

Heterogeneity in How Investors Respond to Disputes: Greenfield FDI and Co-Industrial Disputes*

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Abstract

Do investment disputes lead to lower foreign direct investment (FDI)? Recent studies argue that disputes make potential investors view the host country as riskier. Yet, a dispute, which reflects economic harm to the disputing firm, may signal new economic opportunities to firms hoping to enter the same industry. The competing pressures of risk and reward mean that the impact of disputes on FDI is *ex ante* unclear. However, we argue that the balance of risk and reward varies across industries. Specifically, we expect that rewards are increasing as a function of industry fixed costs. We test our hypothesis using new data on industry-level greenfield FDI between countries from 2003 to 2015. We find that a co-industrial dispute reduces investment in industries with low fixed asset intensity but not high fixed asset intensity. Overall, the results highlight the importance of theory and data that allow for heterogeneity of investors.

Keywords: Foreign direct investment, multinational firms, investment disputes

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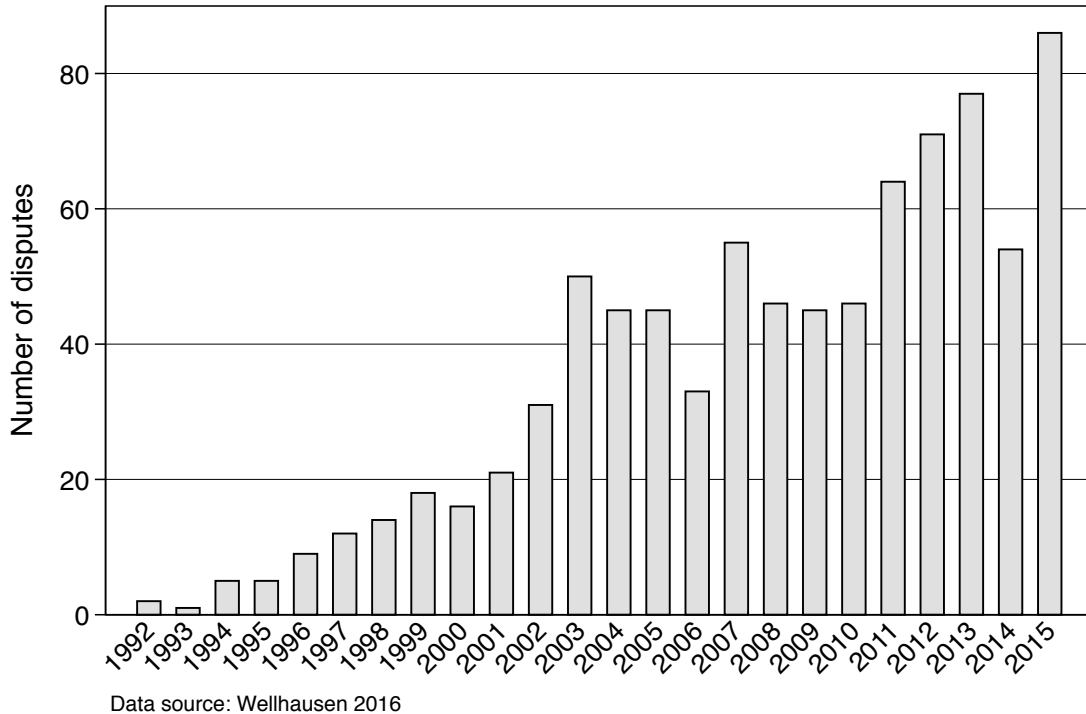
What factors determine which countries receive more or less foreign direct investment (FDI)? A large body of work has focused on domestic and international institutions as important factors. Yet empirical research has traditionally analyzed aggregate FDI flows, which lump together the behavior of potentially heterogeneous investors. Recently, a growing number of studies open the black box of FDI to examine the ways in which investors are heterogeneous with respect to political risk. Using firm or industry level data, scholars have focused on home country (e.g. Beazer and Blake, 2018) and industry characteristics (e.g. Wright and Zhu, 2018; Zhu and Shi, 2019).

Yet there is still a lot we do not know about the behavior of heterogeneous investors. Specifically, we ask how do investment disputes affect the ability of countries to attract FDI? A dispute occurs when an investor alleges a breach of contract by the host government. Investors can claim an alleged breach by the host country under a BIT, a PTA or other contract (Wellhausen, 2016). The most prominent venue for arbitrating these claims is the International Centre for the Settlement of Investment Disputes (ICSID). The number of investment dispute arbitrations has increased dramatically as shown in Figure 1; 66 dyadic disputes were filed from 1990-1999, compared to 785 dyadic disputes filed between 2000-2015.¹ Firms can allege a breach of contract for both direct expropriation (i.e. outright seizure of property or the compulsory transfer of title to property), as well as indirect expropriation (e.g. policy and regulatory changes that negatively affect firms' profits).² As the costs of these agreements in terms of compensation claims, future investment, and constraints placed on

¹A dispute filed by two home countries A and B against host C is counted as two separate dyadic disputes. There are 746 unique disputes between 1999-2015.

²Indirect expropriation is also called *de facto*, creeping, or measures equivalent to expropriation (Pelc, 2017). As Fortier and Drymer (2004) note, “the deprivation of property rights may result from *a series* of acts - what is referred to above as a “process” - the overall result of which constitutes expropriation (297).” Notably, host governments can face a dispute even if the policy or regulatory action was not intended to harm the investor.

Figure 1: Dyadic investment dispute filings over time



the host countries' policy space become clear, many countries are beginning to reconsider participating in international investment agreements (Aisbett et al., 2016; Peinhardt and Wellhausen, 2016; Poulsen and Aisbett, 2013; Simmons, 2014).

Disputes provide new information that may cause potential investors to revise their assessments of the investment climate in the host country and reconsider investing. We argue that disputes will have the largest effect on investment flows in the same industries, what we call a co-industrial dispute. Disputes affect potential investors' perceptions of both the anticipated risks of investment as well as expected profits. On the one hand, disputes may increase the perceived risk of investment and thus reduce the likelihood of future investment (see Aisbett et al., 2016; Allee and Peinhardt, 2011; Wellhausen, 2014). On the other hand, disputes indicate harm to the filing firm (i.e. disputant) and thus may indicate new market opportunities for potential investors to exploit, which would increase the likelihood of future investment. Therefore, the effect of a co-industrial dispute on FDI is ambiguous: the

net effect of a co-industrial dispute could range from negative (reducing FDI) due to risk assessments to positive (increasing FDI) due to new market opportunities created by the harm to an existing firm. Yet, the extent to which a dispute increases risk or return varies across industries in systematic ways. Thus, we further contend that whether the net effect of a co-industrial dispute is positive or negative will depend on the amount of fixed assets required for investment, that is, industry fixed asset intensity. We expect that an investment dispute will discourage investment at low fixed asset intensity, but may encourage or at least should not discourage investment at high levels of fixed asset intensity.

To test our theory of heterogeneity in investor behavior at the industry level, we introduce a new dataset on dyad-industry-level greenfield FDI, which is developed from project-level greenfield investment data available from *fDi Markets*. Our estimation sample covers greenfield investment between 56 home countries and 126 developing host countries in 20 industries, between 2003 and 2015. We discuss differences between our data and other datasets below, but to the best of our knowledge, this is the first analysis of foreign direct investment at the dyad-industry level across countries over time. Our dataset also covers more home countries relative to the most common sources of dyadic data.³ We limit our analysis to developing host countries due differences in the determinants of FDI into developed and developing hosts. We find support for our argument that the effect of dispute will vary by industry, and specifically that a co-industrial dispute has a negative effect on FDI at low levels of fixed asset intensity, but that this effect becomes less negative as fixed asset intensity increases. At high levels of fixed asset intensity (e.g. utilities, telecommunications, oil and gas), a co-industrial dispute does not significantly increase or decrease FDI.

