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Accepted for publication in Long Range Planning

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https://doi.org/10.1016/j.lrp.2026.102665

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Conditioning the Pollution Haven Hypothesis: Climate Policies, Transaction Costs, and Sunset Industry Firms' Cross-Border Acquisitions**

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** This study is based on the TUBITAK 1001 project numbered SOBAG 123K066 and titled "The Impact of Climate Risk and Climate Risk Distance on Ownership Strategy (Ownership Structure) in Cross-Border Acquisitions: The Moderating Role of Institutional Environment and Institutional Distance", managed by Tulay Ilhan-Nas and supported by the Scientific and Technological Research Council of Türkiye (TUBITAK). We would like to express our deepest gratitude to TUBITAK for its support of this project.

Conditioning the Pollution Haven Hypothesis: Climate Policies, Transaction Costs, and Sunset Industry Firms' Cross-Border Acquisitions

Abstract

To reduce global heating, many governments have implemented climate policies of varying stringency that are likely to have a marked effect on sunset-industry firms, which are often heavy polluters and rely on outmoded technologies. The 'pollution haven hypothesis' posits that firms in polluting industries will relocate their activities to countries with weaker climate regulations. Using transaction-cost economics, we extend this research. Sunset-industry firms' cross-border acquisitions (CBAs) are marked by high asset specificity and stranded-asset risk, making transaction costs pertinent. Yet, existing empirical PHH tests often overlook how transaction costs associated with host-country 1) public expropriation, and 2) policy uncertainty influence CBAs. We hypothesize that stringent host-country climate policies are associated with sunset-industry firms' higher 1) investment amounts and 2) equity stakes in CBAs, with host-country public expropriation risks and policy uncertainty moderating these relationships. Using multi-level regressions and a large sample (up to 21,442 CBAs) between 2006 and 2022, we find stringent host-country climate policies are associated with higher financial outlays and equity stakes. A complementary 'gate and chain' configurational analysis supports these findings. While stringent host-country climate policies attract acquisitions, this association reverses when host-country public expropriation risks or policy uncertainty is high. By identifying how transaction costs and the stringency of climate policies combine to influence sunset-industry firms' CBAs, we reveal the complexity of these investments and the implications for climate policies. We provide some boundary conditions for the PHH, highlighting the importance of asset specificity, stranded-asset risk and transaction costs for firms' responses to host-country climate policies.

Highlights

Our research reveals:

- Stringent host-country climate policies attract rather than deter sunset-industry firms' cross-border acquisitions, providing boundary conditions for the pollution-haven hypothesis.
- Compliance with stringent climate policies deepens asset specificity, making acquisition a more efficient governance response than market-based alternatives.
- Public expropriation risk and policy uncertainty are boundary conditions that reverse the positive effect of climate-policy stringency on acquisition investment.
- Under stringent climate policies and policy uncertainty, firms decouple financial commitment from organizational control, scaling back investment, while preserving equity stakes.
- Governments seeking to manage sunset-industry de-carbonization should focus on governance quality and policy stability as well as climate-policy stringency.

1. Introduction

Fuelled by global heating, the number of extreme weather events around the world is growing (Boiral, 2006), posing a danger to human health and societies. In response, several governments have implemented climate policies to de-carbonize and reduce industrial greenhouse-gas (GHG) emissions and other pollutants (Stern & Valero, 2021). Sunset-industry firms are likely to be highly sensitive to climate policies, because they tend to emit relatively high levels of GHGs, as they frequently rely on energy-intensive production processes and older technologies (Pan et al., 2026; Verrier & Strachan, 2024).

The efficacy of climate policies for firms in general is disputed (Aragón-Correa et al., 2020; Cole et al., 2017). For instance, some research suggests that polluting companies will relocate some of their activities to 'pollution havens', or countries with weak environmental standards (Ben-David et al., 2021; Copeland and Taylor, 1994, 2004; Dechezleprêtre & Sato, 2017; Garsous & Kozluk, 2017; Millimet & Roy, 2016). Other studies find conflicting or no evidence to support the pollution-haven hypothesis (PHH) (Cole et al., 2017; Porter & van der Linde, 1995; Ranocchia & Lambertini, 2021; Rivera & Oh, 2013; Tang, 2015; Wang et al., 2019).

Regardless of their specific findings, existing studies that test the PHH tend to assess a binary choice: firms can either invest at home or abroad depending on which location has the least stringent policies (Chen & Hennart, 2004; Copeland & Taylor, 2004, p. 9; Tang, 2015; Wang et al., 2019). We complement existing research, examining conditions that potentially influence the applicability of the PHH (Whetten, 1989).

We include transaction costs in our analysis (Williamson, 1979, 1985, 1991a, 1991b), which existing research tends to neglect. We focus on 1) the threat of public expropriation by host-country governments, and 2) the degree of host-country policy uncertainty. These two areas represent significant risks to investing firms, shaping how much they invest and their equity stakes in CBAs (Henisz & Williamson, 1999; Hennart, 1988).

