%. I normalize the results by excluding the year before the treatment, 2011, as is commonly done in the literature (Sun and Abraham (2021)).

Increase in FDI amounts

Table 12 presents my main results using the fDi Markets data from 2009 to 2015. The dependent variable is the monthly dollar amount of FDI projects by firm. The main explanatory variables are the interaction between the indicator for targeted firms and the year. I present three specifications including firm, month, and year fixed effects and varying their control variables. In Panel A I show the estimated coefficients using PPML, and in Panel B the economic valuation of the coefficients.

In column 1, I show the estimation of the model without control variables. The coefficient for the targeted firms in 2012 is 2.838 and it is statistically significant at the five percent level. Using the formula for the semi-elasticity, this converts into a 1608% increase in the dependent variable. To provide a more comprehensive meaning for this estimation, I show the dollar amounts in Panel B. I calculate this by multiplying the percentage change by the yearly average FDI in the pre-policy period. I use two benchmarks for this valuation. First, the average amount invested by targeted firms, which is 9 million dollars, and then the average amount invested by all the firms in my sample, which is 13 million dollars. This

translates into 145 and 208 million dollars per year respectively of increased FDI by targeted firms with respect to non-targeted firms in 2012.

In column 2, I show the estimation using as a control variable the number of jobs created by the project, as a way of considering the potential impact of the project. The coefficient for targeted firms in 2012 is 2.464 and it is statistically significant at the five percent level. This semi-elasticity represents a 1075% increase in FDI, meaning 97 million dollars per year when the coefficient is evaluated at the pre-policy average for targeted firms, and 139 million dollars per year using the average for all firms. Hence, the economic value of the change in FDI is smaller in this case than in the specification without any controls.

The third and final column in this table presents the estimations controlling by how many projects a firm announces per month. The objective is to take into consideration the frequency of the FDI activity by the firms. In this case, the coefficient for the year 2012 is statistically significant at the 10% level with a value of 2.352 which represents an increase of 952%. This is equivalent to 86 or 123 million dollars per year, depending on which of the two benchmarks is used. In this specification, I also find a statistically significant effect for the year 2015. This means that after taking into account the number of projects, targeted firms increased FDI by 90 to 129 million dollars in 2015 with respect to non-targeted firms. Thus, the number of announcements also impacts the results, making them smaller in magnitude but introducing an effect in other years.

Decrease in the Number of Projects

Table 13 my estimations of the effects of the policy in the number of projects for the sub-sample of firms that make more than one announcement per year. FDI greenfield investments are large projects and take a long time to materialize. Hence, not all multinational firms that engage in FDI activity announce several projects per year. To analyze if the trade barriers under study might affect the number of announcements, I study the sub-sample of firms that have more FDI activity in the period. I estimate my model for the sub-sample of firms that make more than one announcement per year, which are 23 firms that represent 30% of the

original sample. The dependent variable is the count of the number of announcements per year.

I present three specifications which all include firm and year fixed effects and vary in their control variables. In Panel A I show the estimated coefficients using PPML, and in Panel B the percentage change in the number of projects.

In column 1, I present the estimation of the model without control variables. The coefficient for targeted firms in 2013 is -0.755 and it is statistically significant at the one percent level. Using the formula for the semi-elasticity, Panel B reflects that this converts into a 53% decrease in the number of projects by targeted firms in comparison with firms in the non-targeted group. Similarly, the coefficient for the year 2014 is -0.799 and represents a reduction of 55% in the dependent variable.

In column 2, I show the estimation using as a control variable the number of jobs created by the project. The coefficient for targeted firms in 2013 is -0.708 while for 2014 it is -0.800, both are statistically significant at the one percent level. These semi-elasticities represent a decrease in the number of projects of 51% and 55% respectively.

The third and final column in this table presents the estimations controlling by the FDI amounts. As in the previous two columns, I find negative and statistically significant effects for targeted firms in the years 2013 and 2014. The estimated coefficients imply that these firms reduce their number of projects by 56 and 57% in 2013 and 2014 respectively.

Thus, the results are consistent in showing that after the initial reaction to the policy of increasing FDI amounts in 2012, firms that engage in more FDI activity reduce their number of projects for two years after the policy. This might reflect the necessity to let the new larger projects announced in 2012 mature, as well as a response to the financial setbacks experienced by these companies shown in Table 10, as a consequence of having restricted access to a large market as the US.

M&A deals: Domestic and Cross-Border

In Table 14, I show my estimations for mergers and acquisitions using Thomson and Reuters

data from 2009 to 2014. These results complement my previous estimates for greenfield investments and help provide a wider picture of the foreign and domestic activity of the firms under analysis. The dependent variable equals one if there is an M&A deal on that month, domestic or cross-border, and zero otherwise. Thus, this specification estimates the probability of having such a deal. As before, the main explanatory variables are the interaction between the indicator for targeted firms and the year. I present two specifications which all include firm, month, and year fixed effects and vary in their control variables. In Panel A I show the estimated coefficients using PPML, and in Panel B how the coefficients convert to percentage changes.

In column 1, I show the estimation of the model controlling for completed deals, which could be domestic or cross-border. I find a negative and statistically significant coefficient for the year 2012. This means that targeted firms have a lower probability of completing an M&A deal than non-targeted firms the year the policy is implemented. The coefficient is -1.469, statistically significant at the five percent level, and implies that targeted firms have a probability of completing an M&A deal that is 77% lower than non-targeted firms.

In column 2, I show the estimation adding as a control variable if it is a cross-border deal. Hence this complements the FDI activity by these firms including brownfield investments to my previous estimates for greenfield projects. Unlike the previous specification, I do not find significant effects at the 5% level. I find a negative coefficient, statistically significant at the 10% level, for the year 2012. This semi-elasticity of -1.448 translates into targeted firms having a -76% probability of completing a cross-border M&A deal that year.

Thus, the two groups show different strategies after the policy. Targeted firms increase their greenfield investment amounts in 2012, as shown by previous estimates. While these results show that non-targeted firms increase their domestic merger and acquisitions, increasing their presence in the Chinese domestic market as a response to the policy, and their brownfield foreign direct investment.

Change in Location Choice

In this section, I describe the results of a variety of tests I devise for evaluating several theoretical predictions regarding multinational firms' location choice for foreign direct investment.

Even though FDI location choice decisions in one country are not independent of the other alternatives, this initial test allows me to pin down pattern changes following the policy change. In addition, in the following section, I develop a conditional logit model of location choice that includes all potential alternatives.

Evolution Over Time

Does the location choice of targeted firms change after the policy? I test if each year has a particular effect on the probability of investing in the three relevant regions in the sample: the US, Europe, and Asia. I first approach this question by estimating equation 6. Full estimations for this logit model are presented in Table A8. I also estimate linear probability models and present the results in Table A9 in the Appendix. In Figure 8 I show the conditional marginal effects with 95% confidence intervals for the targeted firms estimated using FDI as a control variable.

The first graph shows the effects of each year in the sample on the probability of investing in the US. I do not find a statistically significant effect on any of the years. This means I cannot support the tariff-jumping hypothesis of targeted firms increasing their foreign direct investment in the US as a consequence of the AD-CVDs. These results align with those from Blonigen (2002) that finds tariff-jumping is only a realistic option for multinational firms from industrialized countries like Japan.

In the second graph, I present the effects of each year in the sample on the probability of investing in Europe. There could be different motivations for this location choice. One of them could also be tariff jumping since the European Union started anti-dumping investigations on Chinese solar panels firms in 2013, a year after the US. Another motivation could be to serve the European market, after having restricted access to the US. However, I do not find support for either of these. My estimations show that from 2013 until the end of

the period, there is a statistically significant negative effect on the probability of investing in Europe for targeted firms.

The third graph shows the effects of each year in the sample on the probability of investing in Asia. Here, the estimations show a positive trend after 2013 and statistically significant effects in 2015. After receiving a negative shock like AD-CVDs, there might be different motivations for Chinese firms to increase their presence in other Asian countries. For instance, a necessity for reducing costs and increasing efficiency thus promoting production fragmentation in the region (vertical FDI); establishing new plants that could later export to the US (export platform FDI); or increasing their presence in China or other domestic Asian markets. Some of these strategies are addressed by the companies in their Annual Reports or other communications, as shown in quotes here and the Appendix A2:

The company's external affairs department told reporters that at the beginning of the case, the company began to strengthen its "internal skills" practice, and actively explored emerging markets while enhancing product competitiveness. It has reached a number of export contracts and intentions with emerging market countries, making up for the loss of exports to the United States. (CNPV Solar Power)[10]

In the face of Europe and the United States anti-dumping, the company actively expands emerging markets, deepens the industrial chain, and avoids risks brought about by international trade frictions to the greatest extent. (Zhejiang Sunflower Light)[11]

The company announced plans to expand its solar panel production capacity in Malaysia. This shows that panel manufacturers will deploy new production capacity in a trade-neutral zone in order to export to the world, while China's production capacity is for domestic consumption (Hanwha Q CELLS).[12]

Location Choice in 2015

The results above show statistically significant results for the year 2015. There are posi-

[10] 2012 website article.
[11] 2012 Annual Report.
[12] 2014 website article.

tive effects on the probability of targeted firms investing in Asia and negative for Europe. However, the estimated effects are small and close to zero. I take a deeper look into what these initial results suggest to have a better understanding of the effects of the policy on the location choice decision. I do this by estimating a conditional logit model of location choice for the year 2015.

Table 15 presents the conditional marginal effects for the estimations from equation 8. The control variables are GDP per capita, inflation rate, and a rule of law index. [13] Table A10 in the Appendix does the same without the rule of law as a control variable.

Panel A of the table shows the conditional marginal effects for targeted firms on the predicted probability of choosing from the set of location choices J=1,...,6. These outcomes are shown in each row: Asia, Europe, North America, Africa, Latin America and the Caribbean, and Oceania. The first column gives predicted probabilities of the outcome. The second column shows the standard errors clustered at the firm level. The following columns present the z-statistic, the results for the z-test, and the 95% confidence interval.

The coefficient 0.363 is the expected probability of a targeted firm investing in Asia in 2015 with respect to the non-targeted group. This means that targeted firms have a 36.3% more probability of locating in Asia than non-targeted firms. This result is statistically significant as shown by the z-statistic and the 95% confidence interval. The coefficient -0.421 is the expected probability of a targeted firm investing in Europe in 2015 with respect to the base outcome. This represents a 42.1% smaller probability of investing in Europe for the firms in the targeted group compared to the non-targeted. This result is also statistically significant as shown by the respective statistics. The estimated coefficients for the rest of the location choices are not statistically significant or cannot be estimated in the case of Oceania.

Thus, we can conclude that the two groups of firms have different reactions to the policy in terms of location choice in 2015, with targeted firms choosing to locate their investments

[13] These variables are extracted from the World Development Indicators.

in Asia.

Industry Activities: Vertical FDI

I move to the vertical FDI hypothesis and estimate equation 9 for Asia in 2015, the region and year where I find statistically significant effects in my previous models. Thus, in Table 16, I show the linear probability estimations using my fDi Markets sample restricted for the year 2015. The coefficients multiplied by 100 are interpreted as the percentage change in the dependent variable when the dummy explanatory variable equals one. I divide the sample for targeted and non-targeted firms and present the results in separate columns for each group. The dependent variable equals one if a firm makes an announcement of a project in Asia in a particular month, and zero otherwise. The main explanatory variables are each of the industry activities defined by fDi Markets. I present two specifications for each group which include firm fixed effects and vary in their control variables.

In column 1, I show the estimation of the model for targeted firms controlling for FDI amounts. I find positive and statistically significant effects (at 1% level) for three industry activities. There is a 78.4% increase in the probability of investing in Asia if the activity in the new project is Electricity; 83% if it is Manufacturing; and 98% for Sales. Meanwhile, the rest of the activities do not have a statistically significant effect on such probability. In column 2 I present the same estimation for the non-targeted group. These results do not show a statistically significant effect of electricity activities. They show an increase in the probability of investing in Asia for manufacturing (56.3%), and sales (49%). Which are similar in sign but smaller in magnitude and statistical significance than the effects for targeted firms. Headquarters and design activities decrease the probability for this group.

In column 2, I present the estimation of the model for targeted firms controlling for the number of projects. The results in this specification are very similar to those in column one in sign, size, and statistical significance. In column 4 I show the same estimation for the non-targeted group. These results do not show a statistically significant effect for most of the activities. I only find that there is a 58.9% decrease in the probability of investing in

Asia for design activities.

After analyzing the estimations for the four columns I conclude that electricity, manufacturing, and sales activities have a positive effect on the probability of investing in Asia by targeted firms. Comparing this with the results for the non-targeted group, there is a difference in many of the effects, with manufacturing and sales having a small positive impact only in one of the specifications. These results point in the direction of a new structure of cross-border activities for targeted firms and contribute to the vertical FDI hypothesis.

Destination Countries: Export Platform FDI

To contribute to understanding if the export platform hypothesis applies in this case, I take a deeper look into the data. Considering the destination countries in Figure 9 we can see the different countries where the two groups of firms choose to locate their new plants. The most frequent choices for targeted firms are Japan (with 6 projects), Turkey (4 projects), India (3 projects), and Thailand (3 projects). These add up to 70% of the projects in the post-policy period. The rest of the destination countries receive one project. Meanwhile, the preferred locations by firms in the non-targeted group are India (6 projects), Japan (4 projects), and the United Arab Emirates (2 projects). These countries make up 70% of the projects, while the other destinations received one project in this period. The same graph for the pre-policy period is presented in Figure A2 in the Appendix. The comparison between the destination countries in Asia during the two periods shows that firms invest in a larger number of countries post-policy.

I then look into data from the USITC to find imports of solar cells by source country. In Figure 10 I show imports from Japan, Thailand, India, and Turkey, the countries that receive the most number of projects. I divide the data into three periods: pre-policy (2009 to 2011), post-policy (2012 to 2015), and medium-run (2016 to 2018). Because greenfield investments take time to mature after they are announced, it makes sense to consider a longer period after the policy is implemented to capture if the new plants become exporters. The numbers in the chart show the quantity imported from each country (in million units)

and in parenthesis the share they represent from the total US imports in each period.

There is a difference in the relevance of each of these countries as a source of solar cells to the US. There were virtually zero imports from Turkey before the policy. After, it grows their magnitude and relative share, although remaining pretty low at 0.2% of total US imports of solar cells in the medium-run. India also shows an increase in absolute quantity but only grows to 0.3% of the share in the medium run, from 0.2%. Thailand presents a more important change through time, growing to 2.8% in the medium run. Finally, Japan has the most important share of imports through time. It was already a relevant source of solar cells in the US before the policy with 5.6% of imports, it managed to consistently grow up to 8.3% in the medium-run.

Thus, even though the FDI destination countries have different relevance in the US domestic markets, the four of them manage to grow in quantities and share over time, with Thailand and Japan showing the most growth. This is relevant in a context where the overall imported quantities of solar cells in the US diminished from 2009 to 2018, as shown in Figure A3. Although I do not have data on firm-level exports to the US to confirm if the plants installed by the Chinese firms affected by the US trade barriers are the ones exporting through these other countries, the fact that the countries become more relevant sources of import after the policy shows initial support for the export platform hypothesis.

3.6 Robustness Checks

Anticipation

A relevant aspect to consider in difference-in-differences settings is anticipation of the agents. Whenever a policy is about to be modified, and if there is a level of public knowledge that this will happen, agents can adapt their behavior to avoid potential negative effects of the policy change. In this case, this would mean that Chinese firms that anticipated the AD-CVDs were to be imposed modified their strategy before being hit by the duties and hence negatively impacted their exports to the US and streams of income. This is indeed considered in the investigation by the US Department of Commerce. In the preliminary determinations of May 2012, the USDOC states that "exporters, producers, and importers of solar cells from the PRC had reason to believe that AD and CVD proceedings were likely during September 2011" (US Department of Commerce, 2012).

I test for this possible change in firms' behavior by eliminating from the sample the period from November 2011 to April 2012 (included). This considers the beginning of the investigations and the publication of the preliminary determinations in May 2012. I also consider the period starting in September 2011, following the USDOC statement about firms knowing about this policy change since September.

In Table 17 I present my results for these robustness checks that test for anticipation, using my fDi Markets sample from 2009 to 2015. The dependent variable is the monthly dollar amount of FDI announcements by firm. The main explanatory variables are the interaction between the indicator for targeted firms and the year. I present two specifications which all include firm, month, and year fixed effects, and vary in the period eliminated for the anticipation test. In Panel A I show the estimated coefficients using PPML, and in Panel B the economic valuation of the coefficients. Overall, these estimations confirm my previous results: targeted firms increase their FDI amounts the year of the policy, with one of the specifications showing results three years after.

In column 1, I show the estimation of the model without control variables after removing

the months from November 2011 to April 2012 (included). The coefficient for the targeted firms in 2012 is 3.181 and it is statistically significant at the five percent level. Using the formula for the semi-elasticity, this translates into a 2307% increase in FDI. Panel B shows the economic valuation for this estimation which is 208 million dollars per year when considering the pre-policy average FDI for targeted firms, and 298 million dollars considering the average for all the firms. In this specification, I also find effects in the year 2015, though economically and statistically smaller. The coefficient of 1.963, significant at the 10% level, implies an increase of 55 to 79 million dollars per year in FDI by targeted firms.

Column 2 presents the estimation of the model without control variables after removing the months from September 2011 to April 2012 (included). The coefficient for the targeted firms in 2012 is 2.456, statistically significant at the 10% level, implying an increase of 96 or 138 million dollars depending on the benchmark chosen.

Hence, even after considering the possibility of firms modifying their behavior as a response to the policy before the policy is in place, my results remain robust.

Financial Sub-Sample

In Table 18 I present my first robustness checks. I use a financial sub-sample that results from merging my fDi Markets sample from 2009 to 2015 with variables averaged at the year level, with the Refinitiv data I collected with financial information for publicly traded firms. Hence, this is a yearly sub-sample that contains financial performance indicators, as well as the FDI variables. The dependent variable is the yearly dollar amount of FDI announcements by firm. The main explanatory variables are the interaction between the indicator for targeted firms and the year. I present three specifications which all include firm and year fixed effects, and vary in their control variables. In Panel A I show the estimated coefficients using PPML, and in Panel B the economic valuation of the coefficients. Overall, these estimations confirm my previous results: targeted firms increase their FDI amounts the year of the policy, with some specifications showing results three years after. Given the characteristics of this sub-sample, which is biased towards larger firms that can manage to

be public, the dollar amounts are larger than in my previous estimates.

In column 1, I show the estimation of the model controlling for the ratio of capital expenditure over assets. The coefficient for the targeted firms in 2012 is 5.271 and it is statistically significant at the one percent level. Using the formula for the semi-elasticity, this converts into a 19361% increase in the dependent variable. To provide a more comprehensive meaning for this estimation, I show the dollar amounts in Panel B. I calculate this by multiplying the percentage change by the average FDI in the pre-policy period using two benchmarks for this valuation. First, the average amount invested by targeted firms in the sub-sample, which is 12 million dollars, and then by all the firms in the sub-sample, which is 16 million dollars. This implies that in 2012, for the sub-sample of publicly traded companies, targeted firms increased their FDI amounts by 2406 or 3086 million dollars per year respectively, with respect to the non-targeted group. I also find a positive effect in 2015, though economically and statistically smaller. The coefficient of 3.755 represents an increase in FDI by targeted firms of 519 or 665 million dollars, depending on the benchmark used.

In column 2, I show the estimation using as a control variable the total debt percentage of total assets. I find a positive and statistically significant effect for the interaction of targeted firms and the year 2012, which is very similar in magnitude and significance to the coefficient in column 1.

Column 3 in this table presents the estimations controlling by capital expenditure over assets and the total debt percentage of total assets. The effects I find in this specification are larger than in the two previous ones. The coefficient for the targeted firms in 2012 is 6.609, statistically significant at the one percent level, which means an increase of 9207 or 11808 million dollars. I also find a positive statistically significant effect in 2015, with a coefficient of 3.826 that converts into an increase of 558 or 715 million dollars.

These estimations confirm my previous results and provide insight into the effect heterogeneity. A sub-sample of firms experience a larger reaction to the policy, reflected in the amounts of their new investments and the effects lasting up to three years after.

