

Heterogeneity in How Investors Respond to Disputes: Greenfield Foreign Direct Investment and Coindustrial Disputes

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Do investment disputes reduce foreign direct investment (FDI)? Investors may perceive host governments involved in arbitration as riskier. Yet a dispute may also signal new economic opportunities for firms hoping to enter the same industry as the disputant firm. These competing pressures mean the impact of disputes on FDI is *ex ante* unclear. However, the balance of risk and opportunity varies across industry fixed asset intensity (FAI). FAI is associated with both the irreversibility of investment, which influences risk, as well as the structure of the market, which shapes competitive opportunities arising from a dispute. We expect the rewards from investment to exceed risk as industry FAI increases. Using new data on industry-level greenfield FDI between countries from 2003 to 2015, we find that a coindustrial dispute reduces investment in industries with low FAI but increases FDI in those with high FAI. These results highlight the importance of heterogeneous investors.

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 how investors are heterogeneous with respect to political risk. Using firm- or industry-level data, scholars have focused on how home country (e.g., Beazer and Blake 2018) and industry characteristics (e.g., Wright and Zhu 2018; Zhu and Shi 2019) shape FDI.

Yet there is still a lot we do not know about the behavior of heterogeneous investors. This article asks: How do invest-

ment 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 bilateral investment treaty (BIT), a preferential trade agreement (PTA), or other contract (Wellhausen 2016). The most prominent venue for arbitrating these claims is the International Centre for Settlement of Investment Disputes. The number of investment dispute arbitrations has increased dramatically over time; 66 dyadic disputes were filed from 1990 to 1999, compared to 785 dyadic disputes filed between 2000 and 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.,

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1. A 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 and 2015 (Wellhausen 2015).

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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 the host countries' policy space become clear, many countries are beginning to reconsider participating in international investment agreements (IIAs; Aisbett, Busse, and Nunnenkamp 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 in the same industry, what we call a *coindustrial 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 and thus may indicate new market opportunities for potential investors, which would increase the likelihood of future investment. Therefore, the effect of a coindustrial dispute on FDI is ambiguous: the net effect of a coindustrial dispute could range from negative (reducing FDI) to positive (increasing FDI).

However, the extent to which a dispute increases risk or return more varies across industries in systematic ways. Thus, we further contend that whether the net effect of a coindustrial dispute is positive or negative will depend on the amount of fixed assets required for investment, that is, industry fixed asset intensity (FAI). FAI is the amount of capital required to enter the market; it captures the type and magnitude of start-up costs that potential investors must pay to enter a market. FAI is associated with both the irreversibility of investment, which influences risk, as well as the structure of the market, which shapes competitive opportunities arising from a dispute. We expect that an investment dispute will discourage investment at low FAI because risk exceeds new opportunities, but the dispute may encourage or at least will not discourage investment at high levels of FAI because market opportunities offset the increase in risk.

To test our theory of heterogeneity in investor behavior at the industry level, we introduce a new data set on dyad-industry-level greenfield FDI, which is developed from project-level greenfield investment data available from fDi Markets.

2. Indirect expropriation is also called de facto, creeping, or measures equivalent to expropriation (Pelc 2017). Notably, host governments can face a dispute even if the policy or regulatory action was not intended to harm the investor.

Our estimation sample covers greenfield investment between 56 home countries and 125 emerging and developing host countries in 20 industries, between 2003 and 2015. We discuss differences between our data and other data sets below, but to the best of our knowledge, this is the first analysis of FDI at the dyad-industry level across countries over time. Our data set also covers more home countries relative to the most common sources of dyadic data.³ We limit our analysis to developing host countries because of differences in the determinants of FDI in developed and developing hosts. We find support for our argument that the effect of a dispute will vary by industry and, specifically, that a coindustrial dispute has a negative effect on FDI at low levels of FAI but that this effect becomes less negative as FAI increases. At high levels of FAI (e.g., utilities, telecommunications, oil and gas), a coindustrial dispute actually can lead to an increase in FDI.

This article contributes to the literature on IIAs and FDI and also speaks to a broader literature on the heterogeneous behavior of investors. In particular, the article highlights why firms perceive risk to be more or less than reward and how the competing pressures of risk and reward shape investors' reaction to new information. Our findings suggest that we need to account more for the strategic considerations of firms and how market structure shapes these considerations. Moreover, it suggests that the protection of IIAs—or at least compliance with agreements—may not be as important to investors in certain industries, particularly those that are typically seen as more capital intensive. In the remainder of the article, we review the literature on political risk and FDI before introducing our theory. We then discuss our data and how they compare to other data used in the literature before presenting our results.

POLITICAL RISK AND FDI

In recent decades, 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 after investment as 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. It is difficult for investment-seeking governments to

3. Analyses using Organization for Economic Development (OECD) data typically have about 23–24 home countries (e.g., Kerner 2009, 83), while the United Nations Conference on Trade and Development (UNCTAD) has data for 39 home countries (e.g., Aisbett et al. 2016, 8).

4. FDI involves the construction of a new facility or expansion of an existing one (greenfield investment) or the transfer of existing assets to the multinational (mergers and acquisitions).

make credible commitments to their investor-friendly policies. This is an important problem for many developing countries that depend on FDI as a leading source of capital (e.g., Moran, Graham, and Blomstrom 2005).