This paper contributes to the literature on international investment agreements (IIAs)

³Analyses using OECD data typically have about 23-24 home countries (e.g. Kerner, 2009, 83), while UNCTAD has data for 39 home countries (e.g. Aisbett et al., 2016, 8). As we note below, our raw data include over 90 additional home countries, but we focus on the 56 home countries responsible for over 98 percent of total greenfield investment.

and FDI, and also speaks to a broader literature on the heterogeneous behavior of investors. In the remainder of the paper, we first review the literature on political risk and FDI before introducing our theory. We then discuss our data and how it compares to others used in the literature before presenting our results.

POLITICAL RISK AND FDI

In recent decades, foreign direct investment (FDI) flows have become an important and attractive source of external financing for many countries.⁴ Multinational firms, however, face the problem of the “obsolescing bargain” (Vernon, 1971), where firms gradually lose the initial bargaining advantage once invested; the balance of bargaining power shifts to host governments over time. As a result, firms are vulnerable to both outright expropriation, as well as *ex post* policy changes in host countries, and it is difficult for investment-seeking governments to make credible commitments to their investor-friendly policies. This is an important problem for many developing countries who depend on FDI as a leading source of capital (e.g. Moran, Graham, and Blomstrom, 2005).

There are a growing number of studies on determinants of FDI. One strand of research focuses on the impact of domestic political institutions on FDI. Many argue that democratic institutions promote FDI inflows by reducing political risks and ensuring more credible property rights protection. Yet empirical findings on the impact of democracy on FDI are inconclusive, and more work is needed on the mechanisms linking democracy and FDI (c.f. Li 2009; Jensen 2008, 2003; Li and Resnick 2003; Resnick 2001).⁵ In fact, recent studies show that relying on aggregate FDI data overlooks important industry- and/or firm-level variation in risk assessment and institutions (e.g. Arel-Bundock 2017; Blake and Moschieri 2017; Kerner 2014; Wright and Zhu 2018).

⁴FDI takes the form of the creation of new assets through the construction of a new facility or expansion of an existing facility (greenfield investment) and the transfer of existing assets to the multinational investor (mergers and acquisitions).

⁵See Li, Owen, and Mitchell (2018) for a review and meta-regression analysis.

A second strand of research focuses on the role of bilateral investment treaties (BITs), as well as other agreements with investment provisions (e.g. preferential trade agreements) in attracting FDI (e.g. Bütthe and Milner, 2014; Lee and Johnston, 2016; Poulsen and Aisbett, 2013). The *ex ante* signaling effect of BITs and *ex post* costs for non-compliance are thought to represent useful solutions to the commitment problems of FDI. By signing a BIT or other investment agreement, host governments send investors the *ex ante* costly signal about their willingness to protect foreign-owned assets (e.g. Lee and Johnston 2016; Desbordes and Vicard 2009; Neumayer and Spess 2005). Host governments also can credibly commit to abiding by rules of an agreement because the various protections BITs provide individual investors impose *ex post* costs in the event of non-compliance (e.g. Aisbett, Busse, and Nunnenkamp 2016; Allee and Peinhardt 2011; Jandhyala, Henisz, and Mansfield 2011). BITs can have a differential effect across industries, and in particular may be more effective at attracting FDI in industries with many sunk costs or immobile assets as suggested in recent work by Bauerle Danzman (2016) and Colen et al. (2016).

Investment disputes are evidence to current and potential investors that a host country has violated a particular agreement and undertaken action that negatively affects a particular multinational firm. As such, disputes are theorized to affect multinationals' perceived risks of expropriation by host country governments. The findings suggest that a dispute increases perceived risks and consequently discourages FDI (Allee and Peinhardt 2011; Blake and Moschieri 2017; Wellhausen 2016).⁶ In the first paper to examine the impact of disputes on FDI, Allee and Peinhardt (2011) argue firms re-evaluate investments in the host in light of evidence of non-compliance and find that investment disputes reduce inward FDI flows. Their argument implies that a dispute has a homogeneous effect on the perceived risks across all potential investors.

In contrast, Wellhausen (2015) argues that only firms of the same nationality as the filing firm are likely to react to a breach of contract, thus reducing investment from the

⁶In terms of future investment as well as divestment.

home country of that firm only. Also in a dyadic context, Aisbett, Busse, and Nunnenkamp (2016) suggest that the impact of a dispute on investment depends on whether the investor is protected by a BIT or not, and specifically that disputes will reduce investment from firms protected by a BIT between their home country and the host because the dispute undermines the expectation that the BIT will deter violations. At the firm-level, Blake and Moschieri (2017) offer an account in which the impact of disputes is firm-specific, arguing that a negative experience leads firms to update their information on policy risks as well as their managerial capability of investment, resulting in divestment both in the targeted country and the region.

Yet there are reasons to think that the impact of the dispute may be limited to, or most influential in the same industry. In the next section, we offer a theory of co-industrial disputes.

THEORY

We argue that disputes will have the largest effect on investment flows in the same industries. Disputes affect potential investors perceptions of both the anticipated risks of investment as well as expected profits. On the one hand, disputes may increase the perceived risk of investment and thus reduce the likelihood of future investment. On the other hand, disputes may create new market opportunities for potential investors to exploit (i.e. profitability) and thus increase the likelihood of future investment. Due to these competing pressures, the overall (net) effect of a dispute on FDI is ambiguous. Yet the effect of these co-industrial disputes will vary across industries in systematic ways.

We argue industry fixed asset intensity (FAI) is a key characteristic that determines whether a dispute is likely to increase or decrease future FDI flows to an industry because the dominance of the risk and opportunity channels will vary. Fixed asset intensity refers to the amount of upfront capital required to engage in the production of a good or service (i.e. the amount of capital required to enter a particular market). Thus, FAI captures the type and magnitude of startup costs that potential investors must pay to enter a market. Although

the disputes literature has treated the impact of disputes on FDI as homogeneous across industries, a growing body of literature has examined the variation in investment risk across industries (Kobrin, 1980, 1987; Frieden, 1994; Henisz, 2002; Hajzler, 2012; Bauerle Danzman, 2016), and specifically across fixed asset intensity (Colen et al., 2016; Johns and Wellhausen, 2017; Wright and Zhu, 2018). Colen et al. (2016), in particular, claim that the impact of BITs on FDI flows varies across sector due to its variation in the degree of investment irreversibility (i.e., sunk costs). They suggest that differences in investment illiquidity across industries will produce different patterns of investor and host government behaviors. In this section, we first discuss the risk and opportunity effects of a dispute. We then describe how the net effect of a dispute will vary according to the level of FAI.

Investment risk

The first channel through which disputes can shape FDI flows is risk, which has been the focus of the existing literature. Of particular concern for multinationals is the risk of expropriation through either outright nationalization or/and indirect expropriation of assets.⁷ For firms with the right to arbitration through an investment agreement, filing a dispute is one way of objecting to their treatment by the host. Indeed, filing a dispute alone is costly which requires firms to spend time and money (Wellhausen, 2015, 252-53). Thus, the willingness of a firm to bring the host government to arbitration sends a signal of bad treatment of foreign investment to other multinationals, regardless of the outcome of the arbitration (Allee and Peinhardt, 2011; Wellhausen, 2015). Thus, potential investors are likely to revise their assessment of risk in the host country upward following a dispute.