All firms face these transaction-cost risks when acquiring a company abroad (Contractor et al., 2021; Lin et al., 2019; van Eenennaam & Brouthers, 1996; Williamson, 1979, 1985, 1991a). However, sunset-industry firms are likely to be highly sensitive to climate policies (Chester et al., 2024; Duanmu, 2014). We define firms in sunset industries, because of changing market and socio-economic conditions, by their polluting and declining nature (Kanashiro & Rivera, 2019; Verrier & Strachan, 2024).

Sunset-industry firms face unique risks from stringent climate policies: their assets, which are costly to replace and which are predicated on providing certain returns to investors, could become ‘stranded’ (i.e. lose value quickly, potentially becoming liabilities), because of policy changes (Daumas, 2024; Verrier & Strachan, 2024). Such policy changes can include stringent climate policies being enacted (Rozenberg et al., 2020), or policies being changed quickly and unexpectedly (Chester et al., 2024; Edenhofer et al., 2020), which can happen when public-expropriation risks and policy uncertainty are high. Indeed, sunset-industry firms’ assets, including their acquisitions abroad, are likely to be difficult to convert to other purposes (Verrier & Strachan, 2024); this increases their asset specificity and, consequently, susceptibility to stranding (Buhr, 2017; Kermani & Ma, 2023; Verrier & Strachan, 2024; Williamson, 1979, 1985).

Our approach enables us to extend research beyond the traditional focus on investment amounts to the equity stakes that investing firms take in the target company (Caetano et al., 2022; Chung, 2014; Garsous & Kozluk, 2017; Millimet & Roy, 2016; Xing & Kolstad, 2002), and that transaction costs influence. While investment amounts reflect financial commitments, equity stakes reflect organizational commitments. Examining both simultaneously reveals how firms strategically balance commercial opportunities and transaction-cost related risks under varying levels of climate-policy stringency, expropriation threats, and policy uncertainty. By doing so, we seek to deepen our understanding of firms' complex responses to climate policies abroad, providing boundary conditions to the PHH and a nuanced assessment of the efficacy of climate policies.

Specifically, we hypothesize that, for sunset-industry firms, stringent host-country policies will be associated with higher 1) investment amounts in cross-border acquisitions (CBAs), and 2) equity stakes in those CBAs. We further hypothesize that 1) host-country public-expropriation risks and 2) policy uncertainty will moderate these relationships, with higher public-expropriation risks and higher policy uncertainty being associated with lower investment amounts and equity stakes in CBAs at any given level of host-country climate-policy stringency.

We focus on CBAs as one strategic response to de-carbonization pressures. We do not cover all strategic responses, such as greenfield investments and off-shored out-sourcing, by which firms could re-locate production to pollution havens (Bu & Genin, 2026; Rezza, 2015). Work that examines these issues indicates that stricter environmental regulations deter greenfield investments more than CBAs (Bialek & Weichenrieder, 2021; Rezza, 2015). However, covering all forms of foreign direct investment, such as greenfield investment, may include

diverse activities that are not related to environmental regulations, confounding the analysis (Yoon & Heshmati, 2021). Out-sourced and off-shored activities involve markets and contracts, indicating that transaction costs, by definition, are relatively low. This makes them unsuitable for analysing how transaction costs may condition the PHH.

By contrast, CBAs often combine some of the firm's assets with foreign ones (Dikova & van Witteloostuijn, 2007; Wan et al., 2023), raising issues of asset specificity and actor opportunism, key foci in transaction-cost economics (TCE) (Williamson, 1979, 1985). While PHH research often presents a relatively static picture – firms make decisions about re-locating their polluting activities to jurisdictions with weak environmental regulations based on current policies (Copeland & Taylor, 1994; cf. Cole & Elliott, 2005) – TCE offers a more dynamic, or future-oriented perspective (Williamson, 1979). By combining PHH with TCE, we move beyond asking *if* firms invest abroad to examining *how* they invest, revealing how transaction costs influence firms' financial commitments (how much they invest acquiring firms abroad) and organizational commitments (the equity stakes that they acquire). Finally, combining PHH with TCE facilitates a focus on a key issue, climate policy, that TCE alone would not be able to do, as TCE, beyond a general aversion to regulations (Williamson, 1985, p. 302; 2010), does not typically provide a clear indication of how particular policies are likely to influence the CBAs of firms in certain industries.

This study's contributions are twofold. First, it conditions the PHH by integrating TCE to explain not merely whether sunset-industry firms invest abroad in response to climate policies, but how those policies shape sunset-industry firms' financial and organizational commitments in CBAs. This provides a theoretically grounded explanation for some of the contradictory empirical findings in the literature. Second, it identifies public expropriation

risk and policy uncertainty as further critical boundary conditions that explain when and how the PHH is likely to be applicable.

2. Literature Review and Hypotheses Development

2.1. Hypothesis Development: Climate-Policy Stringency

Building on existing studies (Caetano et al., 2022; Cole & Elliott, 2005; Garsous & Kozluk, 2017), we develop three pairs of hypotheses. The first hypothesis in each pair focuses on the amount sunset-industry firms invest in CBAs; the second, on their equity stake. We first examine the associations between the stringency of host-country climate policies and our two outcomes (investment amount, and equity stake); we then assess the moderating roles of host-country expropriation risks and policy uncertainty on those associations.