There are a growing number of studies on the 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 (Jensen 2003, 2008; Li 2009; Li and Resnick 2003; Resnick 2001).⁵ Recent studies show that relying on aggregate FDI data overlooks important industry- or firm-level variation in risk assessment and the role of institutions (e.g., Arel-Bundock 2017; Blake and Moschieri 2017; Kerner 2014; Wright and Zhu 2018).

The second strand of research focuses on the role of BITs, as well as other agreements with investment provisions (e.g., PTAs) in attracting FDI (e.g., Bütte and Milner 2014; Lee and Johnston 2016; Poulsen and Aisbett 2013). The *ex ante* signaling effect of BITs and *ex post* costs for noncompliance 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., Desbordes and Vicard 2009; Lee and Johnston 2016; Neumayer and Spess 2005). Host governments also can credibly commit to abiding by rules of an agreement because the various investor protections in BITs impose *ex post* costs in the event of noncompliance (e.g., Aisbett et al. 2016; Allee and Peinhardt 2011; Jandhyala, Henisz, and Mansfield 2011). BITs may 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, Persyn, and Guariso (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 multinational. As such, disputes are theorized to affect multinationals' perceived risks of expropriation by host country governments. Findings indicate that a dispute increases perceived risks and consequently discourages FDI (e.g., 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 that firms reevaluate investments in the host following evidence of noncompliance and find that investment disputes reduce inward FDI flows. Their argument implies that disputes have a homogeneous effect on risk calculations across 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 home country of that firm only. Also in a dyadic context, Aisbett et al. (2016) suggest that the impact of a dispute on investment depends on whether the investor is protected by a BIT 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) suggest that 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 political capabilities, resulting in divestment from the targeted country and the region.

Although a growing body of work has examined the heterogeneity of FDI across industries (Bauerle Danzman 2016; Burger, Ianchovichina, and Rijkers 2015; Frieden 1994; Hajzler 2012; Henisz 2002; Kobrin 1980, 1987), research on the impact of disputes on FDI has not considered the industry-specific impacts of a dispute. Yet, there are several reasons to think that the impact of the dispute may be significant in the same industry and that the impact of a dispute will vary across industries. As several recent studies suggest, the risk of FDI varies across FAI (Arel-Bundock 2017; Colen et al. 2016; Johns and Wellhausen 2017; Wright and Zhu 2018). FAI is the amount of up-front capital required to engage in the production of a good or service; it is the amount of capital required to enter a particular market. Because FAI influences the degree of irreversibility (e.g., sunk costs) of FDI, investors are likely to perceive risk differently at different levels of FAI. At the same time, variation in FAI also influences market structure (Tirole 1988), which has important consequences for competitive pressures arising in the wake of a dispute. To address this, we develop a theory of coindustrial disputes in the next section.

THEORY

We argue that disputes will have the largest effect on investment flows in the same industry. 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

5. See Li, Owen, and Mitchell (2018) for a review and metaregression analysis.

6. In terms of future investment as well as divestment.

potential investors to exploit and thus increase the likelihood of investment. Because of these competing pressures, the overall (net) effect of a dispute on FDI is ambiguous.

However, we expect that the net effect of a coindustrial dispute will vary across industries in systematic ways. Industry FAI is a key characteristic that determines whether a dispute is likely to increase or decrease future FDI flows to an industry. On the one hand, industries with high levels of FAI are typically capital intensive and require higher start-up costs. The nontransferable and more irreversible investments in these industries become vulnerable to expropriation, which increases investors' perceived risk following a dispute. On the other hand, industries that are characterized by high levels of start-up (and sunk) costs are more likely to have greater barriers to entry; these types of markets typically have a few large firms (Tirole 1988). These market characteristics create strategic considerations that may incentivize investment following a dispute. As a result, the dominance of the risk or opportunity channels depends on the level of FAI. 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

Risk is the first channel through which disputes can shape FDI flows. Of particular concern for multinationals is the risk of expropriation through either outright nationalization or 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 government. Indeed, filing a dispute alone is costly because firms must spend time and money to do so (Wellhausen 2015, 252–53). Regardless of the outcome of the arbitration, therefore, the willingness of a firm to bring the host government to arbitration sends a signal of bad treatment by the host government to other multinationals (Allee and Peinhardt 2011; Wellhausen 2015). Thus, after observing a dispute, potential investors are likely to revise upward their assessment of risk in the host country.⁸

We expect disputes to have the largest effect on investment in the same industry as the filing firm. Coindustrial firms are more likely to be affected by the same cause of breach raised in the dispute. Multinationals are also likely to have more access to information about disputes in the same sector. This likely reduces their incentives to invest.

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

8. The option to defer in the face of uncertainty or risk from real options theory (Dixit, Dixit, and Pindyck 1994; Fisch 2008; Folta, Johnson, and O'Brien 2006; McDonald and Siegel 1986) is a related mechanism that puts downward pressure on the incentive to invest following a dispute.

Consider two examples illustrating the industry-specific impact of disputes. Hugo Chavez's long-term policy of expropriation started with a breach of contract in the mining and petroleum industries in 2001 in Venezuela. Under the 2001 Hydrocarbons Law, Chavez raised the royalties on extra heavy crude projects from 1% to 16.6%. From 2001 to 2006, "at least \$1.7 billion in mining and petroleum investments has been expropriated," with the additional seizure of assets of ExxonMobil and ConocoPhillips in 2006 and 2007 (Hajzler 2010, 5). Similarly, the 2007 Ecuadorian Hydrocarbons Law regulates the oil and gas industry and increased the windfall tax on oil from 50% to 99%. Failure to reach an agreement results in termination of the contract and government seizure of oil fields. Indeed, Ecuador seized control of oil fields operated by French oil company Perenco and the US oil company Occidental Petroleum and terminated their contracts altogether.