We expect disputes to have a larger effect on investment flows in the same industry as the filing firm relative to other industries. First, multinationals are likely to have more access to information about disputes in the same sector and to pay close attention to it. Second, co-industrial firms are more likely to be affected by the same cause of breach raised in the dispute, which reduces incentives to invest in that industry in the host relative to other

⁷See Kobrin (1979, 1980, 1984) for a review of political risk in FDI.

industries. In Venezuela, for example, Hugo Chavez’s long-term policy of expropriation started with a breach of contract in mining and petroleum industries in 2001. Between 2001 and 2006, “at least \$1.7 billion in mining and petroleum investments has been expropriated” followed by seizing the assets of ExxonMobil ConocoPhillips in 2006 and 2007 (Hajzler, 2010, p. 5).⁸ In Ecuador, the new hydrocarbons laws introduced in 2007 required private oil firms to renegotiate contracts in order to effectively cede control of their assets to the state without adequate compensation. This included US supermajor Chevron, Canadas Ivanhoe Energy, and Anglo-French oil company Perenco. A production fee and reimbursement of production costs were imposed on firms who refused to sign the new contracts.

Yet, the degree to which co-industrial disputes impact risk varies by industry FAI.⁹ Industries with high levels of FAI typically are more capital-intensive and require higher start-up costs. Thus investments in these industries are subject to greater risk of expropriation as the host government can easily target non-transferable and irreversible investments (e.g. Colen et al., 2016).¹⁰ For example, oil and gas production requires large capital investments in plants and equipment for extraction of the product and its delivery. Such investments also require access to infrastructure including railroads, pipelines, utilities, and

⁸In a 1976 nationalization, Venezuela seized assets of Exxon, Shell, and Gulf.

⁹Fixed costs include avoidable and unavoidable fixed costs (a.k.a. sunk costs). Avoidable fixed costs are not firm-specific so that these costs have alternative uses. In contrast, sunk costs include non-transferable and non-refundable license, R&D, or advertising expenses, which do not have foregone values and opportunity cost. Fixed asset (intensity) has been recently focused on in explaining sectoral heterogeneity in investment risks. For example, see Arel-Bundock 2017; Wright and Zhu 2018.

¹⁰For this reason, the obsolescing bargain expected to pose a greater challenge for investors in fixed asset intensive industries. In contrast, Johns and Wellhausen (2017) argue that not all firms in high fixed-asset intensive industries are at high stakes of expropriation because only the immobile portion of startup costs becomes sunk.

telecommunications. Infrastructure is another example of an industry intensive in fixed assets (Bauerle Danzman, 2016; Henisz, 2002). These upfront costs cannot be recovered but remain the same before any revenues are realized as well as if production stops or rents are decreased due to the behavior of the host government. Given the high stakes involved in investments in these industries, we expect that the level of increased risk from a co-industrial dispute will be an increasing function of the level of fixed asset intensity.

Market opportunity

The second channel through which disputes may impact the likelihood of investment is market competition. This mechanism has been less well recognized in the literature (c.f. Wellhausen, 2015). A dispute indicates that an existing multinational active in the host economy (the filing firm) has been disadvantaged by some government action. This disadvantage creates an opportunity for other multinationals to enter the market or increase their market share. Thus, a dispute could encourage new FDI by co-industrial multinationals.

As an example of how a dispute can create a market opportunity, consider the recent dispute over the right to mine the world's largest manganese deposit in Burkina Faso. In 2014, a change in leadership in Burkina Faso took the operating rights away from Pan African Minerals headed by Frank Timis, who then filed a lawsuit against the government to the International Court of Arbitration.¹¹ While this case is still pending, the Burkinabe government declared that it was seeking a new partner in February 2018. In April, the government also declared the end of the agreement with the Pan African. With estimated reserves of more than 100 million tons of ore, Tambao mine is expected to produce three million tons per year. Many companies are interested in this opportunity despite the fact that the Burkinabe government was involved in an earlier dispute in the same area: In 2007, the government "sold" the rights to Pan African Minerals, even though the government had

¹¹The estimated investment was \$650 million with the exclusive right to apply for a mining license for the development of Tambao mine for three years. Pan African Minerals also had the right to apply for two three-year renewals of the license.

previously granted rights to an exploration license to Wadi al Rawda Investments LLC of the United Arab Emirates.¹² This dispute over the operating license gives potential investors in the mining sector new market opportunities with respect to the world's largest manganese mine.

As the example suggests, adverse changes may be firm-specific. The dispute has a negative and specific impact on the assets of the targeted firm. An investment dispute (both outright and creeping expropriation) harms the claimant's business, which will open up new investment opportunities to competing firms in the same industry. A dispute might result in direct gains to competing firms because the affected firms may be more likely to divest.¹³ Thus, we argue that an investment dispute creates new opportunities for co-industrial firms.

However, the effect of a dispute on market competition is likely to vary across the industry-specific levels of FAI. High FAI industries are typically characterized by a few large market actors because only few firms are productive enough to pay high start-up costs, which leads to highly concentrated market structure (Wright and Zhu, 2018).¹⁴ High barriers to entry benefit existing firms by protecting their revenues and profits, making it difficult for new firms to enter. Early entry in such industries provides firms a variety of benefits through brand building, relationship with suppliers, preferential treatment from governments, and excessive investment to preemptively deter following competitors (Burger et al., 2015, p.310-11). First movers can exploit lower costs and consequently erect higher entry barriers for

¹²The dispute was settled in 2013. Wright and Zhu (2018) note that Timis lobbied the leader's family and paid them bribes more than \$8 million, which shows how MNCs enter and secure rents in personalist regimes.

¹³For example, Blake and Moschieri (2017) show that only affected firms react to a dispute by divesting.

¹⁴Sunk costs are important determinants firms' entry and exit decisions because sunk costs increase the cost on entry (Amir and Lambson, 2003; Gschwandtner and Lambson, 2002; Dixit, 1989; Eaton and Lipsey, 1980; Caves and Porter, 1977).

following competitors.¹⁵ Thus, a dispute which harms the position of an existing market actor creates an opportunity for other firms looking to enter or expand their market share in that industry.

In contrast, in low FAI industries, fewer start-up costs mean that more firms are able to enter, which creates a more competitive and saturated market. Due to the large number of potential actors in the market, competitive gains from an existing actor's disadvantage following a dispute are disbursed; therefore, the gains to any one market entrant are small. As a result, new competitive opportunities from a co-industrial dispute are likely small at low fixed asset intensity and large at high fixed asset intensity. Therefore, we expect that the level of new market opportunities from a co-industrial dispute will be an increasing function of the level of fixed asset intensity.

Net effect of disputes on FDI

With these competing pressures (risk and opportunity), the theoretical net effect of investment disputes on future FDI is *ex ante* ambiguous. As noted by Wellhausen (2015), "Coin-dustrials' willingness and ability to act in ways costly to the host government following breach are inevitably tempered by the tension between competition and collaboration: one firm's expropriation can be another firm's opportunity" (242). Our theory suggests that both changes in risks and opportunities increase with industry fixed asset intensity.

We expect that at low levels of FAI, the negative pressure from increased risk is greater than the positive pressure of new market opportunities. Due to its highly saturated market structure and low entry barriers, a co-industrial dispute will not create substantial opportunities for potential entrants these industries. Multinationals in least fixed asset intensive industries may still reassess risk upward following a co-industrial dispute. Thus, the negative

¹⁵As a result, first movers in fixed asset intensive industries are more likely to enjoy the economies of scale with an increase of production and sales. The substantial gains in economies of scale and the initial hurdle to get into the business raise entry barriers for potential entrants even further.

pressure dominates the positive pressure at the lowest FAI.