3.7 Summary and Concluding Remarks

I analyze the case of the anti-dumping and countervailing duties implemented by the Obama administration in 2012 against imports of Chinese solar panels. Leveraging the variation given by the policy's discriminatory nature, I test for the change in Foreign Direct Investment decisions by targeted firms.

My findings show that in 2012, targeted firms increase FDI by 145 million dollars per year, from a previous average of 9 million dollars. The estimations are robust to considering anticipation by the firms, and to including financial controls for the sub-sample of publicly traded firms. These results are for greenfield investment and not mergers and acquisitions. On the contrary, targeted firms have a lower probability of completing an M&A deal, either domestically or cross-border, than non-targeted firms. Furthermore, targeted firms that make more than one announcement per year reduce their number of projects by half for two years after the policy. This reflects a re-adaptation of the firms' strategies after the initial reaction of increasing the FDI amounts the year of the policy.

I use a variety of tests to identify the different hypotheses behind the location choice decisions by targeted Chinese multinational firms in the solar panel industry. I show that the increase in investments does not correspond to tariff-jumping or horizontal FDI as it does not reflect a preference for locating in the US or Europe respectively. I find a rise in investments in Asia in 2015 and estimate that after the policy, manufacturing, and electricity industry activities have a positive impact on the probability of investing in that region. A detailed analysis of FDI and trade data shows that these countries end up becoming exporters of solar panels to the US, showing support for the export-platform hypothesis in the medium run.

Since these firms produce solar cells and modules, whether assembled on solar panels or not, my results show how a change in bilateral trade policy can reshape multinational production. This can be motivated by multinational firms' need for efficiency gains after facing a negative external shock, as well as exporting to the desired final market from a different

country. Overall, my results document FDI diversion that modifies investment patterns in the short run and eludes the trade barriers in the medium run, weakening the intended effects of the protectionist policy.

Figure 2. Photo Voltaic Value Chain

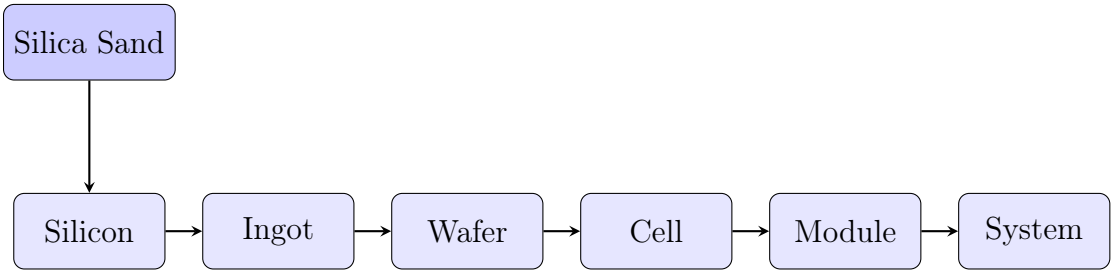
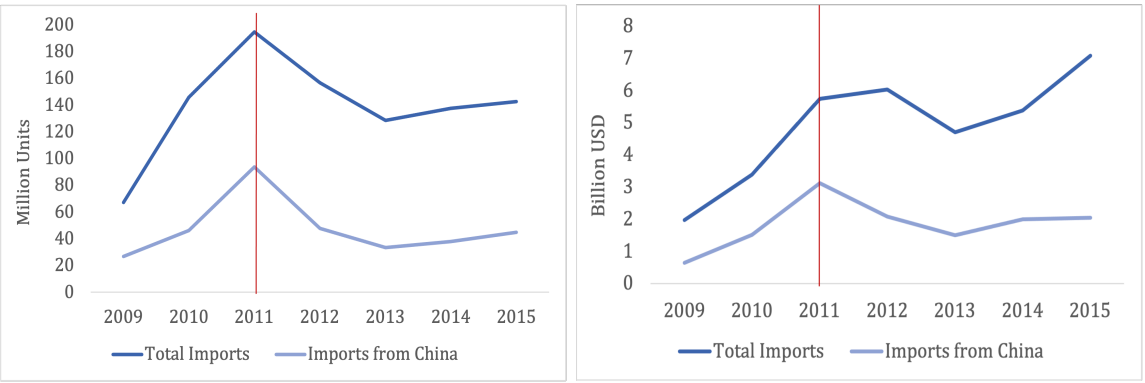


Figure 3. Economic Performance of the Chinese Solar Industry

Source: IBISWorld (2021)

Figure 4. US Imports of Solar Cells: Quantity & Value



Source: USITC (2021)

Figure 5. Policy's Timeline

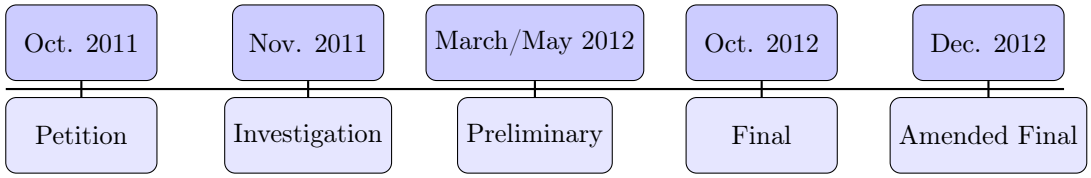


Table 7. fDi Markets Sample Description

Panel A: FDI announcements within the cluster of environmental technology	**Percent**
Industry Sector	
Electronic components	75
Renewable energy	24
Other	1
Sub-Sector	
All other electrical equipment & comp..	75
Solar electric power	24
Other	1
Industry Activity	
Sales, Marketing & Support	43
Electricity	21
Manufacturing	15
Headquarters	14
Design, Development & Testing	4
Logistics, Distribution & Transportat..	4
Panel B: FDI announcements by project type and location	
ProjectType	
New	96
Expansion	4
Location	
Europe	43
Asia	31
North America	11
Africa	8
Oceania	4
Latin America & Caribbean	3

NOTE: This table describes the variables in my fDi markets sample. Panel A shows the percentage of observations within the environmental technology cluster by industry sector, sub-sector, and industry activity. Panel B shows the type of projects and their locations.

Table 8. Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
FDI	6,468	3.15	49.4	0	2,000
Jobs	6,468	3.91	71.0	0	3,000
Projects	6,468	0.03	0.2	0	4

NOTE: This table presents the summary statistics in my fDi markets sample after expanding the sample as a panel with one observation per firm per month during the period 2009-2015.

Table 9. Characteristics of M&A Deals by Chinese Firms

Panel A: By Country	Target	Percent
	China	68
	Hong Kong	10
	United States	7
	Portugal	2
	Sweden	2
	United Kingdom	2
	Other	6
Panel B: By Industry		
Acquiror	Target	Percent
Horizontal		
Electronic and Electrical Equipment	Electronic and Electrical Equipment	49
Vertical		
Invest. & Commodity Firms, Dealers, Exch.	Electronic and Electrical Equipment	10
Electronic and Electrical Equipment	Invest. & Commodity Firms, Dealers, Exch.	7
Electronic and Electrical Equipment	Wholesale Trade-Durable Goods	5
Electric, Gas, and Water Distribution	Electronic and Electrical Equipment	5
Metal and Metal Products	Electric, Gas, and Water Distribution	5
Other		20

NOTE: This table describes the Thomson and Reuters M&A data from 2009 to 2014. Panel A shows target countries for M&A deals. Panel B shows the Industry of Acquiror and Target companies. When the industry is the same in both companies is a horizontal deal, otherwise, it is a vertical deal.

Table 10. Mean Differences Test: FDI data

		PRE-POLICY				POST-POLICY			
		Non-targeted	Targeted	Diff.	t-stat	Non-targeted	Targeted	Diff.	t-stat
	Obs.	1,872	900			2,496	1,200		
FDI	Mean	1.23	0.75	0.48	0.54	3.75	6.72	-2.97	-1.35
(mill.USD)	Std. dev.	26.12	8.36			58.07	70.79		
Jobs	Mean	2.32	2.10	0.22	0.10	2.35	11.01	-8.66	-3.00
	Std. Dev.	62.03	18.07			30.45	137.55		
Projects	Mean	0.02	0.05	-0.03	-3.70	0.03	0.05	-0.02	-3.14
	Std. Dev.	0.18	0.25			0.21	0.26		

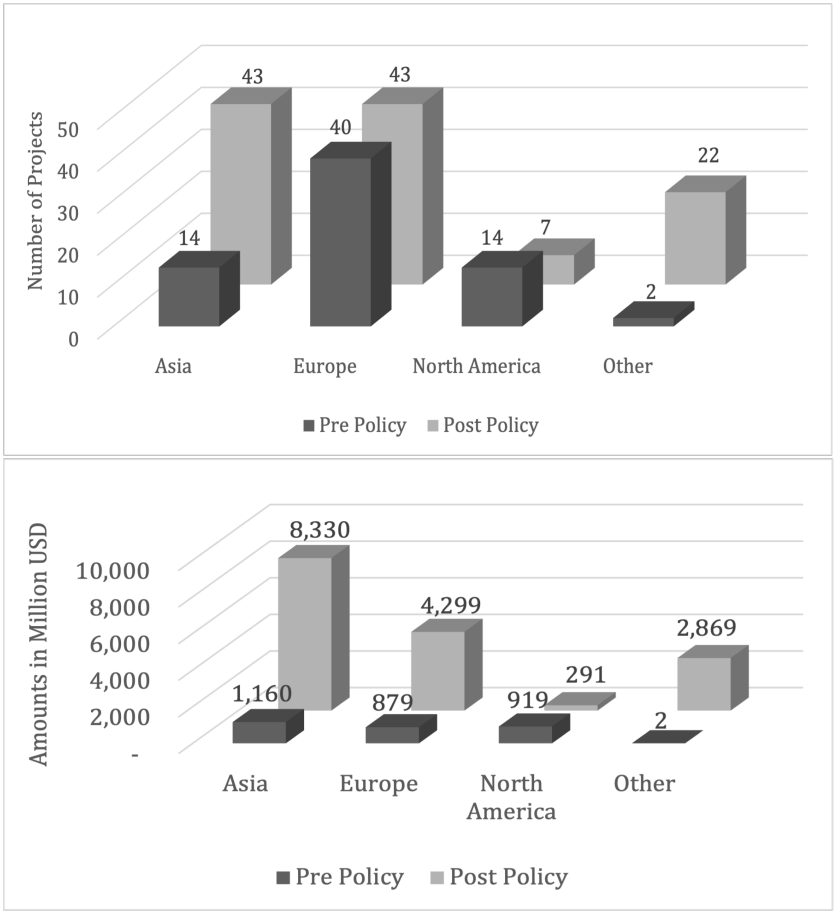
NOTE: This table presents the means differences test for my fDi markets sample. The differences are statistically significant at the 10% level if the t-statistic is greater than 1.645, and at the 5% level if it is larger than 1.96.

Table 11. Mean Difference Test: Financial Data

		PRE-POLICY				POST-POLICY			
		Non-Targeted	Targeted	Diff.	t-stat	Non-Targeted	Targeted	Diff.	t-stat
CapEx	Mean	115.87	200.15	-84.27	-1.50	79.5	70.5	9.0	0.4
	Std. Dev.	136.02	282.94			95.2	113.4		
	Obs.	32	33			49	32		
Profit Mg	Mean	27.65	25.20	2.46	0.41	7.9	17.3	-9.4	-0.8
	Std. Dev.	17.11	29.95			57.9	36.6		
	Obs.	32	34			50	33		
EBITDA/A.	Mean	0.09	0.05	0.03	0.99	0.05	0.003	0.04	2.2
	Std. Dev.	0.17	0.07			0.1	0.1		
	Obs.	33	31			50	32		
ROAA	Mean	8.99	0.76	8.23	1.76	-2.0	-40.4	38.4	1.1
	Std. Dev.	25.20	16.06			14.8	252.9		
	Obs.	32	46			48	51		
DEBTA.	Mean	25.35	31.98	-6.64	-1.32	25.5	44.0	-18.6	-3.4
	Std. Dev.	22.01	16.96			18.2	29.7		
	Obs.	31	30			47	29		
Log Assets	Mean	6.32	6.07	0.25	0.69	6.73	6.57	0.16	0.53
	Std. Dev.	1.87	1.52			1.66	1.39		
	Obs.	34	54			50	50		

NOTE: This table presents the means differences test for my Refinitiv sample. The differences are statistically significant at the 10% level if the t-statistic is greater than 1.645, and at the 5% level is it larger than 1.96. CapEx is Capital Expenditure; Proft Mg is Gross Profit Margin; EBITDA/A is Earnings Before Interest, Taxes, Depreciation, and Amortization divided by assets; ROAA is the Return on Average Total Assets; DEBTA is the Total Debt Percentage of Total Assets; Log of Assets takes the logarithm of Assets.

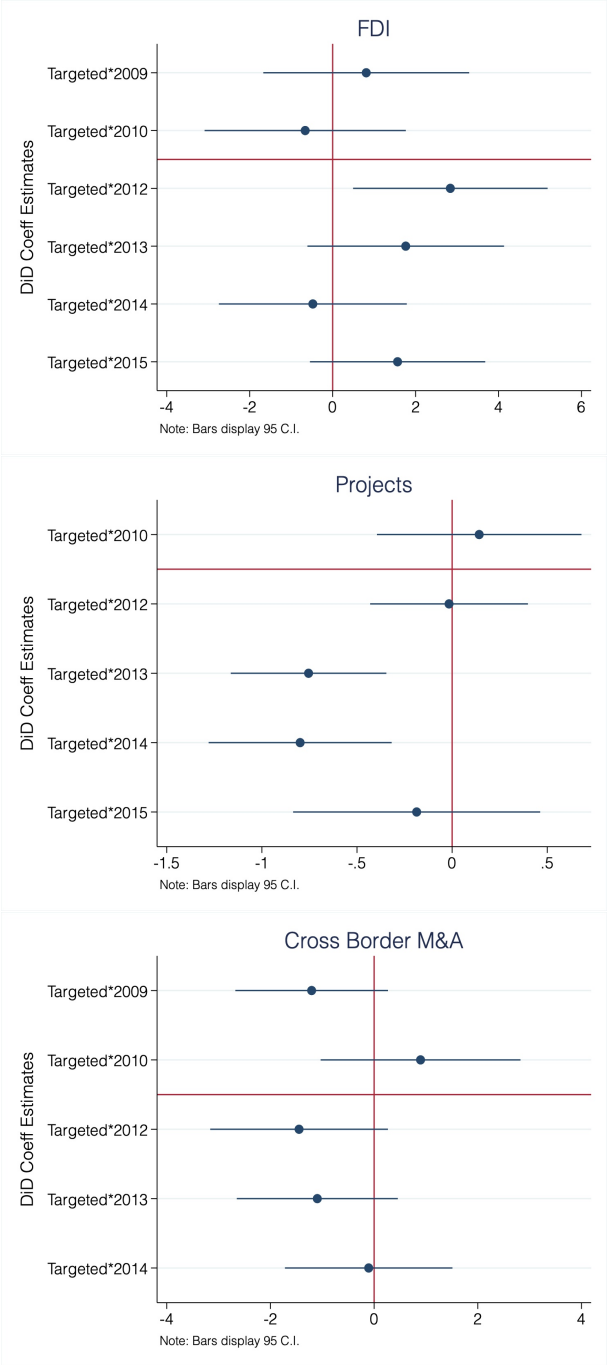
Figure 6. Projects Pre and Post Policy by Location: Number & Amounts



Source: fDi markets

NOTE: The top panel in this figure shows the total number of projects by region announced from 2009 to 2011 (Pre Policy), and from 2012 to 2015 (Post Policy). The bottom panel shows the same information in millions of US dollars.

Figure 7. Event Study for FDI Amounts, Number of Projects, and Cross-Border M&A



NOTE: The first figure shows the estimations based on equation 5 using FDI as a dependent variable with no control variables. The source is fDi Markets data from 2009 to 2015. The second figure shows the estimations based on equation 5 using the number of projects per year as a dependent variable with no control variables. The sample is restricted to firms making more than one announcement per year. It does not show results for 2009 due to lack of observations. The source is fDi Markets data from 2009 to 2015. The third figure shows the estimations based on equation 5 using the existence of a cross-border merger and acquisition deal as a dependent variable with no control variables. The source is Thompson and Reuters M&A data from 2009 to 2014.

Table 12. Effects of Trade Barriers on FDI

Panel A: Estimation of coefficients (PPML)			
	(1)	(2)	(3)
	FDI	FDI	FDI
Targeted*2009	0.810	0.826	-0.321
	(1.267)	(1.258)	(1.249)
Targeted*2010	-0.662	0.223	-0.224
	(1.238)	(1.780)	(1.221)
post-policy			
Targeted*2012	2.838**	2.464**	2.352*
	(1.197)	(1.034)	(1.243)
Targeted*2013	1.762	1.795	2.281
	(1.209)	(1.177)	(1.639)
Targeted*2014	-0.478	-0.303	0.985
	(1.156)	(1.173)	(1.221)
Targeted*2015	1.566	0.983	2.392*
	(1.078)	(1.417)	(1.301)
Fixed effects			
Firm	✓	✓	✓
Month	✓	✓	✓
Year	✓	✓	✓
Controls			
Jobs		✓	
Projects			✓
Observations	6468	6468	6468
PseudoR^2	0.372	0.475	0.762
Panel B: Economic valuation of coefficients (in million dollars)			
Targeted*2012	145	97	86
Targeted*2015			90
Mean FDI pre-policy for targeted firms:			9
Targeted*2012	208	139	123
Targeted*2015			129
Mean FDI pre-policy for all firms:			13

NOTE: Panel A of this table presents the results of the PPML estimations for equation 5 using fDi markets data from 2009 to 2015. The dependent variable is FDI in million dollars per month per project. The coefficients represent semi-elasticities. The percentage change is calculated as=100*(exp(δ)-1)%. Standard errors clustered at the firm level are shown in parentheses. Statistical significance levels are given by: $^{*}p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Panel B presents the economic valuation. For each statistically significant coefficient, I estimate the percentage change and then multiply it by the yearly values in the pre-policy period of the mean dependent variable both for targeted and all firms.

Table 13. Effects of Trade Barriers on the Number of Projects

Panel A: Estimation of coefficients (PPML)			
	(1) Projects	(2) Projects	(3) Projects
Targeted*2010	0.142	0.117	0.149
	(0.274)	(0.274)	(0.292)
post-policy			
Targeted*2012	-0.0162	-0.0209	0.0132
	(0.212)	(0.213)	(0.209)
Targeted*2013	-0.755***	-0.708***	-0.827**
	(0.209)	(0.166)	(0.342)
Targeted*2014	-0.799***	-0.800***	-0.839***
	(0.245)	(0.238)	(0.189)
Targeted*2015	-0.186	-0.234	-0.223
	(0.331)	(0.340)	(0.351)
Fixed Effects			
Firm	✓	✓	✓
Year	✓	✓	✓
Controls			
Jobs		✓	
FDI			✓
Observations	552	552	552
PseudoR^2	0.0994	0.0998	0.101
Panel B: Percentage change in the number of projects			
Targeted*2013	-53	-51	-56
Targeted*2014	-55	-55	-57
Projects pre-policy for firms in the subsample:			
	Mean	Std. Dev	Max
Targeted	2.5	0.6	4
All firms	2.9	1.2	7

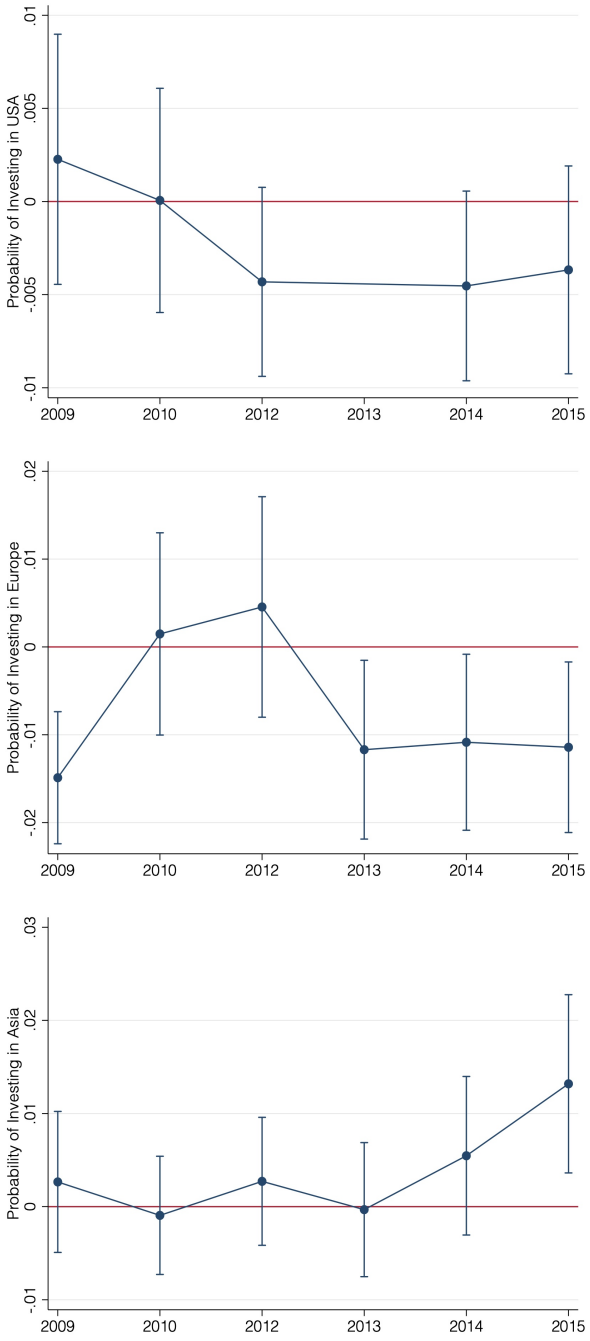
NOTE: Panel A of this table presents the results of the PPML estimations for equation 5 using fDi markets data from 2009 to 2015 for the subsample of firms that make more than one announcement per year. The dependent variable equals the number of announced projects per year. It does not show results for the year 2009 due to lack of observations. The coefficients represent semi-elasticities. The percentage change is calculated as=100*(exp(δ)-1)%. Standard errors clustered at the firm level are shown in parentheses. Statistical significance levels are given by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Panel B presents the equivalence in the percentage change for the projects for each statistically significant coefficient.