Important mechanisms by which firms can relocate their activities are their full or partial acquisitions of foreign companies, enabling firms to move their polluting activities to pollution havens (Cole & Elliott, 2005; Garsous & Kozluk, 2017; Ranocchia & Lambertini, 2021). The PHH rests on a straightforward cost-minimization logic: firms treat environmental regulation as a tax on production and relocate to jurisdictions where that tax is lowest (Copeland & Taylor, 1994; Tang, 2015). This logic, which downplays transaction costs, assumes that firms can shift production elsewhere relatively easily without losing value. For sunset-industry firms, however, that assumption may not hold.

Sunset industries are defined by capital-intensive, technologically mature assets, such as plant, infrastructure, and extraction capacity, that are inherently difficult to redeploy (Dikova & van Witteloostuijn, 2007; Hennart & Verbeke, 2022). Transaction-cost economics identifies this property as asset specificity, or the degree to which an investment loses value

when withdrawn from its intended use (Williamson, 1979, 1985). When asset specificity is high, the governance logic changes fundamentally (Henisz & Williamson, 1999; Williamson, 1985, p. 31). For instance, rather than using markets to access foreign productive capacity, firms are compelled to internalize it through ownership, because the risks of arm's-length contracting, such as opportunism, hold-up, and incomplete contracts, become too costly to bear (Henisz & Williamson, 1999; Williamson, 1979).

Stringent climate policies intensify this dynamic in two compounding ways. First, compliance requirements (monitoring infrastructure, emissions-reporting systems, technology retrofits) are investments that are largely non-transferable: they are co-specialized to specific regulatory regimes and specific physical assets (Bijnens et al., 2024; Ince, 2024). This deepens the asset specificity of any CBA made in a host country with stringent climate policies. Second, stringent policies increase the risk that existing assets become stranded, i.e. that they lose value suddenly if policy tightens further or shifts unexpectedly (Chester et al., 2024; Daumas, 2024; Rozenberg et al., 2020). Stranded-asset risk does not deter acquisition; it changes its logic. A firm that acquires rather than contracts retains control over the asset and its adaptation, reducing its exposure to a partner's opportunism in circumstances where exit is costly.

The PHH anticipates that firms will avoid host countries with stringent climate policies to escape the costs associated with policy compliance. TCE predicts the opposite: precisely because compliance deepens asset specificity and raises the cost of market-based governance, acquisition becomes the more efficient organizational response. Firms do not flee stringent regulatory environments; they commit to them, financially and organizationally, because

ownership is the appropriate governance structure when asset specificity is high and contracting risks are acute. We, therefore, hypothesize:

> H1: The stringency of host-country climate policies is positively associated with the amount sunset-industry firms invest in CBAs.

It is not just the amount of money that firms invest abroad acquiring companies that is important for a fundamental assessment of the PHH and the associated implications of climate policies for sunset-industry firms: equity stakes in acquired companies are also important. However, the PHH tends to overlook this aspect of CBAs. From a transaction-cost perspective, if the costs associated with climate-policy compliance increase the asset specificity of sunset-industry firms' CBAs (Bijnens et al., 2024; Ince, 2024), climate-policy stringency will be associated with higher, rather than lower, equity stakes, as higher stakes will provide greater control to the acquiring company (Tang & Buckley, 2020; Wan et al., 2023; Williamson, 1975). We, therefore, hypothesize:

> H2: The stringency of host-country climate policies is positively associated with the equity stake that sunset-industry firms take in CBAs.

2.2 Hypothesis Development: Moderating Transaction Costs

To establish new boundary conditions for the PHH, we focus on how the combination of host-country climate-policy stringency and transaction-cost risks – 1) public expropriation and 2) policy uncertainty – influence investment amounts and equity stakes in CBAs. However, we note, that, while the PHH does not typically consider transaction costs (e.g. Cole et al., 2017), it is likely to anticipate that increases in host-country transaction costs and,

hence, unpredictability, will reduce yet further investment amounts and equity stakes associated with stringent host-country climate policies.

Using the notions of actor opportunism and incomplete information, which are fundamental to TCE (Williamson, 1985, 2010), we can derive important and novel expectations about how the host-country threat of public expropriation and policy uncertainty influence the relationship between host-country climate-policy stringency and the amount sunset-industry firms invest in CBAs.

Governments can pose a direct risk of expropriation to firms, especially foreign companies (Duanmu, 2014; Henisz & Williamson, 1999; Kobrin, 1979; Sallai et al., 2024; Williamson, 1985), threatening private firms' revenue streams and sunk investments, and shaping firms' strategic decisions (Henisz, 2000; Hernández et al., 2022; North, 1990). When state expropriation risks increase, greater ownership and control heighten firms' vulnerability to *public* expropriation, influencing companies' decisions to invest abroad (Aragón-Correa et al., 2020; Duanmu, 2014; Meyer, 2001; Rivera & Oh, 2013; van Eenennaam & Brouthers, 1996).