Second, new opportunities from a co-industrial dispute increase with FAI. The benefit of new competitive opportunities to potential entrants is substantial at high FAI because of larger economies of scale and greater returns on investment. Once the positive channel of opportunity kicks in, it can significantly attenuate the negative influence of risk associated with a co-industrial dispute on FDI flows. Depending on how the positive effect increases as a function of FAI, we may or may not see a positive net effect of a co-industrial dispute on future FDI flows.

If our theory about competing pressures of risks and opportunities is correct, we expect that the impact of dispute will be negative at low levels of fixed asset intensity (e.g. wholesale trade and professional services), and that the effect will be less negative as fixed asset intensity increases (and perhaps positive) in high fixed asset intensive industries (e.g. utilities, oil and gas extraction). Thus, we hypothesize:

Hypothesis 1. *All else equal, a co-industrial dispute will have a negative effect on foreign direct investment flows in low fixed asset intensive industries, but this effect will become less negative as fixed asset intensity increases.*

DATA AND MODEL SPECIFICATION

In this section, we discuss the construction of the dataset and how it compares to other datasets on disaggregated FDI. We discuss how we use this data to test our theory that the impact of investment disputes on future FDI varies across industries within dyads.

Data

We use an original dataset of project-level greenfield FDI collected from the *fDi Markets* database. The *fDi Markets* data are collected from (over 9,000) media sources, internal information sources at the *Financial Times*, reports from industry organizations and investment agencies, market research and publication companies (FDI Markets 2015). Project announcements go through a quality control process which confirms the existence of the

project using multiple sources. The data include cross-border investments in new physical projects or the expansion of existing facilities.

One advantage of our data is that our outcome, greenfield investment, requires an explicit location decision (compared to say, M&A activity or reinvested earnings, are limited by the location of existing assets). This is particularly valuable given that our theory seeks to explain decisions about where to locate new investment. Thus our data is likely to be useful in testing other theories that are also motivated by decisions about where to locate investments (Barry, 2016). For review of the limitations of FDI flows and stock data as a measure of the phenomena of interest and as a means of testing theories of political risk on multinational behavior, see also Kerner and Lawrence (2014) and Kerner (2014). The obvious limitation of our dataset is that it covers project announcements, rather than completed investments. However, the dataset is updated over time if project announcements are retracted.¹⁶

The original dataset contains information on 157,374 projects. Our unit of analysis is the home-host-industry year. We aggregate the project-level data using NAICS 2007 codes to 20 industries at the 2- and 3-digit level. The list of industries is provided in Table 1. Dyads that do not have any greenfield projects in a particular industry are coded as a zero, where all possible combinations of dyads (excluding tax havens) are considered. Due to the size of the dataset, we limit our analysis to the top 56 home countries. These 56 countries cover over 98 percent of greenfield FDI in terms of amount of capital invested as well as the number of projects. Given the important and well-documented differences in the determinants of FDI flows to developed and developing countries (Blonigen and Wang, 2005), we limit our sample to 126 developing country hosts between 2003 and 2015. We define developing countries as those countries with minimum GDP per capita of less than \$13,000 dollars (constant USD) during the sample period. The lists of home and host countries are in the online appendix.

In terms of coverage, our data offer several advantages over existing sources of disaggre-

¹⁶Note data vintaging is important because the exact projects in the dataset vary based on when data is downloaded. Our data was collected and archived in July 2016.

Table 1: Mean level for key variables by industry

	FDI	FAI (level)	FAI (log level)
Agriculture (11)	0.367	31.14	3.408
Utilities (22)	7.382	56.76	4.036
Construction (23)	5.119	7.414	1.940
Manufacturing (31)	1.866	20.30	3.007
Manufacturing (32)	10.08	21.51	3.064
Manufacturing (33)	18.53	17.02	2.826
Wholesale trade (42)	0.316	5.005	1.606
Retail trade (44-45)	0.0905	28.86	3.353
Transportation & Warehousing (48)	2.388	37.32	3.611
Information (51 except 517)	1.196	7.002	1.938
Real estate (53)	1.978	30.76	3.413
Professional, scientific, and technical services (54)	0.818	6.489	1.867
Administration, support, and waste management (56)	0.268	6.479	1.848
Health care and social assistance (62)	0.174	43.17	3.748
Arts, entertainment & recreation (71)	0.236	40.36	3.682
Accommodation and food services (72)	1.970	35.82	3.566
Oil and gas (211)	5.445	50.70	3.925
Other mining (212)	3.228	38.10	3.638
Telecommunications (517)	2.166	34.89	3.539
Educational services (61)	0.0304	15.46	2.735
Total	3.305	26.67	3.028
Observations	1,409,023		

gated FDI data. Other studies of directed-dyad FDI typically rely on OECD FDI statistics and thus are limited to FDI from home countries that are members of the OECD. As examples, see Kerner (2009); Lee and Johnston (2016); Li and Vashchilko (2010); Wellhausen (2015). Even UNCTAD data is relatively limited in the number of source countries.¹⁷ There are fewer studies of determinants of FDI at the industry level. Again using OECD data, Pinto and Pinto (2008) examine the impact of government partisanship on FDI flows into 24 OECD countries for 17 sectors between 1980 to 2000. In an analysis of the industry-specific effect of BITs, Colen et al. (2016) look at investment into seven sectors for 13 countries in the former Soviet Union and CEE. Blanton and Blanton (2009) use BEA data on the outward activity of US multinational firms to examine the impact of human rights on FDI across industries for the period 1990 to 2004. Wright and Zhu (2018) use UNCTAD data to examine sectoral investment in the primary and secondary sector.¹⁸

Our dataset addresses several of the well-documented limitations of analysis of balance-of-payments FDI measures, while at the same time offering broad coverage in terms of home and host country multinationals, as well as industry variation. Several recent studies also look at firm level data for a limited set of countries or multinationals. First, in enterprise-level analysis, Barry (2016) looks at the establishment of new subsidiaries by 77 multinationals to 133 host countries in developing countries across sector. This company-country data could in theory could be collapsed to look at dyad-industry (or even firm-dyad) but the coverage of our data is significantly greater in terms of number of multinationals and home/host countries.¹⁹ Beazer and Blake (2018) use data on parent firms that establish new affiliates

¹⁷For instance, Aisbett et al. (2016) include 39 source countries (p. 9).

¹⁸Their main analysis focuses on the primary vs. secondary sector. They also analyze more disaggregated data for 16 industries. See page 9 for discussion of missing data in terms of host countries (Wright and Zhu, 2018).

¹⁹Note that our data could be used to do firm level analysis, but the dataset does not include firm level controls shown to be important in other analyses (e.g. firm size, previous

at any point between 2006 and 2011 from *Orbis* to examine the decision to incorporate in a particular host country (16). One additional advantage of our data is that it is time-varying.

Variables

Dependent variable. Our dependent variable is the log of the total amount of greenfield investment in millions of US dollars (current value) between home country i and host country j in an industry k at a year t . We add one to all values to retain dyad-industry pairs that do not have any investment in a given year before logging. We present the mean amount of FDI (unlogged) by industry in Table 1 above. In a robustness check, we present the same results for a binary variable equal to one if there was at least one FDI project and zero otherwise.

Independent variables. The main independent variable in our analysis is the presence of a co-industrial investment dispute. *Co-industrial* dispute is coded as one if the host j was the target of a dispute in a sector k from year $t-3$ up to and including year t .²⁰ We use a four year window on the dispute because the location decision process is often a multiyear process. This variable is based on the *Investor-State Dispute Settlement (ISDS) Data* collected by Wellhausen (2016), and contains detailed information about industrial characteristics of each investment project.²¹ We identify 20 industrial sectors by matching the variable to 2007 North American Industry Classification System (NAICS) codes.²² In investment in host, etc.).