However, the impact of a coindustrial dispute on risk is likely to vary by industry FAI. Industries with high levels of FAI are typically more capital intensive and require higher start-up costs. This makes such investments more difficult to reverse. As such, investments in these industries are subject to a greater risk of expropriation, as the host government can more easily target nontransferable and irreversible investments (e.g., Colen et al. 2016).⁹ For instance, 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 telecommunications. Indeed, infrastructure is another example of an industry intensive in fixed assets (Bauerle Danzman 2016; Henisz 2002). These up-front costs cannot be recovered; they remain the same before any revenues are realized, even if production stops or rents are decreased because of the behavior of the host government. Given the high stakes involved in investments in these industries, we expect that the increase in risk from a coindustrial dispute will be increasing in the level of FAI.¹⁰

Market opportunity

The second channel through which disputes may affect the likelihood of investment is market opportunity. This mechanism has been less well recognized in the literature

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

10. In the real options literature, the option to defer investment is increasingly valuable as the level of irreversibility increases (Dixit et al. 1994; Folta and O'Brien 2004).

(cf. Wellhausen 2015) but is central to understanding the strategic considerations of firms. A dispute signals that an existing multinational active in the host economy (the filing firm) has been harmed by some government action. This weakened position creates an opportunity for other multinationals to enter the market or increase their market share through additional investment. Thus, a dispute could encourage new FDI by coindustrial multinationals.

As an example of how a dispute can create a market opportunity, consider the Tambao mine in Burkina Faso, one of the world's largest manganese mines. A dispute over the right to the Tambao mine provided potential investors in the mining sector with new market opportunities. 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 at the International Court of Arbitration.¹¹ 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 previously granted rights to an exploration license to Wadi al Rawda Investments LLC of the United Arab Emirates. For the third time, the Burkinabe government is seeking a new partner to mine the Tambao deposit, with estimated reserves of more than 100 million tons of ore (and expected to produce 3 million tons per year). Even though several mining companies have been treated badly, many companies are interested in this compelling market opportunity.

As the example suggests, adverse changes may be firm specific and negatively affect the assets of the targeted firm. That is, an investment dispute (both outright and creeping expropriation) harms the claimant's business, which opens 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 are more likely to divest. Indeed, Blake and Moschieri (2017) demonstrate that only the affected firms react to a dispute by divesting. Even if the disputant firm does not exit, a dispute signals that the position of that firm is weakened. New investors still have the opportunity to take advantage of rivals that were harmed in case of industry-wide policy changes (e.g., the Ecuadorian hydrocarbons example above), because the new investor would likely have different investment strategies, while those already in the market are less profitable than they expected to be. Moreover, the uncertainty generated by the dispute (defined as

both lack of information and also risk) creates an opportunity for growth for firms who invest (Folta and O'Brien 2004). Thus, the desire to prevail over competitors might increase the likelihood of entry in the face of uncertainty (Fisch 2008, 112).

The impact of a dispute on market opportunity likely varies by the level of FAI, because FAI influences the structure of the market, which then affects the strategic considerations of firms. Start-up (sunk) costs have been regarded as barriers to entry and consequently play an important role in firms' entry and exit decisions (Amir and Lambson 2003; Caves and Porter 1977; Dixit 1989; Eaton and Lipsey 1980; Gschwandtner and Lambson 2002). In high FAI industries, high barriers to entry benefit existing firms by protecting their revenues and profits; this comes at the expense of new firms because it is difficult to enter the market. Higher fixed assets (fixed costs) are also associated with greater economies of scale, which influences the number of firms in the industry (Tirole 1988). Because only a few firms are productive enough to pay high start-up costs, high FAI industries are typically characterized by a few large market actors and a more concentrated market structure (Wright and Zhu 2018).¹² Early entry into such industries provides firms a variety of benefits through brand building, relationships with suppliers, preferential treatment from governments, and excessive investment to preemptively deter potential future entrants (Burger et al. 2015, 310–11). When an industry is only able to support a limited number of players, timing becomes an important factor and preemptive action to exploit an opportunity is one way firms can secure competitive advantages (Folta and O'Brien 2004).

In high FAI industries, a dispute is likely to create an incentive for other firms looking to enter or expand market share. This is because when an existing competitor is adversely affected by a government's action, potential entrants who might invest to exploit this opportunity face the threat of preemption by other market actors.

In contrast, in low FAI industries, fewer start-up costs mean that more firms can enter because of a lower threshold for entry. This leads to a more contested market characterized by many firms (Kessides 1990; Tirole 1988). Because of the larger 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.¹³ Moreover, in an industry with lower entry

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

12. For instance, Kessides (1990) shows that industries with higher sunk costs have greater levels of market concentration—i.e., lower levels of contestability.

13. See Tirole (1988) for a review of the industrial organization literature on how fixed costs determine scale economies and ultimately concentration and profits.

and exit barriers, there are fewer strategic considerations regarding the timing of entry. There will be less concern about preemptive investment by rivals (Folta and O'Brien 2004).

Taken together, a coindustrial dispute is likely to create large competitive opportunities at high FAI but unlikely to create competitive opportunities at low FAI. Thus, we expect that the level of new market opportunities from a coindustrial dispute will be increasing as a function of FAI.