As host countries' stringent climate policies require firms to undertake long-term, capital-intensive investments (Bijnens et al., 2024), they increase the asset specificity and irreversibility of CBAs (Chester et al., 2024; Kermani & Ma, 2023), heightening sunset-industry firms' vulnerability to state opportunism and the potential for those assets to become stranded (Henisz & Williamson, 1999; Verrier & Strachan, 2024; Williamson, 1985). Moreover, sunset-industry firms often operate assets that are politically salient and vulnerable to host-country intervention, making them more prone to host-country expropriation (Lucke

& Rehfeldt, 2023), and stranding. Therefore, while stringent host-country climate policies increase asset specificity and the likelihood that firms will use acquisitions (either full or partial) rather than the market to access the output from host-country companies, as the threat of host-country public expropriation increases, sunset-industry firms are likely to be less willing to acquire companies there. We hypothesize:

> H3: Higher host-country public-expropriation risks will reduce the positive relationship between host-country climate-policy stringency and the amounts sunset-industry firms invest in CBAs: greater host-country public expropriation risks will be associated with lower investment amounts by sunset-industry firms in CBAs at any given level of host-country climate-policy stringency

The share of the equity that a firm acquires in a foreign entity represents a key governance choice with important implications for the level of control over the overseas operation as well as exposure to public expropriation (Anderson & Gatignon, 1986; Gubbi, 2015; Hennart, 1988; Hill et al., 1990). Higher equity ownership typically confers greater control over foreign operations and assets, while lower equity stakes limit control (Anderson & Gatignon, 1986; Dikova & van Witteloostuijn, 2007; Gubbi, 2015; Hill et al., 1990). A complete acquisition represents a hierarchical form of governance (Williamson, 1985, 1991a), and maximizes the acquirer's control, reducing the risk of *private-actor* opportunism (Hennart, 1988; Dikova & van Witteloostuijn, 2007; Hill et al., 1990; Tang & Buckley, 2020; Wan et al., 2023; Williamson, 1975).

However, the threat of *public* expropriation can influence the level of equity that firms, in general, acquire in foreign companies (Demirbag et al., 2007; Henisz & Williamson, 1999;

Macher & Richman, 2008), with firms, typically, acquiring lower equity stakes in host-country companies as the threat to their asset-specific investments increases (Brouthers, 1995; Delios & Henisz, 2000; Henisz & Williamson, 1999). This tendency is likely to be particularly pronounced for sunset-industry firms, whose acquisitions of companies in countries with stringent climate policies have high asset specificity (Chester et al., 2024; Kermani & Ma, 2023), and are, therefore, especially vulnerable to public expropriation. We, therefore, hypothesize:

> H4: Higher host-country public-expropriation risks will reduce the positive relationship between host-country climate-policy stringency and the equity stakes that sunset-industry firms take in CBAs: greater host-country public expropriation risks will be associated with lower equity stakes in CBAs at any given level of host-country climate-policy stringency.

Transaction-cost economics highlights uncertainty as a critical dimension of any transaction (Williamson, 1979, p. 239; Williamson, 2009). When a host country exhibits high levels of policy uncertainty, it creates a condition of 'consequential incompleteness' (Williamson, 2009, p. 464), where it is impossible for a firm to anticipate or stipulate responses to all future regulatory changes (Delios & Henisz, 2000; Henisz, 2000; Henisz & Williamson, 1999; Kobrin, 1979; North, 1990; Sallai et al., 2024). Different states will behave opportunistically to varying degrees (Henisz & Williamson, 1999).

Hence, from a transaction-cost perspective, when investments are asset-specific and difficult to re-deploy, as they often are with CBAs (Dikova & van Witteloostuijn, 2007; Hennart & Verbeke, 2022), policy uncertainty becomes a central transaction risk, discouraging inward

foreign investment (Azzimonti, 2019; Delios & Henisz, 2003), and reducing CBAs (Lee, 2018).

Sunset-industry firms' acquisitions are likely to have high asset specificity, making policy uncertainty a key concern and increasing the risk that their CBAs, which are often politically sensitive (Lucke & Rehfeldt, 2023), will become stranded (Kermani & Ma, 2023; Williamson, 1985, 2009). Accordingly, host-country policy uncertainty increases the stranded-asset risk for sunset-industry firms' CBAs in host countries with stringent climate policies. We, therefore, hypothesize:

> H5: Higher host-country policy uncertainty will reduce the positive relationship between host-country climate-policy stringency and the amount sunset-industry firms invest in CBAs: greater host-country policy uncertainty will be associated with lower investment amounts at any given level of host-country climate-policy stringency.