²⁰We only count the initiation of disputes at year t but not ongoing unsettled cases in the same year. The length of settlement process can be affected by other unobservable factors in each case, which can cause measurement error but not necessarily add investment risks on the top of the investment risks caused by the initiation of the dispute.

²¹Wellhausen (2016) notes that *Invsttype* variable is the descriptive text of the industrial characterization specified by the arbitration documents. Available at <http://www.rwellhausen.com/data.html>.

²²We exclude the Finance and Insurance sector (52) for two reasons. First, the Finance and Insurance sector is often treated separately than even service industries in analysis of FDI

robustness checks, we code observations as having an co-industrial dispute one if a dispute in a sector k occurs between a year t and a year $t-5$. We lag the disputes variable one year.

Our second independent variable is fixed asset intensity. To measure this, we use information drawn from the U.S. Bureau of Economic Analysis (BEA).²³ We measure fixed asset intensity as the value of the net property, plant, and equipment expenditure (PPE) for an industry as a percent of total assets. The ratio of PPE to the total assets is one of the most frequently used measure of the fixed asset intensity in both business and political economy literature (e.g. Plesko, 2003; Kerner and Lawrence, 2014). Thus our data vary by industry and over time, but not across countries. Unfortunately, the data necessary to calculate this measure are not available for most countries. Although the level of fixed asset intensity will vary over countries, the ordering should not vary because fixed asset intensity is determined largely by industry technology (Wright and Zhu, 2018, 351). See also Nunn and Trefler (2014). We refer to this as *Fixed asset intensity (level)* (Colen et al., 2016, 197). In Table 1, we provide the average by industry. Oil and Gas (211) and Utilities (22) are the most fixed asset intensive industries. As an alternative measure for robustness checks, we normalize the raw form measure such that an industry with the lowest fixed asset intensity in year t is equal to one, following Johns and Wellhausen (2017). Thus the value in other sectors is the proportional increase in fixed asset intensity relative to Wholesale Trade. We refer to this below as *Fixed asset intensity (scaled)*. Both the scale and level measures are skewed and thus we log transform each variable.

We include a number of control variables. To determine controls for the home, host and dyad, we largely follow the specification of Wellhausen (2015) who analyzes the impact of

by international organizations like the OECD, and is typically excluded from most analyses of firm-level investment decisions (Goldberg, 2004). Second, the Finance and Insurance industry is an outlier in terms of our key independent variable, fixed asset intensity. However, our findings are robust to the including of this industry (available upon request).

²³Available at <https://www.bea.gov/>.

disputes on dyadic FDI flows. First, we control for the effect of bilateral investment treaties (BITs) and other international agreements with investment provisions. Extant literature has suggested that BITs are legally binding instruments which impose *ex ante* costs of joining the international agreements and *ex post* costs of violation, which in turn should signal the credibility of governmental commitments on FDI contracts (e.g. Kerner, 2009; Salacuse and Sullivan, 2005; Sachs and Sauvant, 2009; Simmons, 2014; Elkins, Guzman, and Simmons, 2006; Bütthe and Milner, 2008, 2014; Allee and Peinhardt, 2014). We include a dummy variable equal to one to indicate the presence of at least one international agreement with investment provisions (i.e. a BIT or PTA). *IIA* is coded as 1, if a country dyad has a BIT or PTA with investment provision in the given year; otherwise, zero. Data on BITs comes from the UNCTAD Investment Policy Hub,²⁴ and data on PTAs with investment provisions is available from Dür et al. (2014).²⁵

Second, we use the *Polity* score (Marshall et al., 2013) as the measure of regime type of host country. According to previous literature, democracies allow greater institutional constraints on arbitrary policy changes and greater governmental accountability, they are less likely to violate property rights but more likely to commit to liberal economic policies (e.g. Jensen, 2003, 2008; Olson, 1993; Kang, 2003; Li and Resnick, 2003; Bechtel, 2009; Jensen, Biglaiser, Li, Malesky, Pinto, Pinto, and Staats, 2012; Henisz, 2000a,b).

Third, we control for two additional dispute characteristics Wellhausen (2015) finds that co-national FDI contract breaches reduce FDI. To control for this effect, we include a dummy variable equal to one if there was a dispute between home i and host j regardless of a sector k between a year t and a year $t-3$. We also include the total number of disputes filed against

²⁴Available at <http://investmentpolicyhub.unctad.org/IIA/>. Note that in the case of a BIT between a country A and Belgium-Luxembourg Economic Union (BLEU), we code the BIT as two different BITs. Thus, on our sample, this BIT appears at two different country dyads: (A , Belgium) and (A , Luxembourg).

²⁵Available at <https://www.designoftradeagreements.org/>.

the host in previous years. Both variables are coded using Wellhausen (2016)'s data and are lagged one year.

Lastly, we control for the effect of home and host specific macroeconomic factors. We include the (1) the log of per capita GDP of both home and host, (2) GDP growth in both the home and host, (3) the log of host's population size, and (4) natural resources rents as a percent of GDP. These data were collected from the World Bank World Development Indicators (WDI).²⁶ A correlation matrix can be found in the online appendix.

Model specification

We build on gravity-type models of the determinants of FDI. We include dyad- and year-fixed effects but do not include industry fixed effects due to collinearity introduced by the interaction terms. This design allows us to capitalize on previous research demonstrating the importance of dyad characteristics while introducing industry characteristics.

Our theory suggests that the net effect of disputes will be negative for industries with lower levels of fixed asset intensity but this negative effect will be reduced as the levels of fixed asset intensity increases, potentially becoming positive at high levels of fixed asset intensity. We lag all variables one year. Our preferred model specification is as follows:

$$\begin{aligned}
\text{Log}(FDI)_{ijkt} = & \beta_0 + \beta_1 \text{Co} - \text{industrial dispute}_{jk,t-1} + \beta_2 \text{Log}(\text{intensity})_{k,t-1} \\
& + \beta_3 \text{Co} - \text{industrial dispute}_{jk,t-1} \times \text{Log}(\text{intensity})_{k,t-1} \\
& + \beta_4 \text{Co} - \text{national dispute}_{ij,t-1} + \beta_5 \text{Previous disputes}_{j,t-1} + \beta_6 \text{IIA}_{ij,t-1} \\
& + \beta_7 \text{Polity}_{j,t-1} + \beta_8 \text{Log}(GDP\text{PC})_{j,t-1} + \beta_9 \text{Growth}_{j,t-1} + \beta_{10} \text{Log}(\text{population})_{j,t-1} \\
& + \beta_{11} \text{Log}(\text{resources})_{j,t-1} + \beta_{12} \text{Log}(GDP\text{PC})_{i,t-1} \\
& + \beta_{13} \text{Growth}_{i,t-1} + \alpha_{ij} + \gamma_t + u_{ijkt}.
\end{aligned} \tag{1}$$

²⁶ Available at <http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators>

If our theory is correct, the coefficient on the interaction term between co-industrial disputes and log fixed asset intensity (β_3) should be positive. We also estimate the same results using a matched sample based on coarsened exact matching to address concern that there is heterogeneity between “treated” (disputes) and “untreated” (no disputes) observations (Iacus et al., 2012).²⁷ This stratification approach automatically reduces the sample to areas of common empirical support.

RESULTS

We present our main results in Table 2. Model 1 of Table 2 is an unconditional model. The effect coefficient on a co-industrial dispute is negative but not statistically significant from zero. This is not surprising given the ambiguous net effect anticipated by our theory. The coefficient on fixed asset intensity is negative and statistically significant, suggesting that there is less greenfield FDI into fixed asset intensive industries. We do not have a clear theoretical expectation about the effect of fixed asset intensity on FDI itself, because this industry characteristic is better thought of as a variable that conditions the effect of other key determinants of decisions by capturing industry heterogeneity.