Table 14. Effects of Trade Barriers on M&A

Panel A: Estimation of coefficients (PPML)		
	(1)	(2)
	M&A	M&A
Targeted*2009	-0.614	-1.205
	(0.614)	(0.751)
Targeted*2010	1.163	0.896
	(0.985)	(0.983)
post-policy		
Targeted*2012	-1.469**	-1.448*
	(0.684)	(0.875)
Targeted*2013	-0.960	-1.096
	(0.729)	(0.792)
Targeted*2014	-0.291	-0.105
	(0.694)	(0.824)
Fixed Effects		
Firm	✓	✓
Month	✓	✓
Year	✓	✓
Controls		
Completed	✓	✓
Cross Border		✓
Observations	1512	1512
PseudoR^2	0.299	0.329
Panel B: Percentage change in M&A		
Targeted*2012	-77	-76

NOTE: Panel A of this table presents the results of the PPML estimations for equation 5 using Thomson and Reuters M&A data from 2009 to 2014. The dependent variable equals to one the month there is an M&A deal and zero otherwise. The coefficients represent semi-elasticities. The percentage change is calculated as=100*(exp(δ)-1)%. Standard errors clustered at the firm level are shown in parentheses. Statistical significance levels are given by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Panel B presents the percentage change in the probability of having an M&A deal for each statistically significant coefficient.

Figure 8. Location Choice by Year for Targeted Firms



NOTE: These figures show the conditional marginal effects with 95% confidence intervals for targeted firms on the predicted probability of investing in the US for the first graph, Europe for the second, and Asia for the third. Estimations are based on equation 6 using FDI as the control variable. Coefficients for the US in 2013 cannot be estimated due to a lack of observations.

Table 15. Location Choice in 2015

Conditional Marginal Effects (delta-method)						
0.Non-targeted	(base outcome)					
1.Targeted	dy/dx	std. err.	z	P>z	[95% conf.	interval]
Outcome:						
Asia	0.363	0.130	2.800	0.005	0.109	0.617
Europe	-0.421	0.122	-3.440	0.001	-0.661	-0.181
North America	-0.085	0.067	-1.260	0.209	-0.217	0.047
Africa	0.084	0.082	1.030	0.303	-0.076	0.244
Latin America & Caribbean	0.075	0.079	0.940	0.345	-0.080	0.229
Oceania	-0.016	0.012	-1.380	0.168	-0.039	0.007

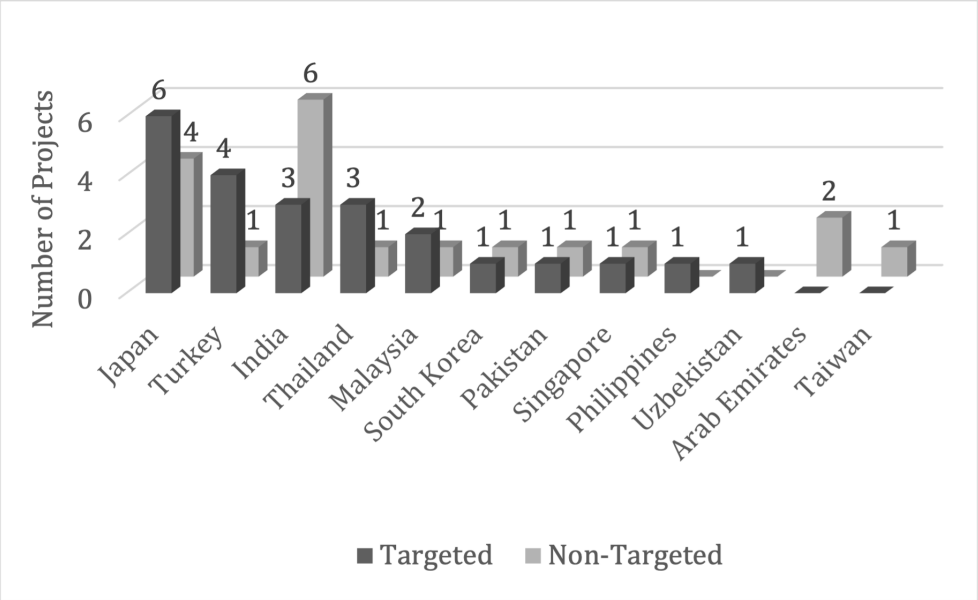
NOTE: This table shows the conditional marginal effects for targeted firms on the predicted probability of choosing from the set of location choices J=1,...,6. Estimations are based on the conditional logit model from equation 8, using as control variables GDP per capita, inflation rate, and an index of the rule of law. dy/dx is the discrete change from the base level. Standard errors are clustered at the firm level.

Table 16. Production Relocation in Asia

Linear Probability Estimation of Investing in Asia in 2015 by Firms:				
Industry Activity	(1) Targeted	(2) Non-Targeted	(3) Targeted	(4) Non-Targeted
Electricity	0.784***	0.212	0.757***	-0.162
	(0.146)	(0.154)	(0.149)	(0.278)
Manufacturing	0.830***	0.563**	0.742***	-0.120
	(0.147)	(0.261)	(0.248)	(0.502)
Sales	0.979***	0.494*	0.898***	-0.234
	(0.014)	(0.252)	(0.084)	(0.444)
Headquarters	-0.021	-0.003***	-0.100	-0.589**
	(0.014)	(0.001)	(0.084)	(0.224)
Logistics	-0.002		-0.172	
	(0.001)		(0.165)	
Design		-0.001***		-0.589**
		(0.000)		(0.224)
Firm FE	✓	✓	✓	✓
Controls	FDI	FDI	Projects	Projects
Observations	300	624	300	624
R^2	0.864	0.591	0.863	0.569

NOTE: This table presents the results of the OLS estimations for equation 9 using fDi markets data for the year 2015. Columns 1 and 3 show the results for the sample restricted to targeted firms, while columns 2 and 4 show the results for the sample restricted to non-targeted firms. The dependent variable equals one if a firm investments in Asia in a specific month, and zero otherwise. The coefficients multiplied by 100 represent the percentage change. Some coefficients are not estimated due to a lack of observations. Standard errors clustered at the firm level are shown in parentheses. Statistical significance levels are given by: $^{*}p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Panel B presents the economic valuation. For each statistically significant coefficient, I estimate the percentage change and then multiply it by the yearly values in the pre-policy period of the mean dependent variable both for targeted and all firms.

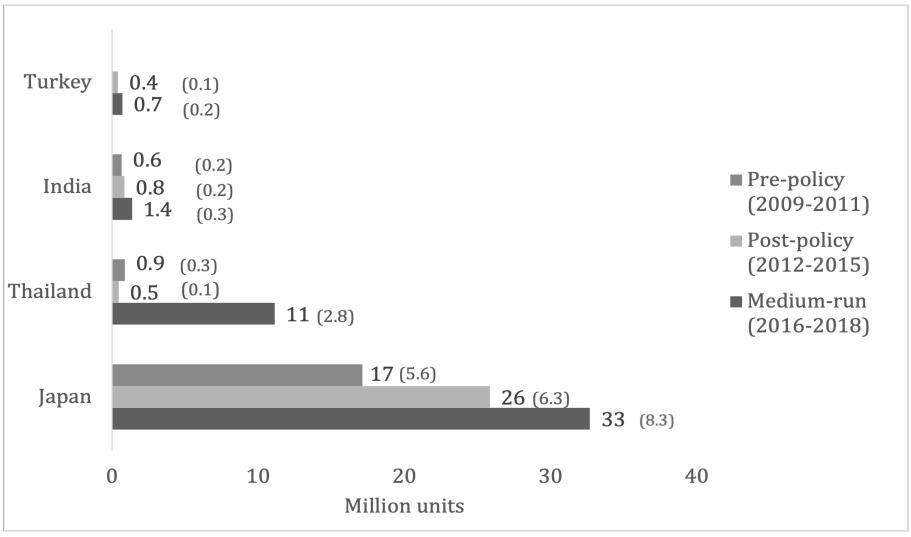
Figure 9. FDI in Asian Countries Post-Policy by Group of Firms



Source: fDi markets

NOTE: This figure shows the number of projects in Asia announced by targeted and non-targeted firms from 2012 to 2015.

Figure 10. US Imports of Solar Cells by Country of Chinese FDI Destination: Million Units & (Percentage of Total)



Source: USITC

NOTE: This figure shows the number of solar cells in million units imported into the US from selected Asian countries from 2009 to 2018 by sub-periods. In parenthesis is the number as a share of total US imports of solar cells in each sub-period.

Table 17. Effects of Trade Barriers on FDI - Anticipation Test

Panel A: Estimation of coefficients (PPML)		
	(1)	(2)
	FDI	FDI
Targeted*2009	1.208	0.483
	(1.350)	(1.506)
Targeted*2010	-0.264	-0.989
	(1.288)	(1.451)
post-policy		
Targeted*2012	3.181**	2.456*
	(1.274)	(1.437)
Targeted*2013	2.160	1.435
	(1.467)	(1.610)
Targeted*2014	-0.0802	-0.805
	(1.233)	(1.400)
Targeted*2015	1.963*	1.239
	(1.173)	(1.345)
Fixed Effects		
Firm	✓	✓
Month	✓	✓
Year	✓	✓
Period Removed		
Nov.2011-Apr.2012	✓	
Sep.2011-Apr.2012		✓
Observations	5382	5092
PseudoR^2	0.362	0.379
Panel B: Economic valuation of coefficients (in million dollars)		
Targeted*2012	208	96
Targeted*2015	55	
Mean FDI pre-policy for targeted firms:		9
Targeted*2012	298	138
Targeted*2015	79	
Mean FDI pre-policy for all firms:		13

NOTE: Panel A of this table presents the results of the PPML estimations for equation 5 using fDi markets data from 2009 to 2015. In the first column, the months from November 2011 to April 2012 are removed; in the second column the months from September 2011 to April 2012. The dependent variable is FDI in million dollars per month per project. The coefficients represent semi-elasticities. The percentage change is calculated as=100*(exp(δ)-1)%. Standard errors clustered at the firm level are shown in parentheses. Statistical significance levels are given by: $^{*}p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Panel B presents the economic valuation. For each statistically significant coefficient, I estimate the percentage change and then multiply it by the yearly values in the pre-policy period of the mean dependent variable both for targeted and all firms.

Table 18. Effects of Trade Barriers on FDI - Financial Sub-Sample

Panel A: Estimation of coefficients (PPML)			
	(1)	(2)	(43)
	FDI	FDI	FDI
Targeted*2009	-0.422	-0.227	-2.400
	(1.604)	(2.089)	(1.853)
post-policy			
Targeted*2012	5.271***	5.285***	6.609***
	(1.768)	(1.668)	(2.027)
Targeted*2013	1.937	1.892	2.378
	(1.860)	(1.845)	(2.139)
Targeted*2014	1.151	0.812	-1.851
	(2.174)	(1.987)	(1.779)
Targeted*2015	3.755*	2.982	3.826**
	(1.941)	(1.984)	(1.913)
Fixed Effects			
Firms	✓	✓	✓
Year	✓	✓	✓
Controls			
CapExAs	✓		✓
DEBTA		✓	✓
Observations	96	89	82
PseudoR^2	0.770	0.783	0.864
Panel B: Economic valuation of coefficients (in million dollars)			
Targeted*2012	2406	2440	9207
Targeted*2015	519		558
Mean FDI pre-policy targeted firms, sub-sample:			12
Targeted*2012	3086	3130	11808
Targeted*2015	665		715
Mean FDI pre-policy all firms, sub-sample:			16

NOTE: Panel A of this table presents the results of the PPML estimations for equation 5 using fDi markets data from 2009 to 2015 merged with Refinitiv data. These are sub-samples that contain financial information from publicly traded firms. The dependent variable is FDI in million dollars per year per firm. The variable CapExAs is the ratio of capital expenditure over assets. The variable DEBTA is the total debt percentage of total assets. The coefficients represent semi-elasticities. The percentage change is calculated as=100*(exp(δ)-1)%. Standard errors clustered at the firm level are shown in parentheses. Results for the year 2010 are not estimated due to a lack of observations. Statistical significance levels are given by: $^{*}p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Panel B presents the economic valuation. For each statistically significant coefficient, I estimate the percentage change and then multiply it by the pre-policy period mean dependent variable in the sub-sample both for targeted and all firms.

CHAPTER 4.

UNRAVELING PROTECTIONISM: STRATEGIC RESPONSES OF CHINESE MULTINATIONALS TO US TRADE POLICY

4.1 Introduction

The recent shift in the global economy from openness to trade protectionism and the increased prevalence of industrial policy challenge international business (IB) practice and theory (Luo (2023)). This paradigm change raises questions about the effects on multinational enterprises (MNE) facing uncertainties in their global operations (Luo and Van Assche (2023), Buckley (2020)). Especially when targeted firms are part of corporate families that develop several industrial and business activities, how does the whole corporate structure react to a firm being affected by protectionism?

We examine these questions with a quasi-experimental empirical design and detailed data on Chinese MNEs. Building on the proposal by Meyer et al. (2023) for the study of firms facing sanctions, we develop a framework in which multinational enterprises face changes in international conditions from the World Trade Organization-supported anti-dumping and countervailing duties. We complement this institutional-based view of IB theory with a resource-based view, emphasizing the use of existing resources such as capital and technology, and the development of new ones by expanding their geographical scope.

The current discussion on changes in IB institutional conditions emphasizes protectionism as moving away from the World Trade Organization (WTO) rules. It focuses on cases such as the US and China trade war or the protectionist measures that industrialized countries have implemented after the COVID-19 pandemic and that base their motivation on supply chain or national security concerns.

However, MNEs may face institutional challenges even in a stable international rule-based system. This is the case with anti-dumping and countervailing duties (AD-CVDs) which can be a one-sided change to bilateral trade conditions. Changes in trade policy affect many aspects of MNEs' activities and have unintended consequences that amplify uncertainty in

the global economy (Meyer et al. (2023), Gereffi et al. (2021)). For firms operating globally, these protectionist policies have the potential to harm their operations, use, and development of resources.

We apply our framework to study how MNEs are affected by the AD-CVDs implemented by the US on the import of solar panels from China in 2012. We analyze how they adapt to this changing environment focusing on the financial effects, the strategic responses regarding using existing resources such as labor and industrial capacity, and the establishment of new subsidiaries.

Rather than focusing on the response of firms targeted by the AD-CVDs as if they were stand-alone, which is usual in this literature, we identify those that are part of larger corporate families and show how the whole structure reacts to an earnings shock to one of their members. In a similar approach to the literature that debates how business groups respond to industry-specific shocks, our framework allows us to test the effect on the whole MNE and examine its strategic response.

We develop a difference-in-differences design leveraging specific characteristics of this policy which targets companies in the same industry with two different rates. The US anti-dumping law defines China as a non-market economy. This legal framework assumes that all Chinese firms are under government control unless they prove otherwise. Those that show government independence receive a specific anti-dumping duty rate, while all others in the same industry are granted a general rate, greater than the specific.

The analysis of the export activity by the two groups of firms shows that the larger exporters are those granted the specific rate. Thus, even though the general rate is the largest, it operates as a non-binding constraint due to the lack of relevant export activity by firms receiving it. The different rates reflect the differential exposure to the US trade policy, with firms receiving the specific - lower - rate being the most exposed (Montti (2024)).

Using this variation given by the policy's discriminatory nature, we compare changes in several outcomes of interest before and after the policy by MNEs that have within their

corporate structure a targeted firm, granted a specific rate, relative to MNEs that have within their corporate structure non-targeted firms, assigned the general rate.

We rely on the Directory of Corporate Affiliations (DCA) database and identify multinational enterprises that, within their structure, have firms targeted by the 2012 US AD-CVDs. Our descriptive data analysis and statistical results show this is a heterogeneous group. To address the internal sources of variation, we estimate the effects on the whole sample and different subsamples defined by MNE characteristics like availability of financial data and number of employees.

Our empirical findings show that targeted MNEs experience a reduction in net income and return on assets the year the policy is implemented. Following this negative shock, they develop several strategic responses. They restructure their domestic units by reducing the number of employees in Chinese subsidiaries. They increase the regional dispersion, having more subsidiaries in Asia, especially in other Chinese administrative regions. Finally, they diversify their industrial scope, increasing the number of industry activities developed by all firms in the corporate family. Our analysis of heterogeneous effects shows that companies with less than 100,000 employees are more affected by this external shock and that those in the financial subsample are more capable of implementing an industry diversification strategy.

Our results provide three insights into the IB literature of multinational enterprises facing tensions such as a trade war. First, we find that MNEs are sensitive to industry-specific shocks that impact one firm in the corporate family. Second, US protectionism hurts Chinese MNEs only in the short run as negative financial results disappear after one year. Third, we contribute to analyzing managerial decisions in an unstable international context that hinders globalization by showing that these are dynamic corporations that adapt rapidly.

Our empirical contribution provides an identification strategy that allows us to find the causal effects of these policies on MNEs' finances, structure, and geographical and industrial scope. We make a descriptive contribution showing that in Chinese MNEs that develop

a large set of activities, the data shows great variation and outliers that require careful management for empirical analysis. Further, we detail a case study for the renewable energy sector, contributing to a better understanding of how Chinese multinationals in a key industry operate in the global economy and react to US unilateral changes in trade policy.

The chapter is organized as follows: In section 4.2 we develop our conceptual framework, in section 4.3 we describe our dataset and the variables we use in our estimations. In section 4.4 we explain our model and estimation method, and in section 4.5 our findings. In section 4.6 we discuss the implications for MNEs' managerial decisions. Finally, in section 4.6 we conclude and present our study's limitations and lines for future research.

4.2 MNE Reconfiguration as a Response to AD-CVDs

Building on the proposal by Meyer et al. (2023) for the study of firms facing sanctions, we develop a framework in which MNEs' international changes come from the World Trade Organization-supported AD-CVDs, as suggested in Peng et al. (2008). We complement this institutional-based view of IB theory with the resource-based view (Meyer et al. (2009)).

We use this integrated framework to analyze how changes in bilateral trade conditions impact the internal aspects of Chinese MNEs affected by US protectionism. We focus on how they recover from a negative financial shock adapting to a changing environment by reorganizing their resources, and geographic and industrial scope.