Moreover, greater host-country policy uncertainty is likely to reduce sunset-industry firms' equity stakes as a strategic response to mitigate the stranded-asset risk. Lower equity stakes provide greater governance flexibility, allowing the firm to exit more easily than if they held a larger equity stake (Williamson, 2009). Policy uncertainty acts as a negative moderator, increasing the risk of sunset-industry firms' asset becoming stranded, and encouraging such firms to prioritize flexibility over a high equity stake. We, therefore, hypothesize:

> H6: Higher host-country policy uncertainty will reduce the positive relationship between host-country climate-policy stringency and the level of sunset-industry firms'

equity stakes in CBAs: greater host-country policy uncertainty will be associated with lower equity stakes at any given level of host-country climate-policy stringency

3. Methods

3.1. Data and sample selection

To test our hypotheses, we created a dataset combining CBA data from sunset-industry companies with countries' climate policies, policy uncertainty, and expropriation risk. We obtained the CBA data from Refinitiv Eikon Datastream, provided by Thomson Reuters, which covers acquisitions worldwide. To assess the stringency of countries' climate policies, we used the Climate Change Performance Index (CCPI), developed by Germanwatch e.V., which includes climate-change mitigation measures from 63 countries representing over 90% of global GHGs. We incorporated data from the World Justice Project's Rule of Law Index (WJP, 2026) and the World Policy Uncertainty Index (Ahir, Bloom, & Furceri, 2022) to account for host-country expropriation risk and policy uncertainty, respectively.

After merging the above databases, we identified and selected sunset industries. There is no commonly agreed classification of such industries. Therefore, we defined sunset industries based on prior studies as industries that are both highly polluting and often in decline due to changing market and socio-economic conditions (Kanashiro & Rivera, 2019; Pan et al., 2026; Verrier & Strachan, 2024). We also used Bialek and Weichenrieder's (2021) classification based on pollution intensity.

Since the model combined multiple data sources and variables, some observations were lost during the merging process. Specifically, while data on our first dependent variable, total investment, were missing for certain observations, the level of equity stake acquired by firms

was available for each deal in Refinitiv Eikon Datastream, leading to sample-size variation across models. The largest sample, based on the dependent variable 'level of equity stake', included 21,442 observations. Table 1 presents the CBA sectoral distribution. Our unit of analysis is the individual CBA. We, therefore, structured the dataset at the deal level, with each observation corresponding to the year in which the transaction occurred. To ensure maximum data availability for all included variables, the analysis covered the period from 2006 to 2022 across 60 countries. While some of the datasets cover more than 60 countries, missing data prevented us from using all these countries.

XXXXXXXXXXX

Table 1 about here

XXXXXXXXXXX

To examine more closely how home- and host-country climate-policy stringency combine to shape firms' CBAs, and to assess our findings from the regression analysis, we conducted a 'gate and chain' analysis (Chen & Miller, 1994). This technique complements our regression analysis, potentially allowing us to describe our regression results with greater confidence and precision. We do not use the gate and chain analysis as a second hypothesis-testing model.

3.2. Measurements

3.2.1. Dependent variables

We measured sunset-industry firms' CBAs in two ways: first, by the value of the acquisition, and second, by the equity stake firms acquire. We measured the value of the investment (total investment) variable using the CBA deal value from the Refinitiv Eikon Datastream. We

measured the level of equity stakes variable using the ratio of the equity stake taken by the acquiring firm in its CBA from the Refinitiv Eikon Datastream, which has been widely used in recent studies (e.g. Collevecchio et al., 2024).

3.2.2. Explanatory and moderating variables

To measure host-country climate-policy stringency, we used the CCPI's 'climate policy' sub-dimension, which captures country-level policy efforts to de-carbonize, with higher values indicating more stringent climate policy (Burck et al., 2022).

We include host-country policy uncertainty and expropriation risk as moderator variables. Several possible indicators exist for policy uncertainty. For instance, prior studies, notably Rivera and Oh (2013), relied on responses from the World Economic Forum's Executive Opinion Survey to capture environmental-policy stringency and predictability. However, this survey stopped including these questions in 2008 and has not re-introduced them, limiting its applicability for longitudinal analyses. Other commonly used measures, such as the OECD's and Baker et al.'s (2016) indices, cover a much smaller set of countries. Given these limitations, we used the World Policy Uncertainty Index (Ahir, Bloom, & Furceri, 2022), which covers 71 countries and where higher values indicate greater policy uncertainty, allowing us to maintain a broader and more balanced sample.

We measured expropriation risk using the expropriation protection sub-dimension of the regulatory enforcement component of the World Justice Project's Rule of Law Index (WJP, 2026). Higher scores reflect lower levels of expropriation risk. To ensure conceptual consistency in our analyses, we transformed this variable so that higher values indicate higher expropriation risk by multiplying the original scores by −1.

In our complementary gate and chain analysis, we dichotomized climate-policy stringency in both home and host countries into high and low levels. We compared the differences in the mean investment amounts and equity stakes between the resulting configurations.

3.2.3. Control variables

To ensure the robustness of our model and estimation results, we systematically controlled for several firm-level and country-level (both home and host) variables. At the firm level, we controlled for deal attitude using a dummy variable (1 if the deal attitude was friendly, 0 otherwise). In non-friendly takeovers, the acquiring firm often seeks to gain a high level of control over the acquired firm, resulting in a preference for wholly owned CBAs (Malhotra et al., 2011: 322).