We note that the direction and significance of other variables are consistent with expectations. The coefficients on IIAs positive and statistically significant, suggesting that signing IIAs (BITs and PTAs with investment provisions) is associated with greater levels of investment. The coefficients on log GDP per capita, log of population and natural resources as a percent of GDP in the host are both positive and statistically different from zero, as is the coefficient on log GDP per capita in the home country. Overall the model explains 16.0 percent of the variation in greenfield investment.

To test whether the impact of co-industrial disputes on future investment varies by industry fixed asset intensity, Model 2 estimates an interaction effect between co-industrial

²⁷Observations coarsened into quartiles based on population and GDP per capita of the host country and industry FAI, with exacting match on host country region.

Table 2: Regression Analysis of Greenfield FDI

	OLS full sample		WLS matched sample	
	(1)	(2)	(3)	(4)
Co-industrial dispute	-0.005 (0.003)	-0.059*** (0.014)	0.000 (0.003)	-0.090*** (0.015)
Log intensity (level)	-0.004*** (0.001)	-0.004*** (0.001)	-0.016*** (0.002)	-0.018*** (0.002)
Co-industrial X Intensity		0.016*** (0.004)		0.027*** (0.004)
Co-national dispute	-0.012 (0.008)	-0.011 (0.008)	-0.017 (0.014)	-0.017 (0.014)
Previous disputes	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Investment agreement	0.008** (0.004)	0.008** (0.004)	0.007 (0.007)	0.007 (0.007)
Polity - host	0.000 (0.000)	0.000 (0.000)	0.001*** (0.000)	0.001*** (0.000)
Log GDPPC - host	0.029*** (0.005)	0.029*** (0.005)	0.020** (0.010)	0.019* (0.010)
Growth - host	0.000*** (0.000)	0.000*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Log population - host	0.127*** (0.010)	0.127*** (0.010)	0.231*** (0.023)	0.231*** (0.023)
Natural resources (% GDP) - host	0.006*** (0.001)	0.006*** (0.001)	0.004 (0.003)	0.004 (0.003)
Log GDPPC - home	0.023*** (0.004)	0.023*** (0.004)	0.019** (0.009)	0.019** (0.009)
Growth - home	-0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Constant	-2.435*** (0.176)	-2.431*** (0.176)	-4.103*** (0.444)	-4.094*** (0.444)
Observations	1409023	1409023	954602	954602
Adjusted R^2	0.16	0.16	0.15	0.15
BIC	1.95e+06	1.95e+06	1.82e+06	1.82e+06

Cluster robust standard errors in parentheses. Dyad and year fixed effects included.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

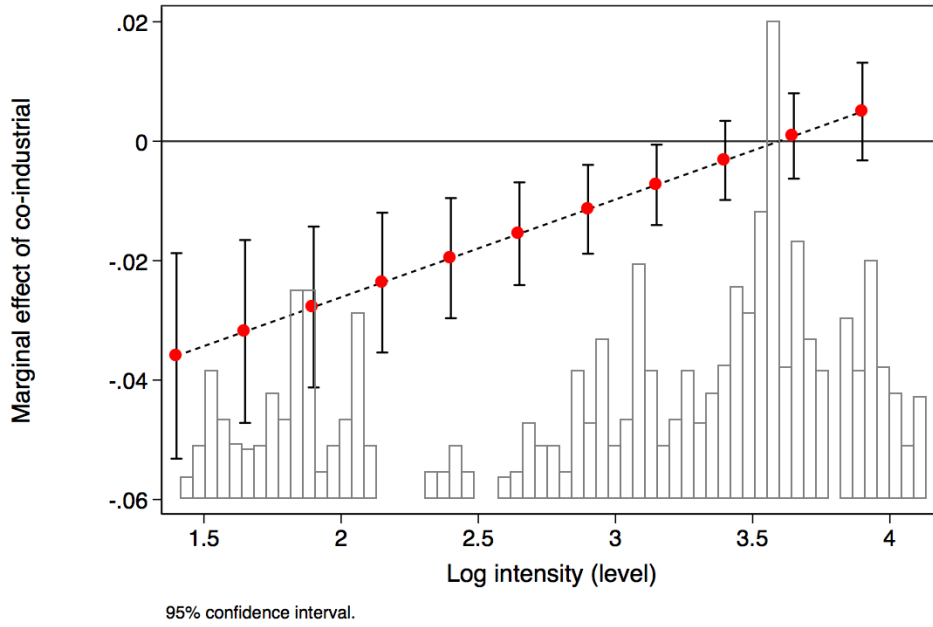
disputes and the levels of fixed asset intensity. The coefficient on interaction term is positive and statistically different from zero as hypothesized. We plot the marginal effect of a co-industrial dispute as a function of fixed asset intensity in Figure 2. We also include a histogram of the conditioning variable. Figure 2 shows that the effect of a co-industrial dispute is negative at low levels of fixed asset intensity, but that the effect is increasingly positive as a function of fixed asset intensity. At high levels of FAI, a co-industrial dispute does not increase or decrease the level of greenfield FDI, consistent with the theoretical expectation that for some industries, the opportunities and risks associated with a dispute offset each other.

In Models 3 and 4 of Table 3, we present the same non-interactive and interactive specifications based on a coarsened sample. With respect to the main effect of interest, the coefficient on the interaction term in Model 4 is again positive and statistically significant from zero. The marginal effect of co-industrial dispute is plotted in Panel B of Figure 2. The patterns are similar to those found in the full sample, except at highest levels of FAI, the marginal effect of a dispute is positive and statistically different from zero. From the histogram, we note that there is a significant mass of observations at this level of fixed asset intensity.

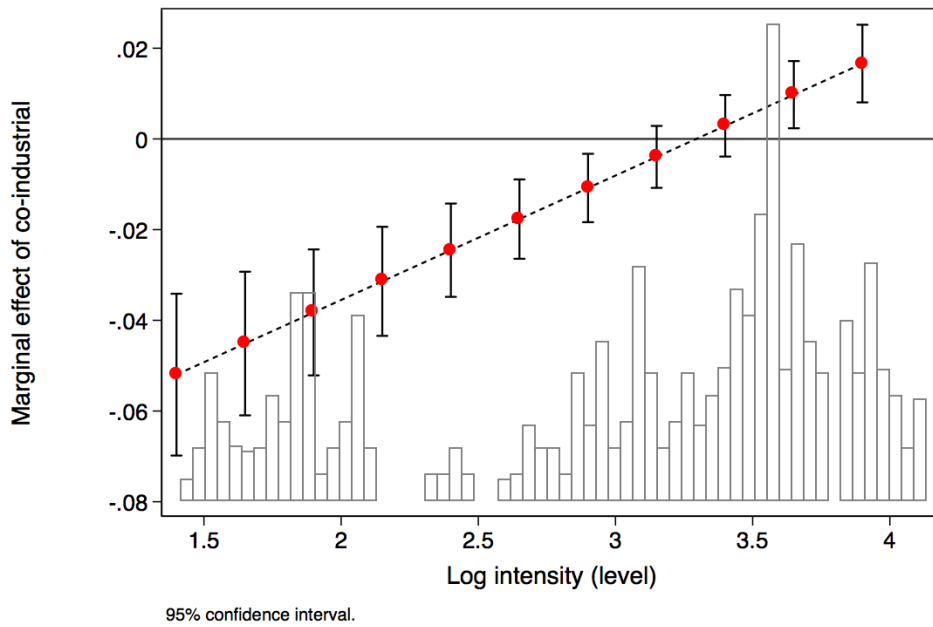
Substantively, we find evidence that is consistent with our theory. As shown in Figure 2, the marginal effect of a dispute on FDI is negative and statistically different from zero at low to medium levels of fixed asset intensity (including such industries as construction, professional and administrative services, etc. At high levels of fixed asset intensity, a co-industrial dispute either has no effect on FDI (Model 2) or may lead to a small increase in FDI (Model 4), including such industries as utilities, telecommunications, and oil and gas. The size of the effect is substantively significant; based on the results in Model 2, a co-industrial dispute for an industry at the 25 percentile leads to a reduction in FDI by 2.22 percent, while for an industry at the 75th percentile, there is no effect of a dispute on FDI. These findings suggest that the risks associated with a dispute exceed the new competitive