Net effect of disputes on FDI

With these competing pressures (risk and opportunity), the net effect of investment disputes on future FDI is *ex ante* ambiguous. As noted by Wellhausen (2015), "coindustrials' willingness and ability to act in ways costly to the host government following a breach are inevitably tempered by the tension between competition and collaboration: one firm's expropriation can be another firm's opportunity" (242). While increased risk creates an incentive to refrain from investing, the competitive pressures to take advantage of a diminished competitor—especially when there is the threat of preemption—create an incentive to invest. Thus, the fear of preemption may counteract the desire to wait to invest (Dixit et al. 1994). Immediate entry relative to delayed entry can allow firms to benefit from first-mover advantages (Kulatilaka and Perotti 1998), particularly in industries characterized by economies of scale, high entry costs, or limited supply of natural resources.¹⁴ Investment into such industries is less likely to be deterred by uncertainty (Mason and Weeds 2010; see also Fisch 2008; Folta and O'Brien 2004).

Our theory suggests both risks and opportunities increase with industry FAI. We expect that at low levels of FAI, the negative pressure from increased risk is greater than the positive pressure of new market opportunities. Because these industries are characterized by smaller, more numerous competitors and there is a smaller threat of being preempted, a coindustrial dispute will not create market opportunities for potential entrants. Because all FDI is irreversible to some degree, we expect risk to reduce the likelihood of investment following a coindustrial dispute in the absence of market op-

portunities. Thus, the negative pressure dominates the positive pressure, and the net effect is negative at low FAI.

In contrast, we argue that competitive opportunities for potential entrants are substantial at higher levels of FAI because of larger economies of scale and greater first-mover advantages. In these types of markets, the timing of the investment matters. Fears that a rival will invest more quickly and thus secure first-mover advantages can counteract concerns about risk. For example, delaying entry may create an opportunity for competitors to establish technical leadership, seize scarce resources, build brands, and obtain preferential treatment from governments (Kulatilaka and Perotti 1998; O'Brien, Folta, and Johnson 2003). Under this scenario, the positive channel of opportunity can significantly attenuate or exceed the negative influence of risk associated with a coindustrial dispute on FDI flows in high FAI.

Depending on how quickly market opportunity increases as a function of FAI relative to the increase in risk, we may or may not see a positive net effect of a coindustrial dispute on future FDI flows at higher levels of FAI. If our theory about the offsetting pressures is correct, the impact of a dispute will be negative at low levels of FAI (e.g., wholesale trade and professional services), less negative as FAI increases, and perhaps positive in high FAI industries (e.g., utilities, oil and gas extraction). Thus, we hypothesize that:

H1. All else equal, a coindustrial 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.

For the net effect to follow the pattern in hypothesis 1, market opportunities must increase faster than risk as functions of FAI. If hypothesis 1 is correct, we should observe that the coefficient on the interaction between FAI and a coindustrial dispute is positive. However, it is useful to lay out the alternative scenarios for the net effect of a dispute and what we would observe empirically. First, if the risk and opportunity channels exactly offset each other, we would observe that coindustrial disputes do not affect the likelihood of FDI as a function of industry FAI. Under this scenario, the marginal effect of a dispute will not be different from zero at any level of FAI.¹⁵ Second, if risk is increasing faster than opportunity as a function of FAI, then we would observe that the marginal effect of a dispute is increasingly negative as FAI increases. Under this scenario, the coefficient on the interaction term would be negative. Finally, if investors in low FAI

14. For another study of the competing pressures of uncertainty and risk, see Burger et al. (2015) who, in an analysis of FDI into the Middle East and North Africa, find that instability will reduce the likelihood of FDI in industries with multiple alternative locations (e.g., tradable goods) but not affect FDI in resources and energy, which are more location specific (fewer outside options). Domestically, Folta and O'Brien (2004) find that uncertainty actually increases domestic investment in US industries characterized by greater economies of scale, while Ghosal and Loungani (1996) find that uncertainty reduces investment in highly competitive industries but does not significantly affect investment in industries with higher concentration, citing the offsetting pressures in such markets.

15. This empirical effect would also be consistent with a world in which firms do not factor coindustrial disputes into their decision-making.

industries perceive neither increased risk nor opportunity, the effect of a dispute could be zero at low FAI industries, with an increasingly large nonzero effect on FDI (positive or negative) as FAI increases. Although we cannot observe the functional form of either channel—and by extension whether opportunity increases faster than risk—the empirical findings will shed light on the underlying functions.

DATA AND MODEL SPECIFICATION

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

Data

We use an original data set 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*, and reports from industry organizations and investment agencies and market research and publication companies (fDi Markets 2015). Project announcements go through a quality control process that confirms the existence of the project using multiple sources.¹⁶ 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, mergers and acquisitions activity or reinvested earnings, which 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 are likely to be useful in testing other theories that are also motivated by decisions about where to locate investments (Barry 2016). For a review of the limitations of FDI flows and stock data as a means of testing theories of political risk on multinational behavior, see also Kerner (2014) and Kerner and Lawrence (2014). Of course, one downside to greenfield FDI data is that they exclude mergers and acquisitions, which are also an important source of entry into developing markets. Another obvious limitation of our data set is that it covers project announcements, rather than completed investments. However, the data set is updated over time if project announcements are retracted.¹⁷ Caution is also re-

quired because the amount of FDI (i.e., the size of the investment) is often estimated. Thus, for our dependent variable, we use the number of projects, which is likely to be more robust (per communications with fDi Markets staff). Additionally, because these announcements are intentions rather than actual outcomes, a count of projects is less vulnerable to mismeasurement than is the size of the investment (Serwicka and Tamberi 2018).