We also controlled for industry relatedness, capturing whether the acquiring and target firms operated in the same industry. We used a dummy variable based on the firms' four-digit SIC codes (Contractor et al., 2014; Malhotra et al., 2011). It is 1 if they belong to the same industry and 0 otherwise. Industry-related CBAs offer distinct advantages, such as reducing the likelihood of opportunistic behaviour by the acquired firm (Contractor et al., 2014). We obtained data for both deal attitude and industry relatedness from the Refinitiv Eikon Datastream. Additionally, we controlled for the public status of both the acquirer and the target firm, as this can influence acquisition preferences and transaction values (Fuller, Netter, & Stegemoller, 2002).

While sunset industries are generally characterized as mature and polluting, their degree of sensitivity to climate policies can vary significantly. For instance, sectors, such as mining,

cement, or chemicals, are typically more sensitive to climate regulations due to their higher carbon intensity and energy consumption compared to other sunset industries, such as textiles. Such differences can substantially affect CBA decisions and values. Therefore, in addition to identifying sunset industries, we also included industry-level climate-policy sensitivity as a control variable. Following pioneering studies (e.g., Ding et al., 2021; Hasan & Chen, 2025), we assigned a value of 1 to target firms in 2-digit SIC codes 10, 12, 13, 26, 28, 29, 33, and 49 (climate sensitive), and 0 otherwise.

At the country level, we controlled for the development status of both the home and host countries, as this influences firms' climate-risk perceptions (Kolk & Pinkse, 2012). Furthermore, companies generally exhibit a lower preference for high equity stakes in acquisitions within developing economies (Wang & Larimo, 2020). Following prior literature (e.g., Tang & Buckley, 2020), we measured this variable using the World Bank's GDP data.

We controlled for country risk, which can significantly influence CBAs (Chari & Chang, 2009; Wang & Larimo, 2020). We measured country risk for both home and host countries in the year of the transaction using the Political Risk Services Group's Composite Risk Index from the International Country Risk Guide, which ranges from 0 to 100; higher values indicate lower risk.

Additionally, we controlled for both countries' trade openness, given its impact on acquisitions (Carril-Caccia & Pavlova, 2020). We measured trade openness as the sum of exports and imports as a percentage of GDP, utilizing data from the World Bank's World Investment Report (Peng et al., 2021). Consistent with previous research (e.g., Erel et al., 2012), we also included annual GDP growth rates as a control. We calculated this as the

percentage change in GDP from the year prior to the acquisition, using data from the World Bank's World Development Indicators (WDI) database (Ding et al., 2021; Peng et al., 2021).

Finally, we incorporated institutional distance and cultural distance, both of which are central to explaining investment choices in international business (Kogut & Singh, 1988; Xu & Shenkar, 2002). We derived institutional distance from the six sub-dimensions of the World Bank's World Governance Indicators (WGI): voice and accountability, political stability, government effectiveness, regulatory quality, rule of law, and control of corruption. We measured cultural distance using Hofstede's (1980) cultural dimensions. We calculated both distance measures using Kogut and Singh's (1988) established formula.

3.3. Analysis strategy

We focus on CBAs, using multilevel (mixed in Stata) models to address the methodological challenges that OLS estimators encounter in hierarchical datasets. In our data structure, CBAs are nested within firms, and acquiring firms are nested within home countries; such a structure can lead to inter-observation dependencies and unobserved heterogeneity at different levels. Since the OLS approach cannot adequately account for this type of multi-layered dependency, it carries the risk of bias and underestimation of standard errors in coefficient estimations. Therefore, in our models, we defined random effects at the firm and host-country levels, explicitly modelling unobserved heterogeneity at these levels.

Common shocks and periodic effects related to the time dimension were controlled through year fixed effects. This multi-level estimation strategy mitigates the issues arising from nested data structures (Muratova et al., 2025; Peterson et al., 2012; Zhu et al., 2019), enabling

more consistent and reliable estimation of the effects of climate-policy stringency on investment amounts and equity stakes.

To examine our moderator hypotheses, we applied the procedure suggested by Baron and Kenny (1986) and Aiken and West (1991). Accordingly, we created interaction terms by multiplying the host-country policy stringency (independent variable in the moderator hypotheses) with, separately, 1) expropriation risks, and 2) policy uncertainty (separate moderators). Following Baron and Kenny (1986), the significant effect of this interaction term on the dependent variable provides evidence for the proposed moderator effect. However, given the theoretical nature of our hypotheses, it is also important to examine how the relationships between independent and dependent variables unfold at low (-1SD) and high (+1SD) levels of the moderator. For this purpose, we used Aiken and West's (1991) simple slope test to graphically illustrate and test the significance of the relationships observed at these different moderator levels.

Throughout the data analysis process, we took several measures to test the assumptions of our multivariate statistical techniques and to ensure statistical robustness. Multicollinearity was of particular concern for the robustness of our models, especially in those with interaction terms, where sensitivity to multicollinearity is inherently greater. To mitigate this issue, the host-country policy stringency, expropriation risk, and policy uncertainty variables were mean-centred ($Xi - \bar{X}$), as suggested by Aiken and West (1991), before including them in the analysis.