The institution-based view of international business asks how institutions impact firm strategy and performance (Peng et al. (2008)). Recent developments in the global economy, such as the rise of protectionism and geopolitical tensions, have prompted IB theorists to suggest that the institutional view needs to adapt to be able to explain this new reality (Luo (2023), Luo and Van Assche (2023), Meyer et al. (2023)). However, tensions and uncertainties also arise under the global institutions governed by the World Trade Organization's rules, such as anti-dumping and countervailing duties.

The Anti-Dumping Agreement (Agreement on Implementation of Article VI of the GATT 1994) defines dumping as "the introduction of a product into the commerce of another country at less than its normal value" (World Trade Organization). The Agreement on Subsidies and Countervailing Measures allows countries to charge a countervailing duty when they find that subsidized imports are hurting domestic producers (World Trade Organization).[14] Because both mechanisms aim at specific products and exporters from a particular country they make for an interesting setting to analyze the differential effects of international policy changes.

AD-CVDs target specific firms in a particular industry, many of which are not stand-alone but part of a larger corporate structure such as a business group. From a resource-based view, foreign trade and investment policies impact the diversification and organization of

[14]See more information for AD and CVD.

business groups in emerging economies. In particular, diversification facilitates access and the combination of domestic and foreign resources such as inputs, processes, and market access (Guillén (2000)).

An earnings shock to one firm can generate trickle-down effects for others in the corporate family (Bertrand et al. (2002), Siegel and Choudhury (2012)). Due to the AD-CVDs' discriminatory nature, we can assess how a trade policy change affecting one firm impacts the whole corporate structure.

Multinational enterprises must make critical strategic decisions regarding their resources and operations when faced with a changing institutional context. These include exploiting loopholes in the regime or relocating operations to third countries and have short and long-term intended and unintended consequences for the organization (Meyer et al. (2023)). Many IB theories focus on the ownership, exploitation, and acquisition of resources to explain MNEs' internationalization strategies (Dunning (1980)). We build on this resource-based view by focusing on how multinationals reconfigure their structure and geographic scope across locations when AD-CVDs disrupt the external environment. Using this policy change to examine institutional transitions allows us to have a country and industry-specific focus.

Motivated by the challenges posed by a negative shift in bilateral trade policy, MNEs can move away from the targeted country into trade-neutral zones, increasing the geographic scope of their organizational units. This behavior has been described as "friend-shoring" in the current context of deglobalization of international trade policies (Hsu et al. (2022)). Previous work has shown that even in a context of growing globalization, the largest MNEs tend to have a home region orientation (Rugman and Verbeke (2004), Banalieva and Dhanaraj (2013)). A widely accepted explanation for this phenomenon is that distance, be it cultural, administrative, geographic, or economic, increases costs and thus refrains multinationals from engaging in international trade, investment, and business with countries far away from their home market (Ghemawat (2001), Hofstede (1994)).

Strategies for alleviating negative impacts induced by trade restrictions involve

production-switching, which implies moving production to countries unaffected by the barriers, or market-switching, which entails selling products to alternative countries (Gereffi et al. (2021)). Due to the size of their economy, Chinese companies can even move away from foreign markets into their domestic economy to avoid trade barriers. Firms can also leverage their resources and diversify their industrial activities to avoid dependence on the harmed industry.

MNE responses depend on managerial decisions and are possible due to context-specific capabilities (Meyer et al. (2009)). Strategic and organizational flexibility allows firms to compete and adapt in volatile environments, especially in emerging economies (Witt (2019), Meyer et al. (2023)). This adaptive managerial approach is key to firms overcoming negative external shocks and not losing relevance in the international markets, even within a seemingly stable WTO-ruled system.

Changes in external conditions directly affect MNEs' operations and require specific strategies. Wenzel et al. (2021) find four strategies firms implement when responding to a crisis. Retrenchment, which implies reducing costs, assets, and product lines, among others, and has the potential of narrowing the scope of the firm's business activity. In contrast, a persevering strategy aims to maintain the firm's activity after a crisis. Another approach is innovating, which they define as realizing strategic renewal in a crisis response. Strategic renewal, as defined by Agarwa and Helfat (2009), can involve continuing incremental changes and discontinuous transformations and may include widening the scope of the business. Finally, an exit strategy is discontinuing a firm's business activities after a crisis.

4.3 Data and Variables

In this section, we describe how we construct our dataset, the units of analysis for our difference-in-differences design, and the several variables we use in our empirical analysis.

Datasets

Our main data comes from the LexisNexis' Directory of Corporate Affiliates (DCA) and consists of Chinese MNEs from 2010 to 2015. This period allows us to have two years before the AD-CVDs are in place, and observe possible mid-term effects after their implementation.

The DCA provides corporate affiliations on global parent companies, affiliates, subsidiaries, and divisions. It traces corporate families to several linkage levels, which allows us to capture the full chain of ownership affiliations, defining the headquarters as the ultimate parent. For non-US-based companies to be included in this dataset, they have to demonstrate revenues above $10 million.

We use the Financial Times' fDi markets dataset to identify Chinese multinational enterprises in the solar panel industry with an active international market presence through a variable that does not relate to the AD-CVD rate. Since larger exporters receive the specific anti-dumping duty rate, we focus on FDI which reflects international activity and is not endogenous to the treatment assignment.

From the Federal Register, we use the list of company names published in the determination for the anti-dumping duty order (United States Department of Commerce (2012a)). We call them targeted solar firms. We search for them in the fDi markets dataset to find Chinese solar panel firms in the international market and then move to the DCA dataset to identify their whole corporate family.

We define targeted MNEs as corporate families with a targeted solar firm making FDI announcements during our analysis period. In the DCA dataset, we identify the whole corporate family and define the variable "treated headquarters" as equal to one for its ultimate parent. This is our main analysis unit.

We define the non-targeted MNEs for the control group in our difference-in-differences

design. To construct them, we first identify Chinese firms that make foreign direct investment announcements during the analysis period and operate in the same economic activities as the targeted solar firms but are not listed in the Federal Register. We classify them according to cluster, industry, sub-sector, and industry activity classification in the fDi markets dataset. This yields a control group with firms that the US Department of Commerce does not list but are as similar as possible to the listed ones regarding their industry and FDI activity. We call them non-targeted solar firms. In the DCA dataset, we identify their whole corporate family and set the variable "treated headquarters" equal to zero for its ultimate parent.

In Figure 11 we present an example of how we define a treated headquarters equal to one and zero. In Panel A we show the example of a targeted MNE. In this case, the targeted solar firm is in level 0, we identify its ultimate parent and set the variable treated headquarters to one.[15] In Panel B, we show the example of a non-targeted MNE. In this case, the non-targeted solar firm is in level 0, we identify the ultimate parent of that firm and set the treated headquarters variable to zero.

From the descriptive data provided by the DCA, we use the number of employees at the headquarters and subsidiary level, and primary industries indicated by Standard Industry Codes (SIC). We also take advantage of the financial and location information as described in section 4.3.

We end up with a balanced panel of 28 Chinese MNEs, 17 targeted and 11 non-targeted, for six years. Panel A of Table 20 shows the means test for the differences in the dependent variables during the pre-policy period. There are no statistically significant differences in the number of subsidiaries in Asia and the number of industries, it does show the two groups are different in their average number of employees in China at the 10% significance level. Even though this does not substitute for the parallel trends assumption, it reflects the balance of the two groups before the policy.

Descriptive Analysis

[15] In our dataset the headquarters is level five, to simplify the figure we present only up to level three.

A key feature of this dataset is the heterogeneity in the value of the observations. Since we analyze the effects that AD-CVDs on solar firms have on the whole MNE there is variation in our main variables of interest, defined at the headquarters level. We address this by performing our empirical analysis for the full headquarters sample and two subsamples.

Table 19 depicts the summary statistics of our relevant variables. In Panel A we show the values for the full sample at the headquarters level. In Panel B we restrict the observations to those who are part of the financial subsample, while in Panel C we summarize it for the sample restricted to MNEs with less than 100,000 employees. In Table A17 in the Appendix, we show the summary statistics for the full sample by year, reflecting the evolution of these variables through time.

Our first subsample is restricted to firms with financial information fully available in our dataset, the "financial" subsample. The rationale behind this choice is that MNEs that provide information for their financial indicators are mostly publicly traded and share this data due to regulation requirements. Thus, they have specific characteristics that differentiate them from those without this information. This subsample has 11 MNEs, 8 targeted and 3 non-targeted.

This being a small subsample might create concerns about possible biases. In particular, how the specific characteristics of these MNEs that differentiate them from the full sample impact our estimations. Despite this, we find that including the results for this subgroup contributes to the analysis of our overall results by considering different sources of data variation.

Panel B of Table 20 shows the means test for the difference in the dependent variables during the pre-policy period for this subsample. There are no statistically significant differences in the financial results, the number of subsidiaries in Asia, and the number of industries; the two groups differ in their average number of employees in China at the 5% significance level. Despite these two groups being different in size, they are balanced before the policy in almost all outcome variables. Importantly, the difference-in-differences design assumes that

the differences between the two groups would have remained unchanged without the policy.

The second subsample is defined by the number of employees at the headquarters level. It comprises firms that before the policy, during 2010 and 2011, had less than 100,000 employees. This number represents approximately the mean plus one standard deviation of employees. This subsample has 20 MNEs, 14 targeted and 6 non-targeted MNEs. Panel C of Table 20 shows that these two groups do not have statistically significant differences in the mean outcome variables in the pre-policy period.

To further describe our data, in Figure 12 we present the scatter plots by year for all the variables, differentiating by targeted and non-targeted MNE. This visualization provides more evidence of the intrinsic heterogeneity of the sample and the variation in the mean values of our variables of interest.

The heterogeneous characteristic of our study object, Chinese MNEs with solar firms within their structure, impacts our analysis and estimations. Our empirical approach explained in detail in section 4.4 captures outliers and other specific characteristics with MNE fixed effects. The intrinsic variation in our dataset, especially toward the end of our analysis period, impacts the standard errors of our estimations, though not the point estimates.

Variables

In this subsection, we describe the construction of the several dependent variables we use to evaluate the impact of AD-CVDs in Chinese MNEs. In all cases, the independent variables are the interaction of the treatment and the year.

Dependent Variables

First, we use a set of dependent variables to analyze the effects of the AD-CVDs on targeted MNEs' financial performance, relying on two financial indicators: net income (in million dollars) and return on assets. These variables are measured at the headquarters level. The net income variable is provided in our dataset and reflects a company's revenues minus its expenses, a useful measure for assessing its profitability. We construct the variable ROA (Return On Assets) as the net income ratio over assets. This performance measure compares

a company's profit with the capital invested in assets.

We investigate the effects on MNE structure focusing on their level of employment. We rely on the number of employees at the headquarters level provided by our dataset. Then, focus on their domestic operations and create the variable "Number of Employees in Chinese Subsidiaries", defined as the sum of the employees in companies located in mainland China for targeted or non-targeted MNEs.

To account for the regional dispersion of firms, we create a variable that counts the yearly number of foreign subsidiaries in Asia. This leaves out mainland China but includes Hong Kong, Macau, and other Asian countries in the sample.[16] We consider an alternative measure for Chinese foreign subsidiaries in Asia. We create a variable that counts all Asian subsidiaries except the People's Republic of China's administrative divisions. We call this variable "Asia not PRC" and it excludes mainland China, Hong Kong, and Macau.

Finally, we focus on the firms' industrial scope. The dataset provides Standard Industrial Classification (SIC) codes at the 4-digit level by year for each unit in the corporate family. The maximum number of SIC codes observed in the data for the same company level is nine. This means a subsidiary can have activities in nine different industries in one year. We construct the variable "Number of SIC Codes" at the headquarters level by counting all the different SIC codes by all the companies in the corporate family.

Control Variables

To isolate the effect of the policy we rely on two-way fixed effects: unit and time. MNE-level fixed effects capture time-invariant characteristics of our units of analysis. The year-fixed effects control for time-specific variations common to all units (Angrist and Pischke (2008)). Our main explanatory variables are the interaction of targeted headquarters and year, accounting for the differential effects before and after the policy for our group of interest with respect to our control group.

[16] All Asian countries in the sample are China, China (Hong Kong), Japan, Singapore, India, Taiwan, China (Macau), Philippines, United Arab Emirates, Malaysia, Pakistan, Saudi Arabia, Indonesia, Jordan, Thailand, Uzbekistan, Vietnam.

4.4 Model and Estimation Method

To evaluate the impact of the AD-CVDs on targeted Chinese MNEs, we develop a difference-in-differences design exploiting the fact that the policy targets firms in the same industry with different rates.

The AD-CVD orders result from investigations by the US Department of Commerce to determine the existence of dumping and subsidies, and by the US International Trade Commission to determine if subject imports materially injure the domestic industry. The final determination provides a list of targeted companies that are granted a specific anti-dumping duty rate, this gives us our cross-sectional variation. The treatment is given by the differential AD-CVD rates the US imposed in 2012 on the imports of Chinese solar cells and modules.

The design has specific characteristics given by the US anti-dumping law defining China as a non-market economy (Section 771(18) of the Tariff Act of 1930). The US Department of Commerce assumes that all Chinese firms are under government control unless they prove otherwise, in which case they are granted a specific anti-dumping duty rate. All other Chinese firms in the industry are assigned a general - larger - rate (PRC-wide).

The analysis of the export activity by the two groups of firms shows that the larger exporters are those granted the specific rate. Thus, even though the PRC-wide rate is the largest, it operates as a non-binding constraint due to the lack of relevant export activity by firms receiving it. The different rates reflect the differential exposure to the US trade policy, with firms receiving the specific - lower - rate being the most exposed (Montti (2024)). Our model is expressed at the level of MNE i and year t as follows:

$$Y_{it} = \sum_{s=2009}^{2015} \delta_t (D_{it} \times 1[t = s]) + \gamma_i + \lambda_t + \epsilon_{it}. \tag{10}$$

Where Y_{it} represents our dependent variables of interest depending on the effect we are

assessing, as described in section 2; D is a binary indicator for targeted MNE; γ_i are MNE fixed effects; λ_t are year fixed effects, and ϵ_{it} is the error term. Robust standard errors are clustered at the MNE level. We use OLS to estimate our main coefficient of interest δ_t.

The key assumption in a difference-in-differences design is the existence of parallel trends, which implies that the pre-treatment trajectories for treated and control groups are parallel (Cunningham (2021)). We present support for this assumption in our framework in the event study plots in Figures A4. We show the results for the subsample of MNEs with less than 100,000 employees since it captures statistically significant effects after the policy for all our variables of interest. The bars in the chart display the estimated coefficients at 90 and 95 % confidence intervals.

The event studies show that the estimated coefficients have no statistically significant effects in the years before 2012. This reflects that the two groups' dynamics are comparable in the pre-treatment period for all our outcomes of interest, as necessary for the validity of the design.

4.5 Findings: MNE Shock and Reconfiguration

In this section, we show and discuss how the 2012 US AD-CVDs on solar panels resulted in a negative shock and a reconfiguration by Chinese multinational enterprises with solar firms within their structure.

Our main explanatory variables are the interaction of year and targeted MNE. We use 2011 as the baseline as it is the last year without the effects of the policy. As expected for a valid difference-in-differences design, we do not obtain statistically significant effects in the pre-policy period (before 2012). All our estimations include MNE and year-fixed effects. At the bottom of each result table, we display the mean and standard deviation of the respective dependent variable for the whole period.

Despite some of our results being statistically significant at the 10% level, we still support these findings as statistically meaningful since many are close to a p-value of 0.050 and the point estimates are robust throughout our specifications. The main reason behind this lower statistical significance is the variation and magnitude of the standard errors due to the heterogeneity in our sample that we address throughout our analysis.

Financial Results

In Table 21, we present the estimation results for the financial variables net income and return on assets (ROA). In the first two columns, we use the financial subsample, in columns three and four, those with less than 100,000 employees. Our estimations only include MNEs with complete information for this variable during the period, thus we cannot capture the financial effects in all firms affected by the shock but only those sharing their financial data. Still, these results provide relevant information on the policy effects and help better understand the impacts on MNEs.

In column 1, we present the results for the net income variable expressed in million dollars. The coefficients of the interaction between treated headquarters and year only show statistically significant effects in 2012. The point estimate indicates that targeted MNEs decrease their net income by 301.2 million dollars (p-value is 0.067) compared to the non-

targeted group. In this specification, the mean net income for the period 2010-2015 is about 39 with a standard deviation of 394 million dollars. This reflects the economic significance of the effect we find as well as the large heterogeneity of the observations.

In column 2, the estimations for ROA, which is the net income normalized by assets and is measured as a percentage, have no statistically significant results.

Column 3 shows the estimated effects on net income for MNEs with less than 100,000 employees. In this case, we also find that the interaction coefficients between treated headquarters and year show statistically significant effects in 2012. The coefficient of -348.4 million dollars (p-value is 0.050) reflects that the loss for the targeted MNEs in this subsample is larger than for those in the financial one. Furthermore, this subsample has a smaller mean of the dependent variable, 26.67 million dollars, and a larger standard deviation, 410.7, than firms in the previous subgroup. Thus, even though these companies are more similar in terms of their number of employees, they are more heterogeneous in their financial performance.

Meanwhile, in column 4, the impact on the return on assets is negative and significant in 2012. The point estimate of -0.089 (p-value is 0.037) indicates that targeted MNEs experience a decrease in the return on assets of nearly 0.09 percentage points compared to the non-targeted group. This is larger than the mean of -0.006.

Overall, we see that the anti-dumping and countervailing duties implemented by the US harm the net income and return on assets of targeted Chinese MNEs the year the policy is implemented. Multinationals with less than 100,000 employees in their headquarters experience larger negative shocks compared to those in the financial subsample, and have a greater dispersion in the observed variables. There are no effects in the rest of the period, showing that this is a short-term negative shock.

Domestic Restructure

We continue our analysis by focusing on the effects on the number of employees. In Table A12 in the Appendix we show that the AD-CVDs do not have statistically significant effects on

employment at the headquarters level. We shift our analysis to the domestic companies and find negative effects.

Table 22 displays the results for the number of employees in Chinese subsidiaries. In the first column, the estimations are performed in the whole sample, in the second, for the subsample of MNEs with available financial data, and in the last one for those with less than 100,000 employees. The estimations only include MNEs with complete information for this variable during the period.

In column 1, there is a negative and statistically significant coefficient of the interaction of treated headquarters and the year 2013. The point estimate of -823.3 (p-value is 0.050) shows a reduction in the number of employees for targeted MNEs with respect to non-targeted. The average number of employees in Chinese subsidiaries in this specification is approximately 41,500 with a standard deviation of more than 100,000. Therefore, our point estimates do not represent a large loss in employment for the whole sample.

In column 2, the statistically significant coefficient for the financial subsample reflects that in 2013 targeted MNEs had a loss of 1042.2 employees (p-value is 0.073) compared to non-targeted. This is a smaller and more homogeneous subsample than that reflected in column 1. The average number of employees is approximately 6,500 and the standard deviation is 9,700. Hence, the point estimate indicates that this group experiences a more severe impact than the previous one.

In column 3 the estimation results for MNEs with less than 100,000 employees show a statistically significant negative coefficient for the interaction of treated headquarters and 2013. The point estimate reflects a loss by the targeted group of about 1067 employees (p-value is 0.046) with respect to the non-targeted. This subsample has an average of 8,190 employees with a 9,898 standard deviation. Thus, on average, these MNEs employ more workers than those in the financial subsample, with a similar dispersion.

These results show that after the negative financial shock experienced in 2012, as the AD-CVDs were implemented, affected MNEs did not reduce the number of employees at the

headquarters level. Instead, they resorted to their domestic companies to recompose their financial performance. This is the case across our different specifications, with smaller MNEs suffering larger employment losses.

Regional Dispersion

Our next analysis looks at the internationalization strategy of the affected MNEs. As we discuss in section , MNEs facing an international changing environment may seek to expand their operations into new countries to take advantage of the available resources. In the case we are analyzing, where China is a direct target of a US trade policy, finding new locations for subsidiaries implies a strategy of moving into a trade-neutral zone.

However, not all new locations present the same desirable characteristics. Familiar locations are preferred when MNEs face financial losses and require a rapid recovery from a negative shock, as in this case. Following our discussion in section 2, we expect them to focus on nearby countries, as being geographically and culturally close is a relevant driver of location choice.