The original data set contains information on 157,374 projects. Our unit of analysis is the home-host-industry year. We aggregate the project-level data using North American Industry Classification System (NAICS) 2007 codes to 20 industries at the two- and three-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. Because of the size of the data set, we limit our analysis to the top 56 home countries. These 56 countries cover over 98% of greenfield FDI in terms of the 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 125 developing and emerging hosts between 2003 and 2015. We define developing and emerging countries as those who are not classified by the International Monetary Fund as advanced economies. We also limit the sample to host countries that have signed at least one IIA. The lists of home and host countries are in the appendix (available online).

In terms of coverage, our data offer several advantages over existing sources of disaggregated 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), and Wellhausen (2015). Even UNCTAD data are relatively limited in the number of source countries.¹⁸ There are fewer studies of determinants of FDI at the industry level. 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 Central and Eastern Europe. Blanton and Blanton (2009) use US Bureau of Economic Analysis (BEA) data on the outward activity of US multinational firms to examine the impact of human rights on FDI across industries for 1990–2004. Wright and Zhu (2018) use UNCTAD data to examine

16. Indeed the fDi Markets data are used by UNCTAD and the Economist Intelligence Unit.

17. Note that data vintaging is important because the exact projects in the data set vary on the basis of when data are downloaded. Our data were collected and archived in July 2016.

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

Table 1. Summary Statistics for Key Variables by Industry

	No. Projects	FAI	Coindustrial Dispute
Agriculture (11)	.00320	31.72	.0374
Utilities (22)	.0300	56.75	.0801
Construction (23)	.0268	7.351	.0248
Manufacturing—food, textile, apparel (31)	.0491	20.88	.0326
Manufacturing—wood, chemicals, plastics, etc. (32)	.144	22.20	.0300
Manufacturing—machinery, electronics, etc. (33)	.376	17.61	.0142
Wholesale trade (42)	.00749	5.283	.00839
Retail trade (44–45)	.0243	29.98	.00475
Transportation and Warehousing (48)	.0639	37.26	.0362
Information (51 except 517)	.142	7.659	.0131
Real estate (53)	.0225	31.41	.0246
Professional, scientific, and technical services (54)	.119	6.816	.00787
Administration, support, and waste management (56)	.0425	7.098	.0362
Health care and social assistance (62)	.00603	42.49	.00681
Arts, entertainment and recreation (71)	.00357	39.99	.00571
Accommodation and food services (72)	.0242	37.74	0
Oil and gas (211)	.0172	51.59	.0766
Other mining (212)	.0130	38.50	.0486
Telecommunications (517)	.0281	37.91	.0305
Educational services (61)	.00367	22.91	0
All industries	.0584	27.61	.0264

Note. North American Industry Classification System codes in parentheses. FAI = fixed asset intensity; $N = 2,031,830$. Observations are dyad-industry-year.

investment in the primary and secondary sectors.¹⁹ Burger et al. (2015) use the fDi Markets data to examine how investors in different industries respond to instability in host countries in the Middle East and North Africa.

Our data set 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, 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 in 133 developing host countries across sectors. These company-country data, 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.²⁰ Beazer and Blake

(2018, 16) examine data on parent firms' decisions to establish new affiliates in a host at any point between 2006 and 2011 from Orbis. One additional advantage of our data is that they are time varying.

Variables

Dependent variable. Our dependent variable is the number of FDI projects between home country i and host country j in an industry k at a year t . We present the mean number of projects by industry in table 1. In a robustness check in the appendix, 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 coindustrial investment dispute. Coindustrial dispute is coded 1 if a dispute was initiated against host j in a sector k from year $t - 2$ up to and including year t . We use a three-year window on the dispute because the location decision is often a multiyear process. This variable is based on the Investor-State Dispute Settlement data

19. Their main analysis focuses on the primary vs. secondary sector. They also analyze more disaggregated data for 18 industries (Wright and Zhu 2018, 351).

20. Note that our data could be used to do firm-level analysis, but the data set does not include firm-level controls shown to be important in other analyses (e.g., firm size, previous investment in the host).

collected by Wellhausen (2016) and contains detailed information about industry characteristics of each investment project. We identify 20 industrial sectors by matching the *Invsttype* variable to 2007 NAICS codes.²¹ In the appendix, we estimate a one-year window on coindustrial disputes and a distributed lag model as well.

Our second independent variable is FAI. To measure this, we use information drawn from the BEA. We measure FAI as the value of the net property, plant, and equipment expenditure (PPE) for an industry as a percentage of total assets. The ratio of PPE to the total assets is one of the most frequently used measures of FAI in both the business and political economy literatures (e.g., Kerner and Lawrence 2014; Plesko 2003). These 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 FAI will vary over countries, the ordering should not vary because FAI 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, in the appendix, we normalize the raw form measure such that an industry with the lowest FAI in year t is equal to one, following Johns and Wellhausen (2017). Thus, the value in other sectors is the proportional increase in FAI relative to wholesale trade. We refer to this as Fixed asset intensity (scaled).