As an additional precaution against multicollinearity, we examined the correlation coefficients among the independent variables and observed that correlations between

variables included in the same model did not exceed the threshold value of 0.80 (Bryman & Cramer, 1997: 257). Furthermore, all VIF values were below 2, which is well under even conservative thresholds of 5 suggested in the literature (e.g., Hair et al., 2019). Accordingly, we concluded that multicollinearity was not a concern for our estimations.

4. Results

4.1. Hypotheses Testing

Table 2 provides descriptive statistics and the correlation coefficients of our variables. The patterns of the raw correlations are consistent with our theoretical expectations. The correlation coefficients among the independent variables, control variables, and moderator variables (within the same models) are all below 0.80.

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Table 2 about here

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Before moving on to the multilevel regressions that we used to test our hypotheses, we briefly consider the random-effects estimates that motivate our multilevel modelling approach, and are shown under 'random part' in tables 3, 4, and 6. Because the nested nature of the dataset alone is not sufficient for using a multilevel model, we calculated intraclass correlations (ICCs) to demonstrate that multilevel regression is a suitable choice. Since all ICCs were greater than 0.05 (Hox et al., 2017; Bendig et al., 2024), we confirmed that multilevel regression is the correct choice. As shown in Tables 3 and 4, the variance components indicate that a meaningful share of the total variance in both total investment and equity stakes is concentrated at the acquirer firm and home-country levels. The magnitude and

statistical significance of the firm-level random effects suggest systematic similarities across investments by the same firm, whereas the home-country random effects point to unobserved institutional and contextual heterogeneity across countries. Moreover, the log-likelihood values and likelihood-ratio (LR) tests comparing the multilevel specifications with single-level linear models indicate that the multilevel models provide a statistically superior fit to the data.

Table 3 presents the results of the multilevel regression analyses conducted to test our hypotheses with total investment as the dependent variable. We relate those results to hypotheses 1, 3, and 5. The stringency of host-country climate policies has a statistically significant and positive association with total investment (Model 1: $b = 0.018$; $p < .001$). This finding supports hypothesis 1.

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Table 3 about here

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The interaction between the host country's policy stringency and host country's expropriation risk has a negative and significant effect on total investment (Model 3: $b = -0.156$; $p < .01$). To examine the form of this significant moderating effect and to test its consistency with our hypotheses, we conducted a simple slope test (Aiken & West, 1991). As Figure 1 shows, the association between host countries' policy stringency and total investment is positive and significant when the host countries' expropriation risk is low ($b = 0.038$; $p < .001$), but insignificant when it is high ($b = -0.010$; $p > .05$). Moreover, the relationship observed at low levels is stronger than the medium-level one ($b = 0.013$; $p < .05$). This pattern indicates that

the positive association between the stringency of host-country climate policies and total investment is further accentuated when the expropriation risk is low. Consequently, hypothesis 3, which stated that host-country expropriation risks will negatively moderate the relationship between host-country climate-policy stringency and the amounts sunset-industry firms invest in CBAs, is supported.

XXXXXXXXXXX

Figure 1 about here

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Model 4 shows that the interaction between the host-country's policy stringency and policy uncertainty has a negative and significant effect on total investment ($b = -0.013$; $p < .01$). Figure 2 shows the relationship patterns at low (-1 SD) and high (+1 SD) levels of the moderator: the positive association between the host countries' policy stringency and the total investment (medium: $b = 0.020$; $p < .01$) is most pronounced when the host-country's policy uncertainty is low ($b = 0.039$; $p < .001$), but disappears at high levels ($b = 0.002$; $p > .05$). These results support hypothesis 5, which states that host-country policy uncertainty negatively moderates the relationship between host-country climate-policy stringency and the amounts sunset-industry firms invest in CBAs with greater host-country policy uncertainty reducing the investment amount in CBAs at any given level of host-country climate-policy stringency.

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Figure 2 about here

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Table 4 presents the findings for the level of equity stakes, this study's other dependent variable, which relate to hypotheses 2, 4, and 6. According to Model 1, host-country climate-policy stringency has a significant and positive effect on the level of equity stakes (Model 1: $b = 0.117$; $p < .01$). This significant effect supports hypothesis 2, which states that host-country climate-policy stringency is positively associated with the level of equity stake that sunset-industry firms acquire in CBAs.

Models 3 and 4 include the effects of the interaction terms between the stringency of the host country's climate policies and the host country's expropriation risk and policy uncertainty on the level of equity stakes. While the interaction term related to the host country's expropriation risk is significant and negative (Model 3: $b = -2.275$; $p < .001$), the coefficient of the interaction term for policy uncertainty is not significant (Model 4: $b = -0.056$; $p > .05$).