In Table 23 we present the results of our regional dispersion analysis. As we describe in section 2, the dependent variable counts the yearly number of foreign subsidiaries in Asia. This leaves out mainland China but includes Hong Kong, Macau, and other Asian countries in the sample. For a more comprehensive description of our regional dispersion measurement and a better interpretation of the results, in Table A13 in the Appendix we show the frequency of the different values taken by this variable before and after 2012.

Column 1 shows the estimated coefficients for the full sample, with positive statistically significant results for the interaction of treated headquarters and the years 2012 and 2013. The coefficient for the year the policy is implemented is 0.176 (p-value is 0.080) while the following year is 0.235 (p-value is 0.038). Comparing both point estimates with the sample mean of 0.589 implies a 30% increase in the number of Asian subsidiaries in 2012 and almost 40% in 2013 for targeted MNEs with respect to non-targeted.

The estimations for the financial subsample in column 2 show a point estimate of 0.375

(p-value 0.084) in the interaction coefficients for 2012, and 0.500 (p-value 0.033) for 2013. The sample mean in this case is 1.015, almost twice the whole sample, indicating these MNEs have, on average, more subsidiaries in Asia. The results show that the difference in the regional dispersion between targeted and non-targeted MNES is 37% the first year of the policy effect and 50% the following year.

Finally column 3, with results for the subsample with less than 100,000 employees, also has positive and statistically significant coefficients for the interaction of treated headquarters with the years 2012 and 2013. The point estimates of 0.214 (p-value is 0.084) and 0.286 (p-value is 0.040) compared with the mean of 0.592 indicate a rise in regional dispersion variables of 36% and 48% respectively by targeted MNEs with respect to non-targeted.

This illustrates that all MNEs in our sample develop a regionalization strategy as a response to the negative shock created by unilateral changes in bilateral trade policy. The magnitudes are different, with firms in the financial subsample taking more advantage of this approach. In addition, we find this effect concomitantly with the policy implementation in 2012 but is larger in magnitude and statistical significance the following year.

In Table A14 in the Appendix, we present the estimations for an alternative measure of regional dispersion considering the ratio of Asian foreign subsidiaries over all subsidiaries outside China. This specification only yields statistically significant results for the financial subsample, in column 2, for 2012 and 2013. The year the policy is implemented, the point estimate is 0.122 (p-value 0.067), and the following year the point estimate is 0.125 (p-value 0.060); both cases represent an increase of about 74% compared to the sample mean of 0.167. This contributes to showing a consistent pattern from our previous results.

Our alternative definition for Chinese foreign subsidiaries in Asia excludes Hong Kong and Macau, in addition to mainland China, as they are administrative divisions of the People's Republic of China. The estimation results are presented in Table 24 and reflect smaller effects than our previous specification.

In column 1, the estimations for the whole sample show statistical significance for the

interaction coefficient of treated headquarters and the year 2013. The point estimate of 0.176 (p-value is 0.080) compared to the sample mean of 0.387 represents a 45% increase in this variable for targeted MNEs with respect to the non-targeted.

Column 2 presents the estimations for the financial subsample. A statistically significant coefficient of 0.375 (p-value is 0.084) in the interaction coefficient of treated headquarters and 2013 indicates a 52.6% increase in regional dispersion outside of the PRC for the targeted group compared to the non-targeted.

We do not show results for the subsample of MNEs with less than 100,000 employees as there are not enough observations to perform the estimations for the whole period.

This alternative definition of Asian foreign subsidiaries does not have effects in 2012, the year of the policy implementation, as it does in the previous analysis including Hong Kong and Macau. In addition, the results for 2013 have less statistical power than the previous definition.

This reflects that an important part of the regionalization strategy by targeted MNEs includes other Chinese regions. As we discuss in section 2, these results are consistent with the literature that finds a negative relationship between cultural distance and firms' international diversification, in particular, as a determinant of Chinese outward FDI. [17]

In Table A15 in the Appendix, an alternative measure of regional dispersion outside the PRC considers the share of Asian foreign subsidiaries, not PRC over all subsidiaries outside China, Hong Kong, and Macau. This specification only yields statistically significant results for the financial subsample, in column 2, for 2013. The year after the policy, the point estimate of 0.113 (p-value 0.089) represents an increase of about 90% compared to the sample mean of 0.167. Even though the statistical power of this specification measured through the R^2 is low, it shows a consistent pattern from our previous estimations.

Industry Diversification

Lastly, we turn our attention to industrial activities to investigate if targeted MNEs imple-

[17] As an example, Chinese outward FDI to Hong Kong represented 49% of all outward FDI from China in 2012 and 58% in 2022 (CDIS, IMF).

ment a scope diversification strategy. For constructing the dependent variable, as described in section 2, we count all the different SIC codes by all the companies in the corporate family.

For a more comprehensive description of our industry diversification measurement and a better interpretation of the results, in Table A16 in the Appendix we show the frequency of the different values taken by this variable before and after 2012.

Column 1 of Table 25 presents the estimations for the full sample, with no statistically significant effects. The average number of SIC codes in this specification is 4.708 with a standard deviation of 5.103.

In column 2 we see the results for the financial subsample. We find a statistically significant and positive coefficient for the interaction of treated headquarters and the year 2012, with a point estimate of 3.000 (p-value is 0.022). Comparing it with the sample average number of SIC codes, which is 5.970, this represents a 50% increase for the targeted group compared to the non-targeted. The following year, the coefficient is 3.375 (p-value is 0.056) and represents an increase by targeted MNEs of 57% with respect to the non-targeted.

In column 3, we present the estimations for the subsample of MNEs with less than 100,000 employees. We find a positive and statistically significant coefficient in the interaction of treated headquarters and the year 2013. The point estimate of 2.190 (p-value is 0.073) implies that the differential increase in industry diversification by targeted MNEs is 46%.

Our findings show heterogeneous results for the industry diversification strategy. The MNEs that take more advantage of it are those in the financial subsample, which make public their financial data possibly due to being traded in international financial markets. Thus, their organizational structure and managerial capabilities have characteristics that make them more suited than other companies to develop this strategy.

4.6 Discussion: Implications for MNEs

Our results uncover interesting strategic responses. Unfortunately, in some cases, the sample size and heterogeneity yield a statistical significance above the 5% level. However, the consistency of the effects on our dependent variables across the different subsamples signals we are uncovering a pattern in the strategic responses.

We find evidence of retrenchment and innovation in terms of the strategies identified by Wenzel et al. (2021). The first one is cost reduction when we show a decrease in the number of employees in China. However, it is not general to the whole MNE but specific to the domestic companies. We see innovation as a strategic renewal when firms expand their activities toward other industrial sectors, widening their business scope as a response to the changing institutional environment.

Our findings align with the literature claiming that in the absence of a pro-globalization social environment - skepticism of globalization - multinational enterprises' strategies may counteract regulatory restrictions (Cuervo-Cazurra et al. (2020)). We show that despite facing an increase in trade barriers, Chinese MNEs do not diminish their international presence. Rather, they re-focus on the home region by increasing the number of subsidiaries in Asia. Thus, MNEs can alter their organizational structure to facilitate strategic responses that avoid de-globalization measures.

The regionalization strategy by these companies mostly focuses on other Chinese regions. These results align with the literature on cultural proximity as a determinant of Chinese outward FDI and indicate that reduced transaction costs, network effects, and relational assets are important for Chinese investors (Buckley et al. (2007)). Similarly, previous work shows a negative relationship between cultural distance and international diversification in high-technology industries. Since these firms already face a higher risk than others due to their large technology investments, they minimize the potential risks of cultural differences by expanding into markets with familiar cultures (Tihanyi et al. (2005)).

The industry diversification strategy can be seen as divestment from solar activities

because of the targeted AD-CVDs. After receiving an industry-specific shock, MNEs respond by increasing their industrial scope and thus diminishing their exposure to the targeted industry.

Overall, we provide evidence that corporate families are affected by industry-specific shocks to one of their firms. The impact on one of the members leads to strategic reshuffling inside the MNE.

These results highlight it is key for MNEs to show capabilities that allow them to be attuned to geopolitical changes, facing critical decisions driven by institution-based and resource-based motivations. Different strategies must be timely implemented for multinational enterprises to successfully navigate the consequences of the changing conditions in international trade policy, investment, and business.

4.7 Conclusion and Limitations

Our paper focuses on anti-dumping and countervailing duties to study the consequences of protectionist policies on targeted MNEs. These administered forms of protection represent international changes with the potential to harm their operations, use, and development of resources.

We analyze the AD-CVDs implemented by the US on the import of solar panels from China in 2012. We use the DCA database and a difference-in-differences design to document how targeted Chinese MNEs are affected by the policy change, and the strategies they develop as a reaction to the negative shock.

The data analysis shows the heterogeneity of the Chinese MNEs operating in the global economy that have companies in the solar energy sector. This leads us to perform our econometric analysis in different subsamples.

Our policy evaluation focuses on several areas of MNEs' operations and strategies: financial results, domestic restructuring, regional dispersion, and industry diversification.

We find that the 2012 US anti-dumping and countervailing duties harm the net income and return on assets of targeted Chinese MNEs the year they are imposed, with MNEs with less than 100,000 employees experiencing larger negative results. After the negative financial shock experienced in 2012, targeted MNEs did not reduce the number of employees at the headquarters level. Instead, they resorted to their domestic companies to recompose their financial performance, with smaller MNEs suffering larger employment losses.

We document that all targeted MNEs in our sample develop a regionalization strategy as a response to the negative shock created by unilateral changes in bilateral trade policy. These are differences in magnitudes, with firms in the financial subsample taking more advantage of this approach. In addition, we find this starts in 2012, concomitantly with the policy, but is larger in magnitude and statistical significance the following year.

We consider an alternative definition for foreign Chinese subsidiaries in Asia that excludes Hong Kong and Macau and find smaller effects than in the previous case. We explain these

results within the framework of cultural distance's impact on international business strategy and management. In particular for firms in high technology industries, expanding into markets with similar cultural backgrounds minimizes the already high potential risks of international diversification.

Lastly, we shift our focus to industry diversification and find it is a strategy that not all can implement. The MNEs that take more advantage of this are those in the financial subsample, which share a specific set of organizational structure and managerial capabilities.

Our results document that US protectionism harms Chinese MNEs in the short run. They quickly respond by developing strategies to avoid being undermined financially and in their international market preeminence. In addition, we show that for MNEs to take full advantage of this set of strategies they require capabilities to adapt to a changing external environment.

Limitations and Future Research

Our study's limitations suggest future research directions. Firstly, due to data availability and consistency, we focus on a reduced number of Chinese MNEs. Therefore, our study faces issues in terms of generalizability. It would be interesting to find a complementary source of MNE-level information that could provide a wider characterization of the sector.

It would also be interesting to determine if our findings can be applied to MNEs from other home countries. Because the Chinese solar sector experienced a rapid increase in the years before 2012, it might be that there are industry and country-specific skills that allow them to develop this set of reconfiguration strategies.

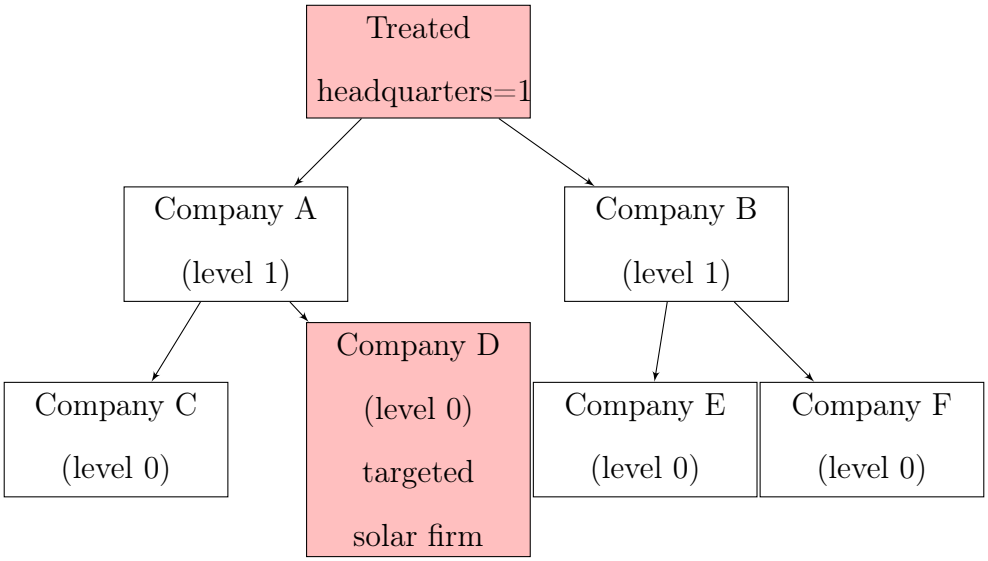
Our study of AD-CVDs allows us to focus on country and industry-specific effects, future research could focus on how this has different effects on MNEs strategies than a generalized increase in tariffs, such as what happened in the US-China trade war.

Finally, the recent growth in the Chinese industry of Electric Vehicles (EV) presents an interesting parallel with the solar panel case. With China becoming the largest EV exporter in the world, both the US and the European Union have been explicit about the possibility

of imposing anti-dumping duties on the import of Chinese EVs. Future research could use the solar panel experience to inform how implementing anti-dumping duties impacts the global provision of resources that promote a green-energy transition.

Figure 11. Example of Targeted and Non-targeted MNE

PANEL A: **Targeted MNE**



PANEL B: **Non-targeted MNE**

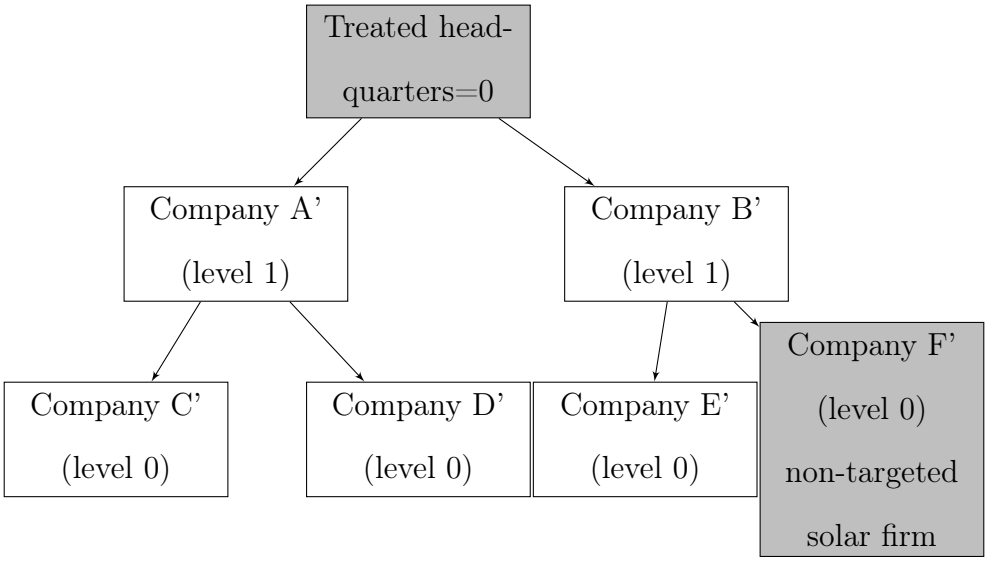
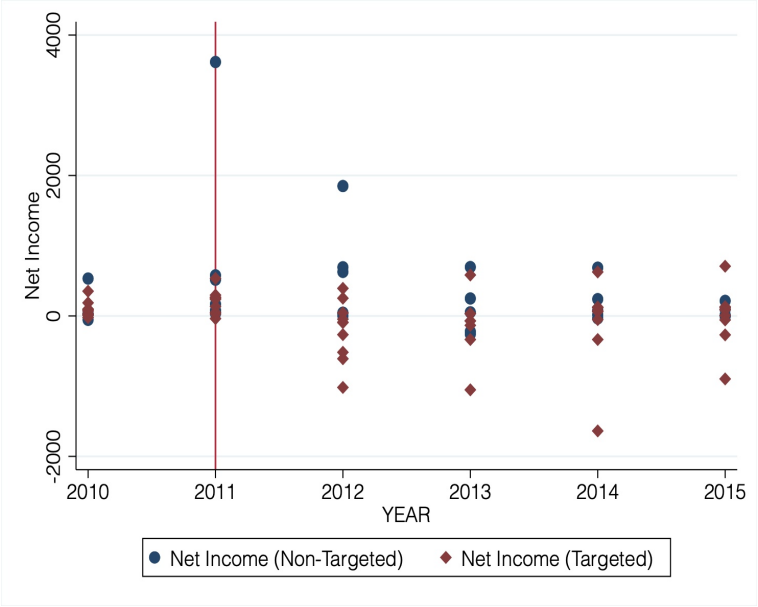


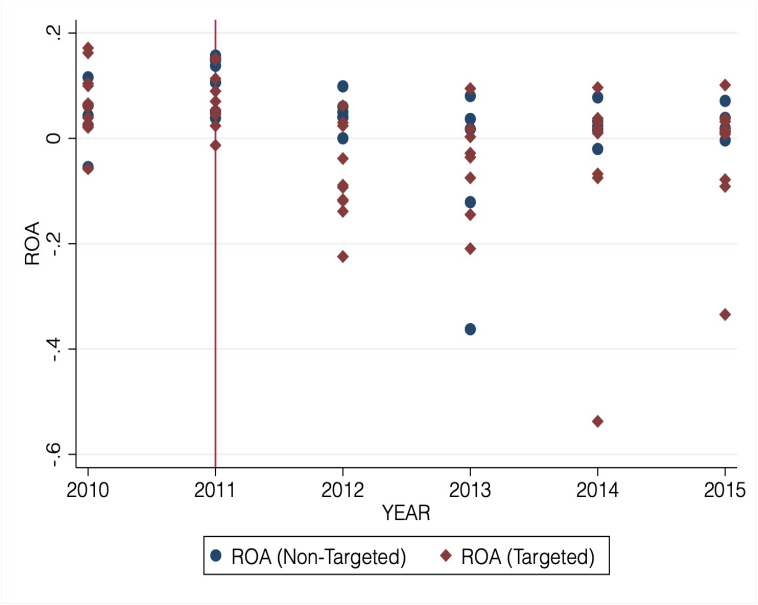
Table 19. Summary Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
Full sample = 28 MNEs					
Employees in China	102	34,138	92,582	0	390,254
Subsidiaries in Asia	168	0.59	1.42	0	11
Number of Industries	168	4.71	5.10	1	28
Financial subsample = 11 MNEs					
Net Income (million USD)	66	39	394	-1637	708
Return Over Assets	66	-0.004	0.12	-0.54	0.17
Employees in China	50	5,230	9,330	0	30,902
Subsidiaries in Asia	66	1	2	0	11
Number of Industries	66	6	7	1	28
<100,000 employees = 20 MNEs					
Net Income (million USD)	74	18	390	-1637	708
Return Over Assets	74	0.004	0.12	-0.54	0.17
Employees in China	75	7,207	9,655	0	30,902
Subsidiaries in Asia	120	1	2	0	11
Number of Industries	120	4.77	5.24	1	28

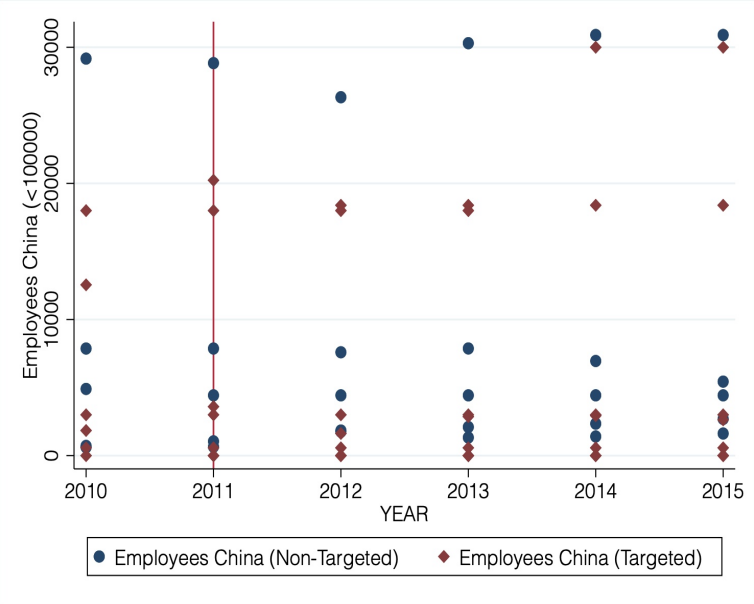
Figure 12. Variables' Scatter Plots by Year for Targeted and Non-Targeted MNEs



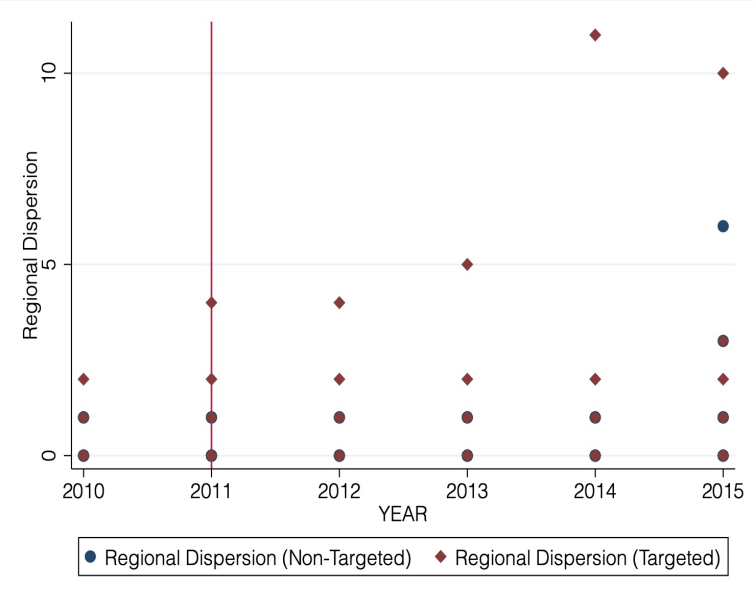
NOTE: This graph shows the yearly average net income or targeted and non-targeted MNEs.