We include several control variables. To determine controls for the home, host, and dyad, we largely follow the specification of Wellhausen (2015), who analyzes the impact of disputes on dyadic FDI flows. First, we control for the effect of BITs and other international agreements with investment provisions. Extant literature has suggested that BITs are legally binding instruments that 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., Allee and Peinhardt 2014; Bütthe and Milner 2008, 2014; Elkins, Guzman, and Simmons 2006; Kerner 2009; Sachs and Sauvant 2009; Salacuse and Sullivan 2005; Simmons 2014). We include a dummy variable equal to 1 to indicate the presence of at least one international agreement with investment provisions (i.e., a BIT or PTA). IIA is coded 1 if a dyad has a BIT or PTA with investment pro-

visions in the given year; otherwise, IIA is coded 0. Data on BITs come from the UNCTAD Investment Policy Hub, and data on PTAs with investment provisions are available from Dür, Baccini, and Elsig (2014).

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

Third, we control for two additional dispute variables. Wellhausen (2015) finds that conational FDI contract breaches reduce FDI. To control for this effect, we include a dummy variable equal to 1 if there was a dispute between home i and host j regardless of a sector k between year t and year $t - 2$. We also include the total number of disputes filed against the host in previous years. Both variables are coded using Wellhausen's (2016) data.

Finally, we control for the effect of home- and host-specific macroeconomic factors. We include (1) the log of per capita gross domestic product (GDP) of both home and host, (2) GDP growth in both home and host, (3) the log of the host's population size, and (4) the log of the host's natural resources rents as a percentage of GDP. These data were collected from the World Bank World Development Indicators. Summary statistics and a correlation matrix are in the appendix.

Model specification

We build on gravity-type models of the determinants of FDI. We include home, host, and year fixed effects. We do not include industry fixed effects because of collinearity introduced by the interaction term. We lag all variables by one year. To model the number of projects, we estimate a negative binomial regression because the dependent variable is a count and there is evidence of overdispersion. A comparison of Bayesian information criteria indicates a negative binomial is preferred to a Poisson. We also estimate the same results using a matched sample based on coarsened exact matching to address the heterogeneity between "treated" (disputes) and "untreated" (no disputes) observations (Iacus, King, and Porro 2012).²² This stratification approach automatically reduces the sample to areas of common empirical support. We also test our theory in the monadic context as discussed below.

21. We exclude the finance and insurance sector (52) for two reasons. First, the finance and insurance sector is often treated separately from service industries in the analysis of FDI 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, FAI.

22. Observations are coarsened into quartiles based on population and GDP per capita of the host country and industry FAI.

Our theory suggests that the net effect of a coindustrial dispute will be negative for industries with lower levels of FAI, but this negative effect will be reduced as the level of FAI increases, potentially becoming positive at high levels of FAI. If our theory is correct, the coefficient on the interaction term between coindustrial disputes and FAI should be positive.

RESULTS

We present our main results in table 2. Model 1 of table 2 is the unconditional model. The coefficient on the coindustrial dispute variable is negative but not statistically significantly

different from zero. This is unsurprising given the ambiguous net effect anticipated by our theory. The coefficient on FAI is negative and statistically significant, suggesting that there is less greenfield FDI into high FAI industries. This is consistent with our argument that the number of entries into high FAI industries is likely to be less than in lower FAI industries, all else equal, because of the greater start-up costs required and barriers to entry.

We note that the direction and significance of other variables is generally consistent with expectations, with a few exceptions. The coefficient on IIAs is positive and statistically

Table 2. Negative Binomial Regression of Greenfield FDI

	All Dyads		CEM Sample	
	(1)	(2)	(3)	(4)
Coindustrial dispute	-.064 (.047)	-.613*** (.098)	-.013 (.050)	-.668*** (.103)
FAI (level)	-.022*** (.001)	-.023*** (.001)	-.028*** (.001)	-.029*** (.001)
Coindustrial × FAI		.018*** (.003)		.022*** (.003)
Conational dispute	.269*** (.054)	.266*** (.053)	.225*** (.071)	.223*** (.071)
Previous disputes	-.015*** (.005)	-.015*** (.005)	-.009 (.008)	-.009 (.008)
Investment agreement	.634*** (.038)	.634*** (.038)	.565*** (.044)	.564*** (.044)
Polity—host	.014*** (.005)	.013*** (.005)	.031*** (.007)	.030*** (.007)
Log GDP per capita—host	.221*** (.084)	.213** (.084)	.054 (.112)	.051 (.113)
Growth—host	.018*** (.002)	.019*** (.002)	.013*** (.004)	.013*** (.004)
Log population—host	1.175*** (.110)	1.168*** (.110)	1.183*** (.157)	1.183*** (.157)
Natural resources (% GDP)—host	-.039 (.042)	-.043 (.042)	-.040 (.050)	-.043 (.050)
Log GDP per capita—home	.388*** (.089)	.388*** (.089)	.487*** (.114)	.487*** (.114)
Growth—home	.008** (.004)	.008** (.004)	-.001 (.005)	-.001 (.005)
Observations	1,628,556	1,628,556	1,333,232	1,333,232
BIC	287,134.13	287,070.41	378,702.80	378,604.90
Log likelihood	-142,108.14	-142,069.13	-187,955.19	-187,899.19
Pseudo R^2	.2581	.2583	.2302	.2304

Note. Cluster robust standard errors in parentheses. Home, host, and year fixed effects included. FAI = fixed asset intensity; GDP = gross domestic product; BIC = Bayesian information criterion.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

significant, suggesting that an IIA is associated with greater levels of investment in a dyad. We also find that the coefficients on the log of GDP per capita, the level of democracy, the log of population, and growth in the host are all positive and statistically different from zero, as are the coefficients on log GDP per capita and growth in the home country. The coefficient on previous disputes is negative, suggesting that all else equal, an increase in the number of investment disputes against the host reduces FDI. However, we find that the coefficient for conational disputes is positive and statistically significant in all the models. This result holds even if we control for the previous projects from i to j . One avenue for further exploration may be into whether there are different dynamics at work for the number of projects versus the amount of investment or whether the shield of nationality could operate differently across industries.