Figure 2: Marginal effect of Co-industrial Dispute by Log of Fixed Asset Intensity

(a) Full sample (Table 2, Model 2)



(b) Matched sample (Table 2, Model 4)



opportunities among industries with fixed asset intensity less than approximately 21. Above that level, the results suggest that the competitive opportunities arising from a dispute generally offset the increase in risk.

ROBUSTNESS

To demonstrate the robustness of our findings, we estimate Equation 1 using alternative measures of our independent and dependent variables. These results are presented in Table 3. First, in Model 1, we estimate the interaction model using the scaled measure of the levels of fixed asset intensity—*Fixed asset intensity (scaled)*. This is calculated by normalizing the *Fixed asset intensity (level)* by the sector with the lowest fixed asset intensity in year t as the baseline.

In terms of the substantive findings of interest, the marginal effect is presented in panel A of Figure 3. We again find that at low- to medium-levels of fixed asset intensity, the effect of a co-industrial dispute is negative and statistically significant. This effect becomes less negative as the level of fixed asset intensity increases. At high levels of fixed asset intensity, a co-industrial dispute leads to an increase in FDI, demonstrating the results follow a similar pattern to those presented above.

Second, in Model 5, we utilize a different window on the *Co-industrial dispute* and *Conational dispute* variables because multinationals might evaluate the overall risks of investment by using relatively longer periods. Hence, we check the robustness of our model by coding dispute variables as one if there was a dispute for the past five years. We return to our original measure of FAI for the most direct comparison to the results in Model 2 of Table 2. The marginal effects plot is presented in Panel B of Figure 3 and again follows a similar pattern.

Third, we estimate a logistic regression where the outcome is a greenfield investment or not (instead of the amount of capital invested). We include home- and host-country fixed effects as well as year fixed effects. The marginal effect of a co-industrial dispute is presented in Panel C of Figure 3. We again find that at low levels of FAI, a co-industrial dispute reduces

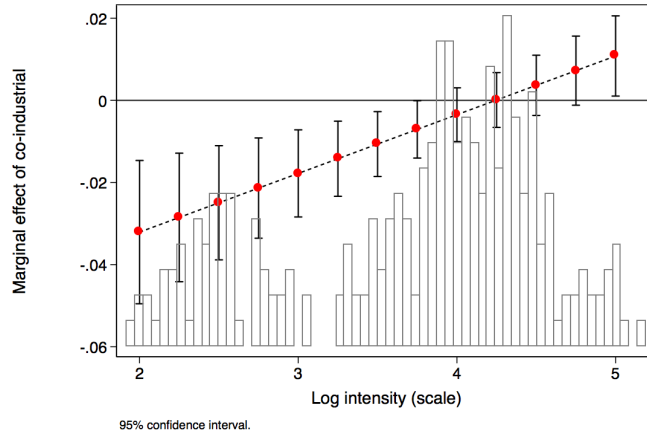
Table 3: Robustness analysis of greenfield FDI

	(1)	(2)	(3)
Co-industrial dispute	-0.061*** (0.017)		-0.514*** (0.140)
Log intensity (scale)	-0.004*** (0.001)		
Co-industrial X Intensity (scale)	0.014*** (0.004)		
Log intensity (level)		-0.005*** (0.001)	-0.280*** (0.013)
Co-industrial X Intensity			0.146*** (0.042)
Co-industrial dispute (five years)		-0.049*** (0.013)	
Co-industrial (five years) X Intensity		0.015*** (0.004)	
Co-national dispute (five years)		-0.016** (0.007)	
Co-national dispute	-0.012 (0.008)		0.270*** (0.040)
Previous disputes	-0.000 (0.000)	0.000 (0.000)	-0.009*** (0.002)
Investment agreement	0.009*** (0.004)	0.009*** (0.004)	0.599*** (0.034)
Polity - host	0.000* (0.000)	0.000* (0.000)	0.006 (0.005)
Log GDPPC - host	0.029*** (0.004)	0.028*** (0.004)	0.136* (0.080)
Growth - host	0.000*** (0.000)	0.000*** (0.000)	0.016*** (0.002)
Log population - host	0.092*** (0.008)	0.091*** (0.008)	2.789*** (0.202)
Natural resources (% GDP) - host	0.005*** (0.001)	0.005*** (0.001)	-0.016 (0.032)
Log GDPPC - home	0.014*** (0.004)	0.014*** (0.004)	0.325*** (0.078)
Growth - home	0.000 (0.000)	0.000 (0.000)	0.009*** (0.003)
Constant	-1.770*** (0.149)	-1.756*** (0.149)	-53.028*** (3.575)
Observations	1564475	1564475	1564475
Adjusted R^2	0.15	0.15	
BIC	2.13e+06	2.13e+06	192208.56

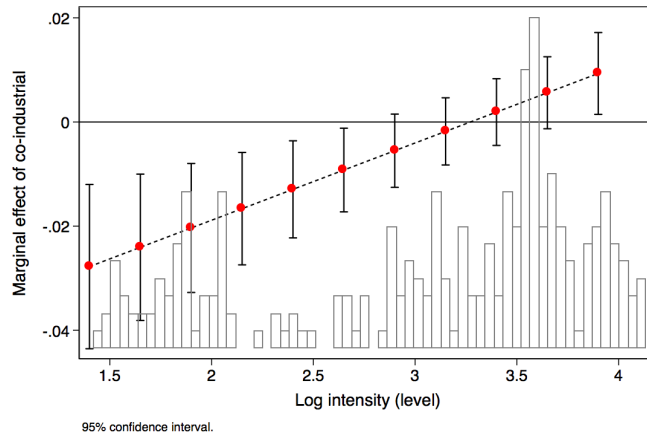
Cluster robust standard errors in parentheses. Dyad and year fixed effects included in Models 1 and 2. Logitistic regression in Model 3 includes home-, host- and year fixed effects. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure 3: Marginal effect of Co-industrial Dispute by Log of Fixed Asset Intensity

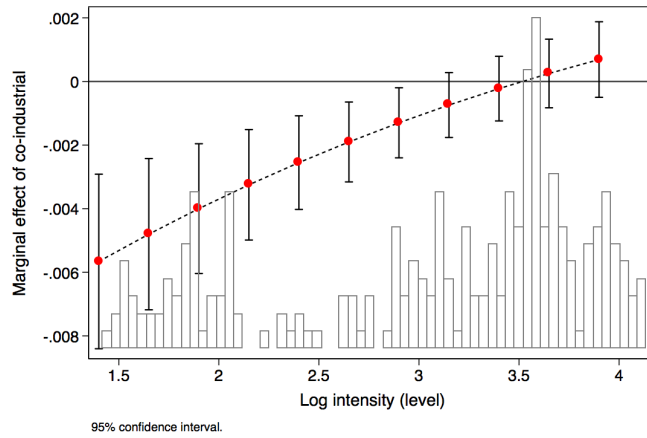
(a) Scaled intensity (Table 3, Model 1)



(b) Five year disputes (Table 3, Model 2)



(c) Project dummy (Table 3, Model 3)



FDI and at medium to high levels, there is no effect on FDI.