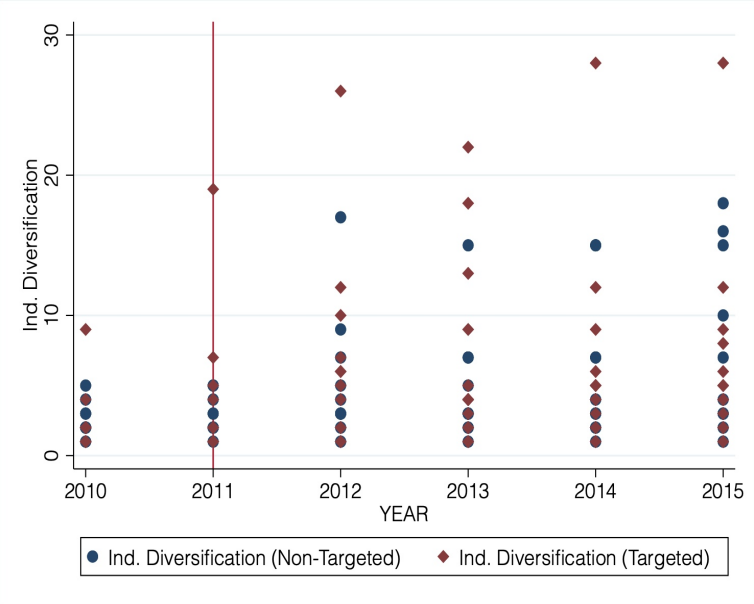
NOTE: This graph shows the yearly average ROA (return on assets) for targeted and non-targeted MNEs.



NOTE: This graph shows the yearly average number of employees in Chinese subsidiaries for targeted and non-targeted MNEs.



NOTE: This graph shows the regional dispersion variable for targeted and non-targeted MNEs measured by the yearly average number of Asian subsidiaries outside mainland China.



NOTE: This graph shows the industry diversification variable for targeted and non-targeted MNEs measured by the yearly average number of SIC codes by all firms in the corporate family.

Table 20. Pre-Policy Means Test for Dependent Variables by Subsample

Pre-policy=2010 & 2011		Non-targeted	Targeted	Difference	t-stat
Panel A: Full Sample (11 non-targeted and 17 targeted MNEs)					
	obs.	14	14		
Employees in China	mean	76,187	5,812	70,375	1.91
	std. dev.	137,334	7,730		
	obs.	22	34		
Subsidiaries in Asia	mean	0.27	0.32	-0.05	0.34
	std. dev.	0.46	0.84		
	obs.	22	34		
Number of Industries	mean	2.68	2.71	-0.02	-0.03
	std. dev.	1.21	3.40		
Panel B: Financial Subsample (3 non-targeted and 8 targeted MNEs)					
	obs.	6	16		
Net Income	mean	219.28	164.97	54.31	0.60
	std. dev.	270.58	153.02		
	obs.	6	16		
ROA	mean	0.06	0.07	-0.01	-0.29
	std. dev.	0.06	0.06		
	obs.	6	6		
Employees in China	mean	12,585	1,908	10,677	1.98
	std. dev.	13,096	1,603		
	obs.	6	16		
Subsidiaries in Asia	mean	0.33	0.56		
	std. dev.	0.52	1.15		
	obs.	6	16		
Number of Industries	mean	3.67	3.63	0.04	0.02
	std. dev.	1.03	4.73		
Panel C: <100,000 employees (6 non-targeted and 14 targeted MNEs)					
	obs.	10	18		
Net Income	mean	148.77	142.30	6.47	0.09
	std. dev.	221.73	151.21		
	obs.	10	18		
ROA	mean	0.07	0.08	-0.01	-0.22
	std. dev.	0.06	0.06		
	obs.	10	12		
Employees in China	mean	8,611	6,781	1,830	0.45
	std. dev.	11,109	7,966		
	obs.	12	28		
Subsidiaries in Asia	mean	0.33	0.29	0.05	0.18
	std. dev.	0.49	0.85		
	obs.	12	28		
Number of Industries	mean	3.17	2.86	0.31	0.29
	std. dev.	1.11	3.59		

Table 21. Financial Results

	(1) Net Income	(2) ROA	(3) Net Income	(4) ROA
TargetedHQ*2010	-3.552	0.016	-9.706	0.010
	(70.08)	(0.069)	(74.75)	(0.071)
	[0.961]	[0.820]	[0.900]	[0.889]
TargetedHQ*2012	-301.2	-0.070	-348.4	-0.089
	(146.9)	(0.039)	(154.1)	(0.036)
	[0.067]	[0.105]	[0.050]	[0.037]
TargetedHQ*2013	-146.4	0.101	-164.6	0.085
	(228.3)	(0.130)	(249.4)	(0.132)
	[0.536]	[0.458]	[0.526]	[0.538]
TargetedHQ*2014	-298.3	-0.074	-329.9	-0.092
	(268.8)	(0.079)	(305.6)	(0.087)
	[0.293]	[0.376]	[0.308]	[0.317]
TargetedHQ*2015	39.16	-0.058	25.19	-0.073
	(220.5)	(0.059)	(241.4)	(0.063)
	[0.863]	[0.351]	[0.919]	[0.278]
Fixed Effects				
MNE	✓	✓	✓	✓
Year	✓	✓	✓	✓
Mean	38.99	-0.004	26.67	-0.006
Std_Dev	394.0	0.119	410.7	0.125
Sample	Financials		<100,000 emp.	
MNEs	11	11	10	10
Observations	66	66	60	60
R^2	0.232	0.405	0.245	0.430

Robust standard errors in parentheses. p values in brackets.

Table 22. Domestic Restructuring

	(1) Employees in China	(2) Employees in China	(3) Employees in China
TargetedHQ*2010	-1408.9	-573.2	-1657.9
	(1115.5)	(610.0)	(1314.5)
	[0.229]	[0.384]	[0.236]
TargetedHQ*2012	-418.6	-437.3	-459.0
	(576.3)	(1103.4)	(770.6)
	[0.481]	[0.706]	[0.565]
TargetedHQ*2013	-823.3	-1042.2	-1066.9
	(381.5)	(480.6)	(468.7)
	[0.050]	[0.073]	[0.046]
TargetedHQ*2014	899.3	-1022.1	942.4
	(1880.9)	(765.0)	(2260.5)
	[0.641]	[0.230]	[0.686]
TargetedHQ*2015	990.9	-887.5	1080.9
	(1937.5)	(1184.2)	(2357.7)
	[0.618]	[0.482]	[0.656]
Fixed Effects			
MNE	✓	✓	✓
Year	✓	✓	✓
Mean	41,453	6,469	8,190
Std_Dev	100,615	9,749	9,898
Sample	Full	Financials	$<$ 100,000 emp.
MNEs	14	7	11
Observations	84	42	66
R^2	0.168	0.184	0.198

Robust standard errors in parentheses. p values in brackets.

Table 23. Regional Dispersion

	(1) Subsidiaries in Asia	(2) Subsidiaries in Asia	(3) Subsidiaries in Asia
TargetedHQ*2010	-0.176	-0.375	-0.143
	(0.131)	(0.281)	(0.148)
	[0.188]	[0.211]	[0.345]
TargetedHQ*2012	0.176	0.375	0.214
	(0.097)	(0.195)	(0.118)
	[0.080]	[0.084]	[0.084]
TargetedHQ*2013	0.235	0.500	0.286
	(0.108)	(0.202)	(0.129)
	[0.038]	[0.033]	[0.040]
TargetedHQ*2014	0.406	0.917	0.548
	(0.437)	(0.948)	(0.538)
	[0.361]	[0.356]	[0.322]
TargetedHQ*2015	-0.294	0.792	0.690
	(0.692)	(0.826)	(0.498)
	[0.674]	[0.361]	[0.181]
Fixed Effects			
MNE	✓	✓	✓
Year	✓	✓	✓
Mean	0.589	1.015	0.592
Std_Dev	1.424	1.981	1.537
Sample	Full	Financials	$<$ 100,000 emp.
MNEs	28	11	20
Observations	168	66	120
R^2	0.156	0.226	0.140

Robust standard errors in parentheses. p values in brackets

Table 24. Regional Dispersion - Asia not PRC

	(1) Subsidiaries in Asia not PRC	(2) Subsidiaries in Asia not PRC
TargetedHQ*2010	-0.059	-0.125
	(0.060)	(0.133)
	[0.335]	[0.371]
TargetedHQ*2012	0.118	0.250
	(0.082)	(0.175)
	[0.163]	[0.183]
TargetedHQ*2013	0.176	0.375
	(0.097)	(0.195)
	[0.080]	[0.084]
TargetedHQ*2014	0.439	0.792
	(0.430)	(0.963)
	[0.317]	[0.430]
TargetedHQ*2015	-0.262	0.667
	(0.699)	(0.840)
	[0.711]	[0.446]
Fixed Effects		
MNE	✓	✓
Year	✓	✓
Mean	0.387	0.712
Std_Dev	1.153	1.537
Sample	Full	Financials
MNEs	28	11
Observations	168	66
R^2	0.140	0.191

Robust standard errors in parentheses. p values in brackets.

Table 25. Industry Diversification

	(1) Number of Industries	(2) Number of Industries	(3) Number of Industries
TargetedHQ*2010	-1.021	-2.500	-1.143
	(0.749)	(1.439)	(0.772)
	[0.184]	[0.113]	[0.155]
TargetedHQ*2012	-0.187	3.000	1.024
	(1.473)	(1.104)	(1.062)
	[0.900]	[0.022]	[0.347]
TargetedHQ*2013	0.711	3.375	2.190
	(1.450)	(1.560)	(1.155)
	[0.628]	[0.056]	[0.073]
TargetedHQ*2014	-0.642	-0.708	0.0238
	(1.502)	(3.293)	(1.767)
	[0.673]	[0.834]	[0.989]
TargetedHQ*2015	-2.107	-1.042	0.286
	(1.791)	(3.587)	(1.915)
	[0.250]	[0.777]	[0.883]
Fixed Effects			
MNE	✓	✓	✓
Year	✓	✓	✓
Mean	4.708	5.970	4.767
Std_Dev	5.103	6.523	5.240
Sample	Full	Financials	$<$ 100,000 emp.
MNEs	28	11	20
Observations	168	66	120
R^2	0.309	0.379	0.291

Robust standard errors in parentheses. p values in brackets.

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APPENDICES

Chapter 2 Appendix

Full Estimations for Losing a Case

In Table A1 I present the full set of coefficients for the effects of losing a case estimated from equation 3.

The effect of having a bilateral investment treaty between the country pair is only statistically significant when considering FDI flows two years after a case. Meanwhile, having a case is negative and statistically significant in all specifications, with columns 1 and 2 referring to a one-year lag, and columns 3 and 4 for two years. The interaction of BIT and case is positive in all cases, but only statistically significant in columns 1 and 4.

The variable indicating if the investor won the case is not statistically significant in any specification. It has a statistically significant and negative effect on flows two years after the case when interacted with the existence of a BIT. On the other hand, the interaction of having a case and an investor winning it is positive for flows one and two years after the case, and not statistically significant for positions.

Thus, the sole fact of an investor winning a case does not provide enough information for a reputational effect. It is the interaction of the whole set of variables and the institutional devices they represent that provide a clearer picture of the developing economy of a destination's reputation.

Full Estimations for Domestic Institutions Complementarity

In Table A2 I present the full set of coefficients for the effects of losing a case estimated from equation 4.

The effect of having a bilateral investment treaty between the country pair is only statistically significant when considering FDI positions one year after a case. Meanwhile, having a case is negative and statistically significant in all specifications, with columns 1 and 2 referring to a one-year lag, and columns 3 and 4 for two years. The interaction of BIT and case is positive in all cases, but not statistically significant in column 3.

The variable *Domestic*, which indicates if the quality of the domestic institutions in enforcing contracts is above the sample mean plus one standard deviation, is not statistically significant in its interaction with the BIT indicator. When interacting with a case, it is only statistically significant, and negative, on positions one year after the case. Meanwhile, the interaction of having a case and an investor winning it is positive for flows one and two years after the case, and not statistically significant for positions. The interaction of *Domestic* and having a case is only statistically significant for FDI positions one year after the case.

Thus, the sole fact of an investor winning a case does not provide enough information for a reputational effect. It is the interaction of the whole set of variables and the institutional devices they represent that provide a clearer picture of the developing economy of a destination's reputation.

Table A1. Effects of Losing a Case on FDI Bilateral Flows and Positions

	(1) FDI flow	(2) FDI flow	(3) FDI position	(41) FDI position
BIT	1.126	1.208*	-0.382	-0.380
	(0.701)	(0.670)	(0.262)	(0.256)
Country pair has a case (t-1)	-1.157*		-0.503*	
	(0.660)		(0.265)	
BIT × Country pair has a case (t-1)	1.378*		0.475	
	(0.736)		(0.315)	
Investor	1.581	2.089	-0.586	-0.092
	(1.581)	(1.384)	(0.479)	(0.541)
BIT × Investor	-1.972	-2.708*	0.111	-0.146
	(1.296)	(1.522)	(0.273)	(0.304)
Country pair has a case (t-1) × Investor	1.834*		0.453	
	(1.067)		(0.430)	
Country pair has a case (t-2)		-1.418*		-0.498***
		(0.729)		(0.193)
BIT × Country pair has a case (t-2)		0.689		0.748**
		(0.791)		(0.322)
Country pair has a case (t-2) × Investor		2.495***		0.162
		(0.926)		(0.493)
Observations	10786	10786	20704	20704
Pseudo R-squared	0.965	0.966	0.991	0.991
All models include: Constant, country of origin-year FE, country of destination-year FE, and country pair FE.				

NOTE: This table shows the results of the PPML estimations based on equation 3. The dependent variable in the first two columns is the FDI flow in the developing economy of the destination from the economy of origin. In columns 3 and 4 the dependent variable is FDI positions. In columns 1 and 3, *Country pair has a case (t-1)* equals to one all the years after the economy of destination faces an ISDS case from a firm from the country of origin, lagged one year. In columns 2 and 4, *Country pair has a case (t-2)* considers two lagged years. *BIT* equals one if a BIT is in force between the country pair and zero otherwise. The variable *Investor* equals 1 if the result of the dispute is favorable to the investor and zero otherwise. Standard errors (clustered by country pair) are in parentheses. *, **, *** represent statistical significance at the 10%, 5% and 1% level, respectively.

Table A2. Effects of Domestic Institutions Complementarity on FDI bilateral Flows and Positions

	(1) FDI flow	(2) FDI flow	(3) FDI position	(4) FDI position
BIT	1.027	1.099	-0.522*	-0.489
	(0.718)	(0.696)	(0.307)	(0.305)
Country pair has a case (t-1)	-1.196*		-0.487*	
	(0.657)		(0.264)	
BIT × Country pair has a case (t-1)	1.430*		0.780**	
	(0.735)		(0.303)	
BIT × Domestic	0.128	0.062	0.187	0.146
	(0.355)	(0.354)	(0.131)	(0.130)
Country pair has a case (t-1) × Domestic	0.119		-0.500**	
	(0.369)		(0.217)	
Country pair has a case (t-2)		-2.338**		-0.481**
		(0.984)		(0.194)
BIT × Country pair has a case (t-2)		1.461		0.934***
		(1.044)		(0.336)
Country pair has a case (t-2) × Domestic		0.707		-0.307
		(0.493)		(0.187)
Observations	10786	10786	20704	20704
Pseudo R-squared	0.965	0.965	0.991	0.991
All models include: Constant, country of origin-year FE, country of destination-year FE, and country pair FE.				

NOTE: This table shows the results of the PPML estimations based on equation 4. The dependent variable in the first two columns is the FDI flow in the developing economy of the destination from the economy of origin. In columns 3 and 4 the dependent variable is FDI positions. In columns 1 and 3, *Country pair has a case (t-1)* equals to one all the years after the economy of destination faces an ISDS case from a firm from the country of origin, lagged one year. In columns 2 and 4, *Country pair has a case (t-2)* considers two lagged years. *BIT* equals one if a BIT is in force between the country pair and zero otherwise. The variable *Domestic* equals 1 if the destination country has a score equal to or larger than the sample mean plus one standard deviation of the *Score-enforcing contracts* variable from the WorldBank (2020), and zero otherwise. Standard errors (clustered by country pair) are in parentheses. *, **, *** represent statistical significance at the 10%, 5% and 1% level, respectively.

Full Estimations for "Low Frequency Countries"

In Table A3 I present the full set of coefficients for the benchmark model in equarion 2 after removing from the sample countries with more than nine cases.

The effect of having a bilateral investment treaty between the country pair is highly statisti-

cally significant for FDI flows one and two years after a case (columns 1 and 2). Meanwhile, having a case is not statistically significant with a one-year lag, but is negative and statistically significant two years after (columns 2 and 4). The interaction of BIT and case yields positive and statistically significant results at the 10% level two years after a case both for flows (column 2) and positions (column 4).

I do not find statistically significant results with a one-year lag after a case when considering positions. I only find negative statistically significant results for the effects of having a case two years after the case.

These results show that countries in the "Low Frequency" subsample experience the negative reputational effect of a case with a two-year lag.

Full Estimations for Sample without China

In Table A4 I present the full set of coefficients for the benchmark model in equation 2 after removing from China from the sample.

The BIT coefficient is not statistically significant in any of the specifications. The case coefficient is negative and statistically significant for a one-year lag both for flows, shown in column 1, and positions, in column 3. When interacting with the BIT variable, the coefficient is only significant for flows (column 1).

Two years after the dispute, I do not find effects for flows. For positions, I find a negative and highly statistically significant coefficient for the case variable. These effects get reverted in the interaction with a BIT and the statistically significant coefficient becomes positive.

This reflects that even after removing China from the sample, I still find the same overall results of a negative reputational effect for a case that is compensated in the interaction with a BIT.

Table A3. Heterogeneous Effects - "Low Frequency" Countries

	(1)	(2)	(3)	(4)
	FDI flow	FDI flow	FDI position	FDI position
BIT	1.724***	1.723***	-0.373	-0.375
	(0.646)	(0.645)	(0.275)	(0.268)
Country pair has a case (t-1)	-1.065		-0.422	
	(0.715)		(0.319)	
BIT × Country pair has a case (t-1)	1.293		0.302	
	(0.796)		(0.372)	
Country pair has a case (t-2)		-2.301**		-0.481**
		(1.171)		(0.214)
BIT × Country pair has a case (t-2)		2.265*		0.755*
		(1.218)		(0.412)
Observations	9888	9888	19076	19076
Pseudo R-squared	0.968	0.968	0.991	0.991
All models include: Constant, country of origin-year FE, country of destination-year FE, and country pair FE.				