To test whether the impact of coindustrial disputes on future investment varies by industry FAI, model 2 estimates an interaction effect between coindustrial disputes and the level of FAI. The coefficient on the interaction term is positive and statistically different from zero as hypothesized. We plot the marginal effect of a coindustrial dispute as a function of FAI in figure 1A. We also include a histogram of the conditioning variable. Figure 1A shows that the effect of a coindustrial dispute is negative at low to medium levels of FAI but that the effect is increasingly positive as a function of FAI. At high levels of FAI, a coindustrial dispute leads to an increase in the expected number of FDI projects, consistent with the theoretical expectation that for some industries, the opportunities associated with a dispute offset or exceed the corresponding risks.

In models 3 and 4 of table 2, we present the same non-interactive and interactive specifications based on a matched sample. Regarding the main effect of interest, the coefficient on the interaction term in model 4 is again positive and statistically significantly different from zero. The marginal effect of a coindustrial dispute is plotted in figure 1B. The patterns are similar to those found in the full sample, except they are nearly twice as large in magnitude.

Substantively, we find evidence that is consistent with our theory. As shown in figure 1, the marginal effect of a dispute on FDI is negative and statistically different from zero at low to medium levels of FAI, including industries like construction and professional and administrative services. At high levels of FAI, a coindustrial dispute leads to an increase in FDI, including such industries as utilities, telecommunications, and oil and gas. The size of the effect is substantively significant. Given the results in model 2, a coindustrial dispute reduces the expected number of projects by 0.022 at the 10th percentile of FAI (95% confidence interval [CI]: -0.027 ,

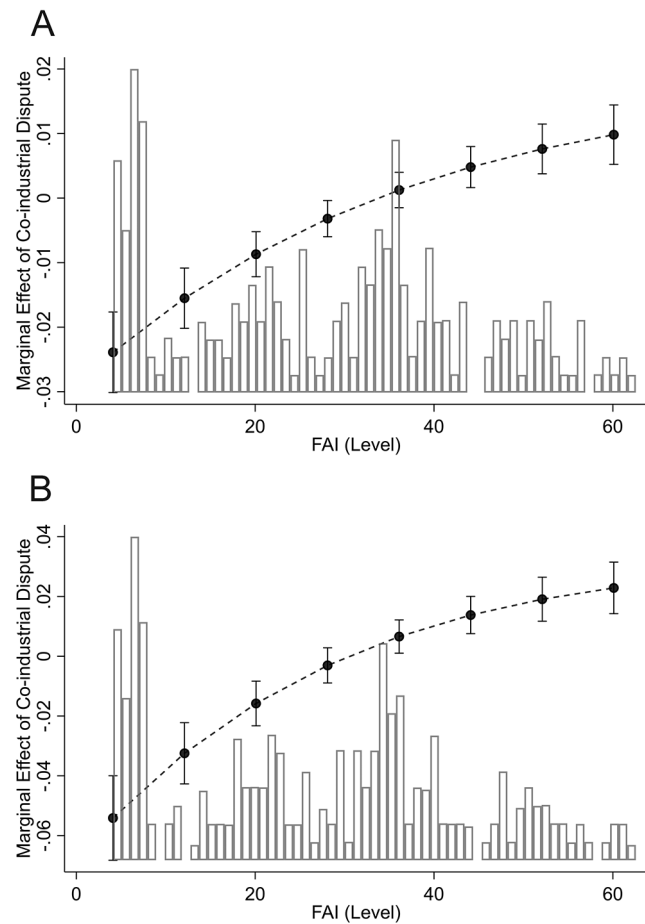


Figure 1. Marginal effect of coindustrial dispute by fixed asset intensity (FAI), with 95% confidence intervals. A, Full sample (table 2, model 2). B, Full sample (table 2, model 4).

-0.016); at the 90th percentile of FAI, a coindustrial dispute increases FDI by 0.007 projects (95% CI: 0.003, 0.011). In model 4, the corresponding effects are a reduction of 0.048 projects (95% CI: -0.061 , -0.035) and an increase of 0.018 (95% CI: 0.011, 0.025).

For comparison, an IIA in the dyad increases the expected number of projects by 0.023 (95% CI: 0.020, 0.025) in model 2. An increase in the growth rate in the host increases the expected number of projects by 0.0007 (95% CI: 0.0005, 0.0008), while a 1% increase in GDP per capita in the host increases expected projects by 0.008 (95% CI: 0.002, 0.0008). Thus, the impact of a coindustrial dispute is substantively important relative to other factors and also in absolute terms when we consider that the mean number of projects for the dyad-industry year is 0.06.