Finally, recent work by Hainmueller et al. (2019) suggests caution when estimating parametric interaction models, because it may be forcing the data into a particular form (when in fact the “true” functional form is non-linear) and/or the results may be driven by a subset of the observations, when there is a lack of common support on the moderating variable. To address these concerns, we estimate a binned regression using the Stata program `interflex` (Hainmueller et al., 2019). This procedure splits the observations into low, middle and high levels of fixed asset intensity and interacts each dummy with the dummy variable for co-industrial dispute. The results of this analysis are presented in Figure 4 in the appendix with marginal effects plotted at the median value in each category. The results are consistent with our parametric analysis: the marginal effect of a co-industrial dispute is negative at low levels of fixed asset intensity, and not different from zero at medium and high levels of FAI. However, the results suggest that there may be some non-linearity as there is essentially no change in the marginal effect between medium and high levels of FAI.

In summary, the results in Table 3 demonstrate the robustness of our findings. We present several additional analyses in the online appendix. In particular, we re-estimate our main model limiting the sample to developed home countries and developing hosts to address possible differences in decision-making by firms in different countries. We also re-estimate our main model by limiting the sample only to those dyads that have an international investment agreement in place, to address the concerns that the effect of dispute differs between protected and unprotected dyads (Aisbett et al., 2016). For both samples, the results are similar to those presented already, albeit with effects that are slightly larger in magnitude. We also check the robustness of our findings from Model 2 of Table 2 through a jackknife analysis of dropping one industry at a time. The results of jackknife analysis are provided in the online appendix; this analysis also demonstrates that our findings are generally robust across different subsets. For 19 of 20 industries, the coefficient on the interaction between co-industrial dispute and log intensity is positive and statistically different from zero.

CONCLUSION

In this paper, we examine the industry specific effects of investment disputes. We suggest that disputes will affect future FDI flows by causing potential investors in an industry to revise their investment decisions in light of a dispute in the host country in that same industry. *Ex ante*, the net effect of a co-industrial dispute is unclear due to competing risk and reward pressures. We offer a theory in which the effect of a co-industrial dispute depends on the level of industry fixed asset intensity.

To test our theory, we introduce a new dataset on greenfield FDI at the dyad-industry-level. We find support for our theory, and specifically demonstrate that the effect of a co-industrial dispute is negative at low levels of fixed asset intensity, but there is no effect of a co-industrial dispute at high levels of fixed asset intensity. Contrary to conventional wisdom, our results indicate that the effect of an investment dispute is not necessarily negative, and in some cases can be positive.

The work in this paper contributes to a larger literature in political science that examines the impact of political risk on the ability of countries to attract FDI. Two of the most prominent lines of research in this area emphasize the role of domestic institutions (like regime type) and international institutions (e.g. international investment agreements).²⁸ However, due to data limitations, much of what we know and what we do not know about the impact of political risk on FDI comes from studies based on highly aggregated FDI measures. The most common measures of FDI, aggregate flows and stocks, have been critiqued for several reasons (e.g. Kerner, 2009; Moran, 2016). In terms of theory building and testing, one limitation of this approach is often competing theories about precise mechanisms cannot be evaluated empirically (Allee and Peinhardt, 2011; Li et al., 2018). Moreover, as aggregate data mask important heterogeneity in investor behavior across a number of dimensions,

²⁸For review, recent reviews, see Li, Owen, and Mitchell (2018) and the 2014 special issue of *World Politics* with contributions from Bütte and Milner, Allee and Peinhardt, and Simmons.

there remains much work to be done in terms of developing theory regarding variation in how potential investors assess and respond to political risk.

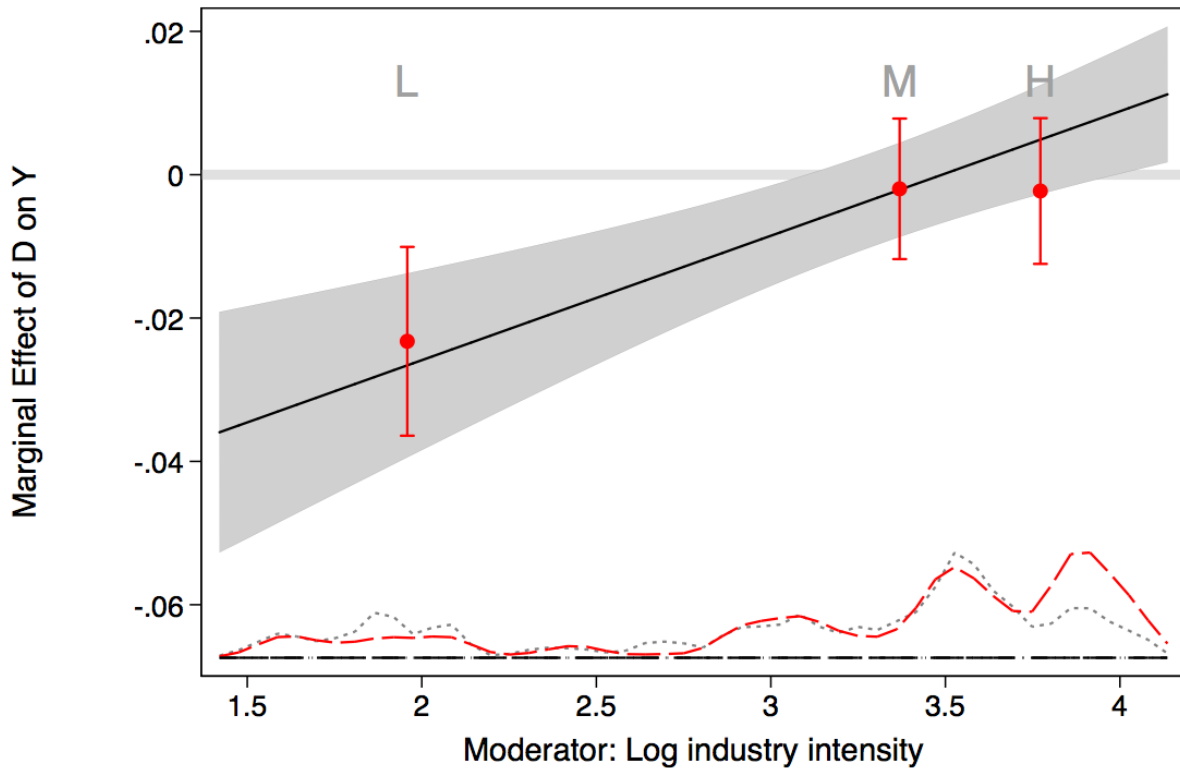
A new wave of scholarship that seeks to open the black box of FDI is emerging and studies of FDI at the firm, industry, or dyad-level are some of the most promising and growing areas of research in the field. This has led to new theory about the conditions under which different mechanisms that ameliorate or alleviate political risk are expected to operate, including work cited above. In the same vein, the results of the paper offer new insight into how investor heterogeneity, specifically industry characteristics, shapes how multinational firms make investment decisions. Our use of disaggregated data allows us to examine a more comprehensive set of theories about the impact of political risk on FDI, and allows for more robust assessment of the sources of heterogeneity in modeling firm behavior, including in the dyadic context.

APPENDIX

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Figure 4: Binned regression analysis of effect of co-industrial dispute



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