NOTE: This table shows the results of the PPML estimations based on equation 2 after removing "High Frequency" countries of destination from the sample. These countries have more cases than the average from 1987 to 2015 (more than nine cases). The dependent variable in the first two columns is the FDI flow in the developing economy of the destination from the economy of origin. For columns 3 and 4 it is FDI positions. In columns 1 and 3, *Country pair has a case (t-1)* equals to one all the years after the developing economy of destination faces an ISDS case from a firm from the country of origin lagged one period. In columns 2 and 4, *Country pair has a case (t-2)* considers two lagged years. *BIT* equals one if a BIT is in force between the country pair. Standard errors (clustered by country pair) are in parentheses. *, **, *** represent statistical significance at the 10%, 5% and 1% level, respectively.

Table A4. Robustness Check - Sample without China

	(1)	(2)	(3)	(4)
	FDI flow	FDI flow	FDI position	FDI position
BIT	0.023	0.033	0.201	0.200
	(1.201)	(1.183)	(0.287)	(0.289)
Country pair has a case (t-1)	-1.342**		-0.458*	
	(0.617)		(0.273)	
BIT × Country pair has a case (t-1)	1.839***		0.525	
	(0.704)		(0.331)	
Country pair has a case (t-2)		-1.114		-0.485***
		(0.689)		(0.164)
BIT × Country pair has a case (t-2)		1.008		0.605***
		(0.786)		(0.234)
Observations	10466	10466	20170	20170
Pseudo R-squared	0.965	0.965	0.986	0.986
All models include: Constant, country of origin-year FE, country of destination-year FE, and country pair FE.				

NOTE: This table shows the results of the PPML estimations based on equation 2 after removing from the sample China as a country of destination. The dependent variable in the first two columns is the FDI flow in the developing economy of the destination from the economy of origin. For columns 3 and 4 it is FDI positions. In columns 1 and 3, *Country pair has a case (t-1)* equals to one all the years after the developing economy of destination faces an ISDS case from a firm from the country of origin lagged one period. In columns 2 and 4, *Country pair has a case (t-2)* considers two lagged years. *BIT* equals one if a BIT is in force between the country pair. Standard errors (clustered by country pair) are in parentheses. *, **, *** represent statistical significance at the 10%, 5% and 1% level, respectively.

Table A5. Cases by year, country pair, and income level

Year	Country of destination	Country of origin	BIT	Destination Income	Origin Income
2009	Argentina	Spain	Yes	Upper Medium	High
2009	Argentina	United Kingdom	Yes	Upper Medium	High
2009	Belize	United Kingdom	Yes	Lower Medium	High
2009	Costa Rica	Germany	Yes	Upper Medium	High
2009	Ecuador	United States of America	Yes	Lower Medium	High
2009	Egypt	United States of America	Yes	Lower Medium	High
2009	Guatemala	Spain	Yes	Lower Medium	High
2009	Kazakhstan	Netherlands	Yes	Upper Medium	High
2009	Cambodia	United States of America	No	Low	High
2009	Sri Lanka	Germany	Yes	Lower Medium	High
2009	Moldova	Russia	Yes	Lower Medium	Upper Medium
2009	Mexico	Spain	Yes	Upper Medium	High
2009	North Macedonia	Switzerland	Yes	Upper Medium	High
2009	El Salvador	United States of America	Yes	Lower Medium	High
2009	Ukraine	United States of America	Yes	Lower Medium	High
2009	Venezuela	Canada	Yes	Upper Medium	High
2010	Bulgaria	Germany	Yes	Upper Medium	High
2010	Belize	United Kingdom	Yes	Lower Medium	High
2010	Bolivia	United Kingdom	Yes	Lower Medium	High
2010	Guatemala	United States of America	No	Lower Medium	High
2010	India	Australia	Yes	Lower Medium	High
2010	Kazakhstan	Moldova	No	Upper Medium	Lower Medium
2010	Kazakhstan	Netherlands	Yes	Upper Medium	High

Table A5 – Cases by year, country pair, and income level

Year	Country of destination	Country of origin	BIT	Destination Income	Origin Income
2010	Kazakhstan	United States of America	Yes	Upper Medium	High
2010	Lithuania	Italy	Yes	Upper Medium	High
2010	Peru	Argentina	Yes	Upper Medium	Upper Medium
2010	Peru	France	Yes	Upper Medium	High
2010	Romania	Turkey	Yes	Upper Medium	Upper Medium
2010	Romania	United States of America	Yes	Upper Medium	High
2010	Turkmenistan	Turkey	Yes	Lower Medium	Upper Medium
2010	Tanzania	United Kingdom	Yes	Low	High
2010	Tanzania	Hong Kong	No	Low	High
2010	Uruguay	Switzerland	Yes	Upper Medium	High
2010	Uzbekistan	Israel	Yes	Lower Medium	High
2010	Venezuela	Barbados	Yes	Upper Medium	High
2010	Venezuela	Switzerland	Yes	Upper Medium	High
2010	Venezuela	Spain	Yes	Upper Medium	High
2010	Zimbabwe	Germany	Yes	Low	High
2011	Albania	Greece	Yes	Lower Medium	High
2011	Albania	Italy	Yes	Lower Medium	High
2011	Ecuador	Canada	Yes	Upper Medium	High
2011	Ecuador	United States of America	Yes	Upper Medium	High
2011	Indonesia	United Kingdom	Yes	Lower Medium	High
2011	Indonesia	Saudi Arabia	Yes	Lower Medium	High
2011	Kyrgyzstan	Latvia	Yes	Low	Upper Medium
2011	Libya	Kuwait	No	Upper Medium	High

Table A5 – Cases by year, country pair, and income level

Year	Country of destination	Country of origin	BIT	Destination Income	Origin Income
2011	Moldova	France	Yes	Lower Medium	High
2011	Mongolia	Canada	Yes	Lower Medium	High
2011	Peru	France	Yes	Upper Medium	High
2011	Peru	United States of America	No	Upper Medium	High
2011	Philippines	Germany	Yes	Lower Medium	High
2011	Turkmenistan	United Kingdom	Yes	Upper Medium	High
2011	Turkey	Netherlands	Yes	Upper Medium	High
2011	Uzbekistan	United Kingdom	Yes	Lower Medium	High
2011	Venezuela	Barbados	Yes	Upper Medium	High
2011	Venezuela	Canada	Yes	Upper Medium	High
2011	Venezuela	Switzerland	Yes	Upper Medium	High
2011	Venezuela	Netherlands	Yes	Upper Medium	High
2011	Venezuela	Portugal	Yes	Upper Medium	High
2012	Costa Rica	Spain	Yes	Upper Medium	High
2012	Algeria	Luxembourg	Yes	Upper Medium	High
2012	Egypt	United States of America	Yes	Lower Medium	High
2012	Guinea	France	Yes	Low	High
2012	Indonesia	United Kingdom	Yes	Lower Medium	High
2012	India	Mauritius	Yes	Lower Medium	Upper Medium
2012	Moldova	Russia	Yes	Lower Medium	High
2012	Moldova	Ukraine	Yes	Lower Medium	Lower Medium
2012	North Macedonia	Netherlands	Yes	Upper Medium	High
2012	Montenegro	Netherlands	Yes	Upper Medium	High

Table A5 – Cases by year, country pair, and income level

Year	Country of destination	Country of origin	BIT	Destination Income	Origin Income
2012	Romania	Italy	Yes	Upper Medium	High
2012	Venezuela	Barbados	Yes	Upper Medium	High
2012	Venezuela	Canada	Yes	Upper Medium	High
2012	Venezuela	France	Yes	Upper Medium	High
2012	Venezuela	Netherlands	Yes	Upper Medium	High
2012	Venezuela	Portugal	Yes	Upper Medium	High
2013	Costa Rica	Switzerland	Yes	Upper Medium	High
2013	Jordan	Kuwait	Yes	Upper Medium	High
2013	Kazakhstan	United States of America	Yes	Upper Medium	High
2013	Kyrgyzstan	Canada	No	Lower Medium	High
2013	Pakistan	Turkey	Yes	Lower Medium	Upper Medium
2013	Panama	United States of America	Yes	Upper Medium	High
2013	Papua New Guinea	Singapore	No	Lower Medium	High
2013	Venezuela	Spain	Yes	Upper Medium	High
2014	Dominican Republic	United States of America	No	Upper Medium	High
2014	Montenegro	Cyprus	Yes	Upper Medium	High
2014	Peru	Canada	Yes	Upper Medium	High
2014	Turkey	France	Yes	Upper Medium	High
2015	Cameroon	Luxembourg	Yes	Lower Medium	High
2015	Senegal	United Kingdom	Yes	Low	High
2015	Ukraine	United Kingdom	Yes	Lower Medium	High

NOTE: This table includes all cases by year, country-pair, and income level. Data source is Wellhausen (2015)

Table A6. Destination Economies, inward direct investment positions

Afghanistan	Egypt	Mayotte	Syria
Albania	El Salvador	Mexico	Tajikistan
Algeria	Eritrea	Micronesia	Tanzania
American Samoa	Eswatini	Moldova	Thailand
Angola	Ethiopia	Mongolia	Timor-Leste
Anguilla	Falkland Islands	Montenegro	Togo
Antigua & Barbuda	Fiji	Montserrat	Tokelau
Argentina	French South Terr.	Morocco	Tonga
Armenia	Gabon	Mozambique	Tunisia
Azerbaijan	Gambia	Myanmar	Turkey
Bangladesh	Georgia	Namibia	Turkmenistan
Belarus	Ghana	Nepal	Tuvalu
Belize	Grenada	Nicaragua	Uganda
Benin	Guadeloupe	Niger	Ukraine
Bhutan	Guatemala	Nigeria	Uruguay
Bolivia	Guinea	Niue	Uzbekistan
Bonaire, St. Eust. & Saba	Guinea-Bissau	Norfolk Island	Vanuatu
Bosnia & Herzegovina	Guyana	North Macedonia	Venezuela
Botswana	Haiti	Pakistan	Vietnam
Bouvet Island	Heard Is. & McDonald Is.	Palau	Wallis & Futuna
Brazil	Holy See	Panama	West Bank & Gaza
British Indian Oc. Terr.	Honduras	Papua New Guinea	Western Sahara
Bulgaria	India	Paraguay	Yemen
Burkina Faso	Indonesia	Peru	Zambia

Table A6 – Destination Economies

Burundi	Iran	Philippines	Zimbabwe
Cabo Verde	Iraq	Pitcairn	Rwanda
Cambodia	Jamaica	Romania	South Africa
Cameroon	Jordan	Russia	Saudi Arabia
Central African Rep.	Kazakhstan	Senegal	Serbia
Chad	Kenya	Réunion	Seychelles
Chile	Kiribati	St. Helena, Asc. & Tristan	Singapore
China	Korea (People's Rep.)	St. Kitts & Nevis	Slovakia
Christmas Islands	Kyrgyzstan	Saint Lucia	Slovenia
Cocos (Keeling) Is.	Lao	St. Vincent & Grenadines	Solomon Islands
Colombia	Lebanon	Samoa	South Africa
Comoros	Lesotho	Sao Tome & Principe	South Korea
Congo	Liberia	Senegal	Spain
Congo (Democratic Rep.)	Libya	Serbia	Sri Lanka
Cook Islands	Lithuania	Seychelles	Sweden
Costa Rica	Madagascar	Solomon Is.	Switzerland
Cuba	Malawi	Somalia	Tajikistan
Côte d'Ivoire	Malaysia	Tanzania	Thailand
Djibouti	Mali	S. Georgia & S.Sandwich	Togo
Dominica	Marshall Islands	South Sudan	Uganda
Dominica	Martinique	Sri Lanka	United Kingdom
Dominican Republic	Mauritania	Sudan	United States of A
Ecuador	Mauritius	Suriname	Uruguay
Albania	Côte d'Ivoire	Macao	Venezuela
Algeria	Denmark	Malaysia	West Bank & Gaza
Argentina	El Salvador	Mali	Zambia

Table A6 – Destination Economies

Armenia	Estonia	Malta	Niger
Aruba	Eswatini	Mauritius	Turkey
Australia	Eswatini	Mexico	Ukraine
Austria	Finland	Moldova	
Azerbaijan	France	Moldova	
Azerbaijan	Georgia	Mongolia	
Bahrain	Germany	Montenegro	
Bangladesh	Ghana	Morocco	
Barbados	Greece	Mozambique	
Belarus	Guatemala	Myanmar	
Belgium	Guinea-Bissau	Namibia	
Benin	Honduras	Nepal	
Bhutan	Hong Kong	Netherlands	
Bolivia	Hungary	New Zealand	
Bosnia and Herzegovina	Iceland		
Botswana	India	Nigeria	
Brazil	Indonesia	North Macedonia	
Bulgaria	Ireland	Norway	
Burkina Faso	Israel	Pakistan	
Cabo Verde	Italy	Palau	
Cambodia	Japan	Panama	
Canada	Jordan	Paraguay	
Chile	Kazakhstan	Peru	
China	Kazakhstan	Philippines	
Costa Rica	Kuwait	Poland	
Croatia	Kyrgyzstan	Portugal	

Table A6 – Destination Economies

Croatia	Latvia	Romania
Curaçao	Lebanon	Russia
Cyprus	Lithuania	Rwanda
Czech Republic	Luxembourg	Samoa

The Data source is the CDIS survey, IMF, for the period 2009-2015.

Chapter 3 Appendix

HTSUS Codes

The most important product treated by the ADD is 8541.40.6020: Solar cells assembled into modules or panels. It represents the majority of the treated imports and experienced important growth during the period (from 43% to more than 90%).

Table A7. HTSUS Codes and Description

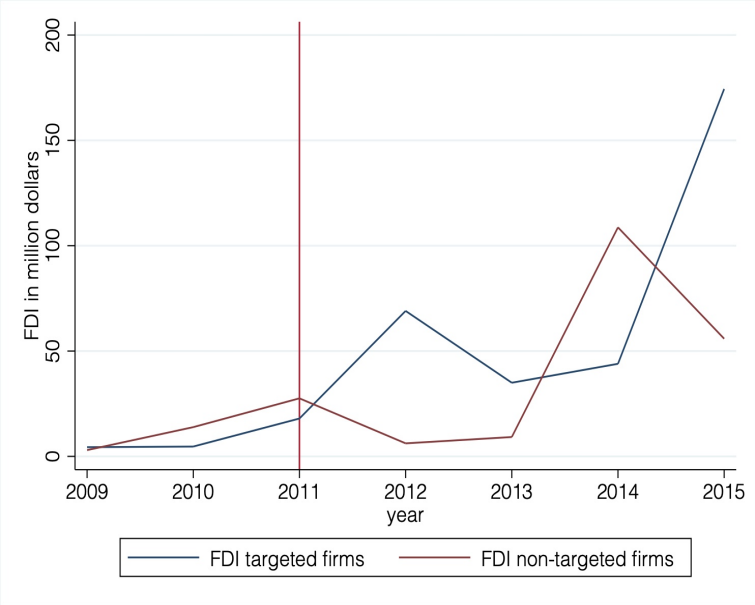
Panel A: Description of HTSUS Codes	
8501.61.0000	AC generators (alternators) of an output not exceeding 75 kVA
8507.20.20	Other
8541.40.6020	Solar cells assembled into modules or panels
8541.40.6030	Solar cells, not assembled into modules or made up into panels
8501.31.8000	Generators

Panel B: Weight of Imports by HTSUS Code (Percent)					
Year/Code	8501.31.8000	8501.61.0000	8507.20.80	8541.40.6020	8541.40.6030
2009	0.9	5.2	28.5	63.8	1.7
2010	0.5	1.9	18.3	76.9	2.3
2011	0.2	1.2	8.1	86.4	4.1
2012	0.2	1.5	11.2	85.9	1.2
2013	0.6	1.6	13.1	84.5	0.2
2014	0.7	1.3	14.1	82.0	1.9
2015	0.5	0.9	10.5	87.7	0.4
2016	0.3	0.5	6.5	92.1	0.6

Note: Panel A of this table shows the HTSUS codes defined by the US Department of Commerce for the imposition of the AD-CVDs. Panel B shows the weight of imports by HTS code, the source is the US International Trade Commission.

More on Targeted and Non-Targeted firms

Figure A1. FDI amounts by group of firms



NOTE: This figure plots the raw data for the average FDI amounts per year by groups of firms. The red vertical line shows the last year without the effects of the policy (2011). The source is fDi markets data from 2009 to 2015.

Logit Models

In Table A8 I show the logit coefficients estimated using equation 6.

Table A8. Location Choice Over Time

Logit Estimation of the Probability of Investing in:									
	(1) USA	(2) USA	(3) USA	(4) Europe	(5) Europe	(6) Europe	(7) Asia	(8) Asia	(9) Asia
year=2009	0.353	0.987	0.340	-1.722***	-2.119***	-1.749***	0.519	1.322	0.313
	(0.536)	(0.705)	(0.541)	(0.553)	(0.750)	(0.566)	(0.803)	(1.369)	(0.658)
year=2010	0.0110	-0.114	-0.0463	0.0798	0.217	0.0283	-0.273	-1.804	-1.747
	(0.569)	(0.881)	(0.581)	(0.314)	(0.387)	(0.319)	(0.901)	(2.215)	(1.628)
year=2012	-1.608	-1.501	-1.619	0.228	0.315	0.211	0.529	0.996	0.272
	(1.103)	(1.242)	(1.105)	(0.317)	(0.349)	(0.320)	(0.766)	(1.231)	(0.640)
year=2013				-1.042*	-0.815	-1.055**	-0.0857	0.675	-0.773
				(0.534)	(0.654)	(0.538)	(0.970)	(1.489)	(1.102)
year=2014	-1.834	-5.147	-1.620	-0.919**	-1.741**	-0.770*	0.877	1.560	0.747
	(1.257)	(3.736)	(1.105)	(0.459)	(0.876)	(0.435)	(0.777)	(1.224)	(0.626)
year=2015	-1.143	-1.506	-1.101	-1.000**	-1.422*	-0.896**	1.485**	2.415**	1.071*
	(0.964)	(1.576)	(0.927)	(0.504)	(0.800)	(0.445)	(0.718)	(1.079)	(0.550)
Controls									
Firm ID	✓	✓	✓	✓	✓	✓	✓	✓	✓
Other	FDI	Projects	Jobs	FDI	Projects	Jobs	FDI	Projects	Jobs
Observations	5544	5544	5544	6468	6468	6468	6468	6468	6468
PseudoR^2	0.0533	0.417	0.0475	0.0626	0.516	0.0411	0.168	0.531	0.260

NOTE: This table presents the logit coefficients for the estimations based on equation 6. The dependent variables are all binary indicators and equal to 1 if the firm makes an FDI investment in the US (columns 1, 2, 3); Europe (columns 4, 5, 6); and Asia (columns 7, 8, 9). Some coefficients are not estimated due to a lack of observations. Standard errors clustered at the firm level are shown in parentheses. Statistical significance levels are given by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Linear Probability Models

Here, I present a different specification for estimating the models of location choice changes over time using a linear probability model.

$$Y_{it} = \delta \mathbf{Year} + \beta X_{it} + \gamma_i + \epsilon_{it}. \tag{11}$$

Where is Y_{it} the probability of investing in a particular region for a firm i in period t (month-year); **Year** is a vector of dummy variables from years 2009 to 2015; X_{it} controls for FDI

amounts, number of projects, or jobs created; γ_i are firm fixed effects; ϵ_{it} is the error term. Robust standard errors are clustered at the firm level. Detailed results shown in Table A9, are in line with the logit estimations presented above. Overall, these results confirm the logit estimations for targeted firms. I do not find support for the tariff-jumping hypothesis that would imply a positive effect of the years after the policy on the probability of investing in the US. I find a negative and statistically significant effect in 2015 on the probability of investing in Europe, and positive, although not significant for all specifications, effects on the probability of investing in Asia in 2015.