MONADIC ANALYSIS AND ROBUSTNESS

One may wonder whether the results also hold in the monadic context. Although the dynamics of dyads shape patterns of investment, neither of our key variables of interest—coindustrial

disputes and industry FAI—are dyadic. Thus, we should also find support for our analysis in a monadic context. The number of projects has a mean of 2.25 and a standard deviation of 14.4 and ranges from 0 to 601 projects. We model the number of projects in industry k in host country j at time t using a negative binomial regression (to account for overdispersion). We include host country and year fixed effects as well as measures of host country characteristics. The results are presented in table 3, with the corresponding marginal effects in figure 2. We again find that the marginal effect of a coindustrial dispute is increasing in the level of FAI. At low levels of FAI, a coindustrial dispute reduces the number of projects. At high levels, there is an increase in the number of projects. A dispute reduces the expected number of projects by 0.79 at the 10th percentile of

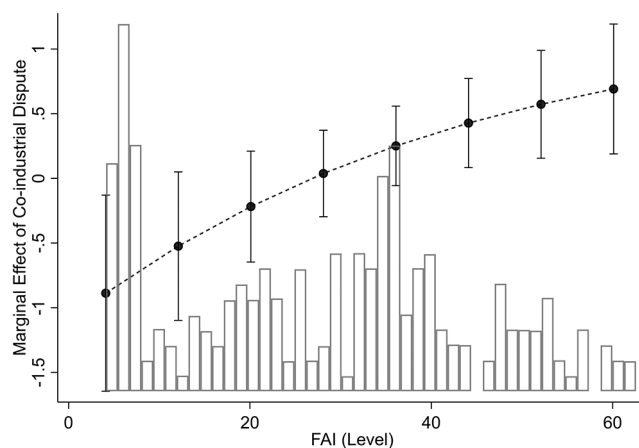


Figure 2. Marginal effect of coindustrial dispute by fixed asset intensity (FAI) for monadic, with 95% confidence intervals.

Table 3. Monadic Analysis

	(1)	(2)
Coindustrial dispute	.088 (.078)	-.374** (.167)
FAI	-.018*** (.002)	-.018*** (.002)
Coindustrial × FAI		.014*** (.004)
Previous disputes	-.0003** (.0001)	-.0003** (.0001)
No. of IIAs	-.001 (.006)	-.002 (.006)
Log GDP per capita—host	.222 (.158)	.222 (.159)
Growth—host	.015*** (.003)	.015*** (.003)
Log population—host	1.028*** (.198)	1.029*** (.199)
Natural resources (% GDP)—host	-.023 (.055)	-.028 (.055)
Polity—host	.019** (.009)	.018** (.009)
Constant	-19.576*** (4.096)	-19.552*** (4.106)
Log α	.644*** (.041)	.642*** (.041)
Pseudo R^2	.20	.20
Log likelihood	-34,784.48	-34,777.00
BIC	71,083.08	71,078.43

Note. Negative binomial regression. Cluster robust standard errors in parentheses. Country and year fixed effects included. FAI = fixed asset intensity; IIAs = international investment agreements; GDP = gross domestic product; BIC = Bayesian information criterion; $N = 29,737$.

* $p < .1$.

** $p < .05$.

*** $p < .01$.

FAI (95% CI: $-1.49, -0.080$) and increases by 0.54 projects at the 90th percentile of FAI (95% CI: $0.14, 0.94$). This is substantively significant because the mean number of projects at the industry level is 2.25, the median number of projects is zero, and the 75th percentile is one project.

In the appendix, we present additional results that investigate the robustness of our findings. First, we reestimate our main model when limiting the sample to only developed home countries to address possible differences in decision-making by firms in different home countries. The results are similar to those presented here. Second, we use different measures of our key independent variables: a scaled measure of FAI and a one-year window for coindustrial disputes. We also estimate a logistic regression where the outcome is a dummy variable equal to 1 for at least one greenfield project and 0 otherwise (instead of the number of projects). In all specifications, we again find that at low levels of FAI, the effect of a coindustrial dispute is negative and statistically significant. This effect becomes less negative as the level of FAI increases. At high levels of FAI, a coindustrial dispute leads to an increase in FDI, demonstrating that the results follow a similar pattern to those presented above. Further, we estimate a distributed lag model and different estimators to address autocorrelation. To ensure that the findings are not driven by countries with high levels of disputes, we estimate the results without Argentina and Venezuela in turn. Finally, 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. This analysis also demonstrates that our findings are generally robust across different subsets. For all 20 industries, the coefficient on the interaction between a coindustrial dispute and FAI is positive and statistically different from zero. Notably, this includes high FAI industries like oil and gas and utilities. In summary, we continue to find

support for our argument that the effect of a coindustrial dispute is increasingly positive as FAI increases.

CONCLUSION

In this article, we examine the industry-specific effects of investment disputes. We suggest that disputes will affect future FDI 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 coindustrial dispute is unclear because of competing risk and reward pressures. We offer a theory in which the effect of a coindustrial dispute depends on the level of industry FAI.

To test our theory, we introduce a new data set on green-field FDI at the dyad-industry level. We find support for our theory and demonstrate that the effect of a coindustrial dispute is negative at low levels of FAI but positive at high levels of FAI. 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 article 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., IIAs).²³ However, because of 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 that 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 several dimensions, there remains much work to be done in terms of developing theories regarding variation in how potential investors assess and respond to political risk.

In a new wave of scholarship that seeks to open the black box of FDI, studies at the firm, industry, or dyad level are some of the most promising areas of research in the field. This has led to new theories about the conditions under which different mechanisms that ameliorate or alleviate political risk are expected to operate, including the work cited above. In the same vein, the results of our article 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 a more robust assessment of the sources of heterogeneity in modeling firm behavior, including in the dyadic context.

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