Table A9. Location Choice Over Time

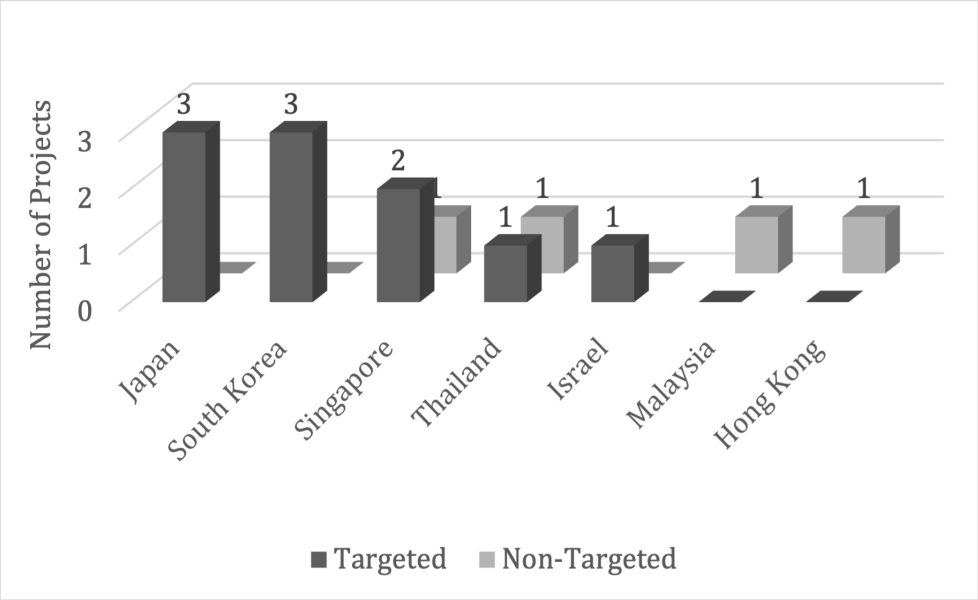
Linear Probability Estimation of Targeted Firms Investing in:									
	(1) USA	(2) USA	(3) USA	(4) Europe	(5) Europe	(6) Europe	(7) Asia	(8) Asia	(9) Asia
year=2009	0.007	0.008	0.007	-0.010	-0.006	-0.010	-0.002	0.000	-0.003
	(0.008)	(0.008)	(0.008)	(0.007)	(0.006)	(0.007)	(0.011)	(0.009)	(0.011)
year=2010	0.007	0.007	0.007	0.007	0.008	0.007	-0.012	-0.012*	-0.013
	(0.008)	(0.007)	(0.008)	(0.012)	(0.009)	(0.012)	(0.009)	(0.006)	(0.009)
year=2012	-0.007	-0.008	-0.007	0.012	0.010	0.013	-0.004	-0.004	-0.002
	(0.007)	(0.007)	(0.007)	(0.012)	(0.010)	(0.012)	(0.009)	(0.010)	(0.010)
year=2013	-0.010*	-0.006	-0.010*	-0.007	0.002	-0.007	-0.011	-0.002	-0.010
	(0.006)	(0.005)	(0.006)	(0.011)	(0.010)	(0.012)	(0.010)	(0.008)	(0.009)
year=2014	-0.010*	-0.009*	-0.010*	-0.011	-0.008	-0.010	-0.009	-0.005	-0.007
	(0.006)	(0.005)	(0.006)	(0.010)	(0.009)	(0.010)	(0.008)	(0.008)	(0.009)
year=2015	-0.010*	-0.011**	-0.011*	-0.021***	-0.019***	-0.018***	0.014	0.024**	0.012
	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)	(0.013)	(0.010)	(0.013)
Firm FE	✓	✓	✓	✓	✓	✓	✓	✓	✓
Controls	FDI	Projects	Jobs	FDI	Projects	Jobs	FDI	Projects	Jobs
Observations	2100	2100	2100	2100	2100	2100	2100	2100	2100
WithinR^2	0.008	0.162	0.010	0.025	0.311	0.007	0.169	0.311	0.187

NOTE: This table shows the results for the Linear Probability Model estimations based on equation 11. The sample is restricted to targeted firms. The dependent variables are all binary indicators and equal to 1 if the firm makes an FDI investment in the US (columns 1, 2, 3); Europe (columns 4, 5, 6); and Asia (columns 7, 8, 9). The coefficients multiplied by 100 represent the percentage change. Standard errors clustered at the firm level are shown in parentheses. Statistical significance levels are given by * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Destination Countries in Asia Pre-Policy

In Figure A2, we observe that before the policy both groups of firms invested in a smaller range of Asian countries compared to post-policy seen in Figure 9. In terms of which countries receive more investments by targeted firms, Japan is the most frequent destination though with a smaller number of projects than after the policy. South Korea and Singapore follow in relevance for this group of firms. On the other hand, the non-targeted firms make fewer investments in this region overall in a variety of countries with only one project.

Figure A2. FDI in Asian Countries Pre-Policy by Group of Firms



Source: fDi markets

NOTE: This figure shows the number of projects in Asia announced by targeted and non-targeted firms from 2009 to 2011.

Marginal Effects of Conditional Logit Model

In this section, I present the estimations for the conditional logit model of location choice using as a control variables GDP per capita and inflation rate.

Table A10. Location Choice in 2015

Conditional Marginal Effects (delta-method)						
0.Non-targeted	(base outcome)					
1.Targeted	dy/dx	std. err.	z	P>z	[95% conf.	interval]
Outcome:						
Asia	0.524	0.096	5.470	0.000	0.336	0.712
Europe	-0.513	0.092	-5.550	0.000	-0.694	-0.332
North America	-0.079	0.048	-1.640	0.101	-0.173	0.015
Africa	0.050	0.086	0.590	0.558	-0.118	0.219
Latin America & Caribbean	0.069	0.076	0.900	0.366	-0.081	0.219
Oceania	-0.052	0.029	-1.810	0.070	-0.108	0.004

NOTE: This table shows the conditional marginal effects for targeted firms on the predicted probability of choosing from the set of location choices J=1,...,6. Estimations are based on the conditional logit model from equation 8 using as control variables GDP per capita and inflation rate. dy/dx is the discrete change from the base level.

Selected Firms' Quotes on Their Reaction to the Policy

Some of the company's products are sold overseas, and the trade protection policies of importing countries will have a certain impact on the company's overseas sales... In this regard, the company will increase its efforts in emerging markets including the domestic market development, actively demonstrate corresponding measures, etc. (Risen Energy)[18]

In order to effectively avoid the potential risks brought by dumping and anti-dumping, Phono Solar reached a cooperation with a Vietnamese partner last year and established a local module manufacturing base. It is a powerful measure to further enhance its ability to supply to the world, and thus achieve smooth shipments to Europe the United States, and other regions. (Phono Solar)[19]

According to Wang Yiyu, chief financial officer of Yingli Green Energy, recently, the past pattern of relying solely on European and American markets has been broken, and Yingli will focus on developing emerging markets such as Southeast Asia in the next step. Yingli began

[18] 2014 Annual Report.
[19] 2017 website article.

to vigorously develop emerging markets such as China, Southeast Asia, and Africa. (Yingli)

US Imports of Solar Cells 2009 to 2018

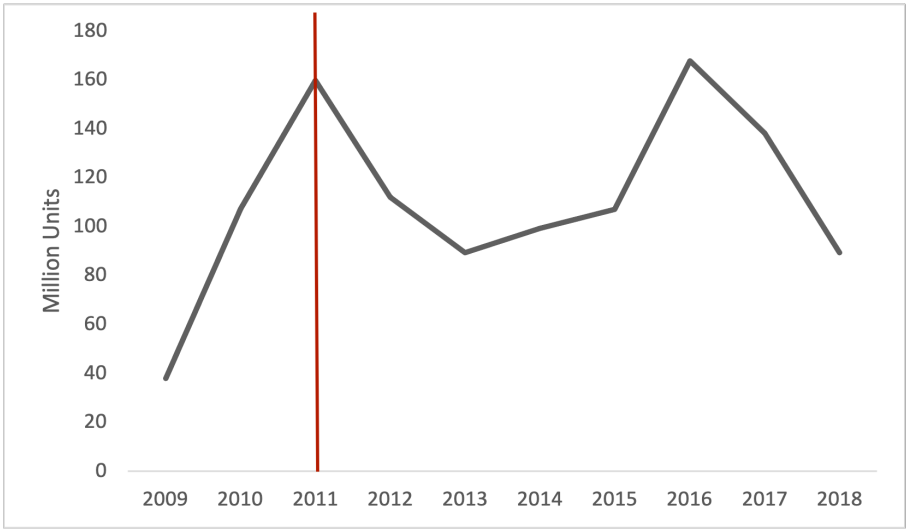
Figure A3 shows the evolution in a million units of solar cells imported into the US from 2009 to 2018. There is a rapid increase up to 2011 and a reduction after the policy is implemented in 2012. A decrease follows the recovery from 2013 to 2016 in the next two years. Overall, even though the quantities imported at the end of the period are larger than at the beginning, there were important fluctuations. This evolution in percentage change by sub-periods is shown in Table A11, where we observe that the years after the policy show a decrease in the number of imports.

Table A11. Change in US Imports of Solar Cells by Sub-Period

Percent	Sub-Period
320	2009 to 2011
-4	2012 to 2015
-20	2012 to 2018
135	2009 to 2018

Source: USITC

Figure A3. US Imports of Solar Cells from 2009 to 2018



Source: USITC (2021)

NOTE: This figure shows imported solar cells in million units in the US from 2009 to 2018.

Chapter 4 Appendix

Figure A4. Event Studies

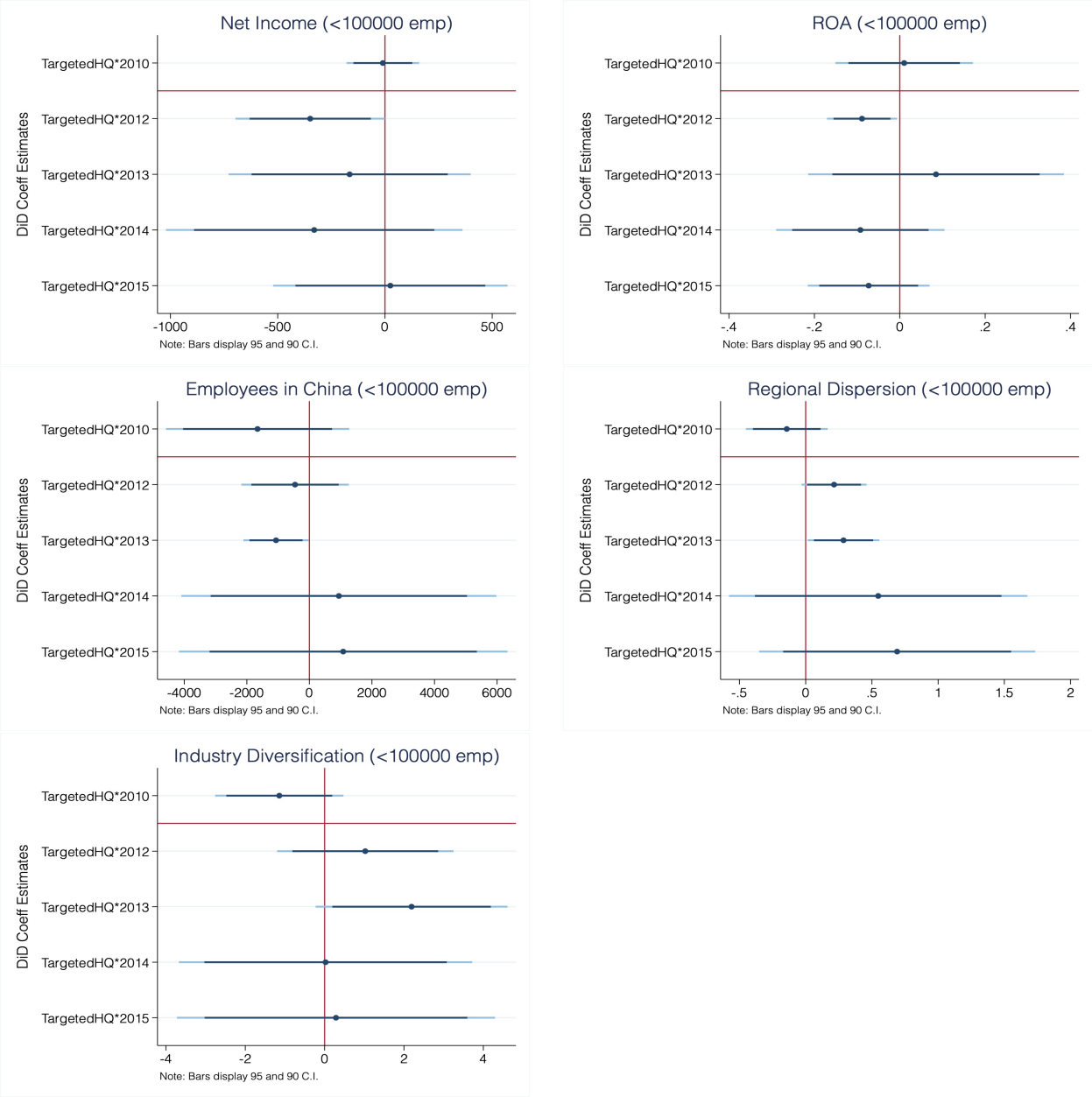


Table A12. Number of Employees in Headquarters

	(1) Employees in Headquarters	(2) Employees in Headquarters	(3) Employees in Headquarters
TargetedHQ*2010	5856.0	-5683.0	-3723.3
	(9650.9)	(950.2)	(999.0)
	[0.551]	[0.000]	[0.002]
TargetedHQ*2012	46.85	930.0	95.74
	(672.6)	(1425.6)	(778.3)
	[0.945]	[0.530]	[0.903]
TargetedHQ*2013	-1043.0	-1497.9	-1220.4
	(1318.8)	(2627.8)	(1347.0)
	[0.438]	[0.583]	[0.377]
TargetedHQ*2014	63.50	-1075.2	-114.4
	(1721.2)	(2865.9)	(1769.5)
	[0.971]	[0.716]	[0.949]
TargetedHQ*2015	42.79	-876.5	-82.44
	(1726.0)	(2945.0)	(1812.5)
	[0.980]	[0.773]	[0.964]
Fixed Effects			
MNE	✓	✓	✓
Year	✓	✓	✓
Mean	37,705	16,848	12,820
Std_Dev	82,557	18,868	15,431
Sample	Full	Financials	$<$ 100,000 emp.
MNEs	22	10	19
Observations	132	60	114
R^2	0.123	0.292	0.190

Robust standard errors in parentheses. p values in brackets

Table A13. Frequency for Number of Subsidiaries in Asia by Conglomerate

	PRE-POLICY		POST-POLICY	
Subsidiaries in Asia	Non-Targeted	Targeted	Non-Targeted	Targeted
0	16	28	26	43
1	6	3	16	16
2		2		4
3			1	1
4		1		1
5				1
6			1	
10				1
11				1
Total Observations	22	34	44	68

Table A14. Regional Dispersion - Share of Asian Foreign Subsidiaries

	(1) Asian Share	(2) Asian Share	(3) Asian Share
TargetedHQ*2010	0.064	0.137	0.036
	(0.045)	(0.097)	(0.037)
	[0.165]	[0.185]	[0.345]
TargetedHQ*2012	0.037	0.122	0.054
	(0.024)	(0.059)	(0.036)
	[0.147]	[0.067]	[0.152]
TargetedHQ*2013	0.038	0.125	0.059
	(0.025)	(0.059)	(0.036)
	[0.131]	[0.060]	[0.138]
TargetedHQ*2014	-0.029	0.012	-0.003
	(0.046)	(0.119)	(0.059)
	[0.528]	[0.925]	[0.955]
TargetedHQ*2015	-0.068	0.011	0.016
	(0.062)	(0.119)	(0.062)
	[0.281]	[0.929]	[0.803]
Fixed Effects			
MNE	✓	✓	✓
Year	✓	✓	✓
Mean	0.154	0.167	0.130
Std_Dev	0.292	0.233	0.258
Sample	Full	Financials	<100,000 emp.
MNEs	28	11	20
Observations	168	66	120
R^2	0.111	0.136	0.041

Robust standard errors in parentheses. p values in brackets.

Table A15. Regional Dispersion - Share of Asian not PRC Foreign Subsidiaries

	(1) Asian Share not PRC	(2) Asian Share not PRC	(3) Asian Share not PRC
TargetedHQ*2010	0.025	0.052	0.036
	(0.044)	(0.099)	(0.037)
	[0.578]	[0.611]	[0.345]
TargetedHQ*2012	0.026	0.100	0.054
	(0.023)	(0.058)	(0.036)
	[0.252]	[0.112]	[0.152]
TargetedHQ*2013	0.032	0.113	0.056
	(0.024)	(0.060)	(0.036)
	[0.194]	[0.089]	[0.138]
TargetedHQ*2014	-0.0002	0.009	-0.003
	(0.033)	(0.116)	(0.059)
	[0.995]	[0.942]	[0.955]
TargetedHQ*2015	-0.051	0.008	0.016
	(0.060)	(0.116)	(0.062)
	[0.401]	[0.948]	[0.803]
Fixed Effects			
MNE	✓	✓	✓
Year	✓	✓	✓
Sample	Full	Financials	<100,000 emp.
Mean	0.0624	0.123	0.130
Std_Dev	0.142	0.187	0.258
MNEs	28	11	20
Observations	168	66	120
R^2	0.074	0.066	0.041

Robust standard errors in parentheses. p values in brackets.

Table A16. Frequency for Number of Industries by Conglomerate

	PRE-POLICY		POST-POLICY	
Total SIC Codes by Conglomerate	Non Targeted	Targeted	Non Targeted	Targeted
1	2	14	4	10
2	11	13	6	15
3	4		14	3
4	2	3	3	13
5	3	1	2	8
6				4
7		1	6	1
8				1
9		1	1	3
10			1	1
12				3
13				1
15			4	
16			1	
17			1	
18			1	1
19		1		
22				1
26				1
28				2
Total Observations	22	34	44	68

Table A17. Summary Statistics by Year

Variable	Obs	Mean	Std. dev.	Min	Max
year = 2010					
Net Income (million USD)	16	97.22	149.46	-54.91	532.57
Return Over Assets	16	0.06	0.06	-0.06	0.17
Employees in China	14	40,678	103,984	0.00	390,254
Subsidiaries in Asia	28	0.25	0.52	0.00	2.00
Number of Industries	28	2.25	1.67	1.00	9.00
year = 2011					
Net Income (million USD)	17	416.58	844.91	-37.82	3616.05
Return Over Assets	17	0.09	0.05	-0.01	0.16
Employees in China	16	36,156	97,657	0.00	390,254
Subsidiaries in Asia	28	0.36	0.87	0.00	4.00
Number of Industries	28	3.14	3.47	1.00	19.00
year = 2012					
Net Income (million USD)	16	81.29	641.86	-1018.00	1850.13
Return Over Assets	16	-0.03	0.09	-0.22	0.10
Employees in China	18	31,878	92,500	0.00	390,254
Subsidiaries in Asia	28	0.46	0.88	0.00	4.00
Number of Industries	28	5.39	5.50	1.00	26.00
year = 2013					
Net Income (million USD)	13	-38.33	431.60	-1,052.06	696.07
Return Over Assets	13	-0.06	0.13	-0.36	0.09
Employees in China	18	32,173	92,467	0.00	390,254
Subsidiaries in Asia	28	0.50	1.04	0.00	5.00
Number of Industries	28	5.39	5.36	1.00	22.00
year = 2014					
Net Income (million USD)	13	-2.28	560.06	-1,637.21	687.26
Return Over Assets	13	-0.03	0.16	-0.54	0.10
Employees in China	18	32,844	92,408	0.00	390,254
Subsidiaries in Asia	28	0.79	2.08	0.00	11.00
Number of Industries	28	5.57	5.83	1.00	28.00
year = 2015					
Net Income (million USD)	14	17.22	337.42	-896.51	708.23
Return Over Assets	14	-0.01	0.11	-0.33	0.10
Employees in China	18	32,775	92,429	0.00	39,025
Subsidiaries in Asia	28	1.18	2.18	0.00	10.00
Number of Industries	28	6.50	6.28	1.00	28.00