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Table 4 about here

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Figure 3 shows the effects of the interaction between host-country climate-policy stringency and expropriation risk on the level of equity stakes. The effect of host-country climate-policy stringency on the level of equity stakes is positive and stronger when the expropriation risk is low ($b = 0.462$; $p < .001$); this relationship becomes negative when the expropriation risk is high ($b = -0.212$; $p < .01$). Hypothesis 4, which states that host-country public-expropriation risks negatively moderate the relationship between host-country climate-policy stringency and the equity stake that sunset-industry firms acquire in CBAs, is supported.

No significant relationship is found for hypothesis 6, which states that the degree of host-country policy uncertainty negatively moderates the relationship between host-country climate-policy stringency and the level of equity stake that sunset-industry firms acquire in CBAs.

XXXXXXXXXXX

Figure 3 about here

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We note that the direct association between host-country policy uncertainty and 1) total investment in models 2, 3, and 4 of Table 3, and 2) equity stake in models 2 and 4 of Table 4 is positive and statistically significant. Although these positive main effects may appear to be inconsistent with our theoretical framework, they can be explained in a way that coheres with the paper's logic and research focus. Sunset-industry firms often adopt 'defensive strategies', locking themselves into current technical solutions and organizational cultures, which represents a high-risk approach over the long term (Verrier & Strachan, 2024). Hence, unless sunset-industry firms are concerned about their foreign assets being directly expropriated, their strategies may make the accumulation of stranded assets more likely and their ability to transition to new strategic objectives more difficult (Verrier & Strachan, 2024). Consequently, they may be more willing to acquire firms in host countries with high levels of policy uncertainty, if that aligns with their defensive strategy.

Using a 'gate and chain' analysis (Chen & Miller, 1994), we assess whether host-country climate policies alone influence sunset-industry firms' CBAs or whether the combination of

home- and host-country climate policy shape these acquisitions. Table 5 shows the results of this analysis; they indicate that the highest (lowest) mean investment amount per CBA is when home- and host-country climate policies are stringent (lax). This supports the evidence above in relation to hypothesis 1. Similarly, companies take the highest (lowest) mean equity stake per CBA when home- and host-country climate policies are stringent (lax). This supports our finding for hypothesis 2 above.

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Table 5 about here

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4.2. Robustness tests

To check the validity of our findings, we conducted several robustness tests. First, to demonstrate that the findings obtained in the main analyses are not driven by simultaneity bias, we estimated *lagged models* as an additional robustness test (see Table 6). Since the unit of analysis is the CBA and the dependent variables reflect the total investment amount and equity stakes associated with these transactions, defining the dependent variables in a one-year lagged form is not methodologically feasible. Therefore, in line with common practice in the literature (Zhu et al., 2019), we incorporated the independent variables into the model with a one-year lag. This approach allows the host country's climate-policy stringency, expropriation risk, and policy uncertainty to be treated as contextual factors from the period preceding the investment decisions. The results obtained from the lagged models are largely consistent with the baseline analyses in terms of both direction and significance, indicating that the main findings are not sensitive to timing assumptions and that the results provide a stronger basis for causal interpretations.

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Table 6 about here

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Second, assuming that, in addition to the host country's attractive factors, it is also important to consider the influence of push factors arising from the home-country context in investment decisions, we incorporated *the moderating effects of home-country climate-policy stringency and climate-policy distance* into our model (Table 7). The results show that neither variable has a moderating effect on total investment.

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Table 7 about here

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For the level of equity stakes, however, the interaction between the host country's climate policy and climate policy distance exhibits a negative moderating effect at the 0.10 level ($b = -0.017$; Table 7, Model 6). Figure 4 illustrates this pattern, indicating that the positive effect of host-country climate-policy stringency on the level of equity stakes becomes stronger only when climate-policy distance between the home and host countries is low ($b = 0.205$; $p < .01$), whereas this effect disappears when the distance is high ($b = 0.064$; $p > .10$). In Model 8 in Table 7, the interaction between home- and host-country climate policy is positive and statistically significant when the outcome is equity stakes ($b = 0.023$; $p < .01$). Figure 4 shows that the relationship between our independent and dependent variables is stronger when home-country climate-policy stringency is high ($b = 0.233$; $p < .001$).

XXXXXXXXXXX

Figure 4 about here

XXXXXXXXXXX

Finally, to ensure industry-level heterogeneity or the overrepresentation of specific industries do not drive our findings, we conducted two additional robustness checks. First, we excluded the two industries with the highest number of observations (chemicals = 5,437 observations; food production = 3,083 observations) from the analysis to mitigate potential bias stemming from uneven sectoral distribution. The results remain highly consistent with our baseline findings (see Appendix Table 1). Second, we re-estimated our models by including industry fixed effects to account for unobserved differences across industries (see Appendix Table 2). The findings remain largely unchanged in terms of both magnitude and statistical significance, providing strong support for the robustness of our results.

5. Discussion

Our central finding is that stringent host-country climate policies are positively, not negatively, associated with both the amounts that sunset-industry firms invest in CBAs and the equity stakes they acquire. We argue that this reflects the influence of transaction costs that existing PHH research overlooks: compliance with stringent climate policies increases CBAs' asset specificity, rendering internalization through acquisition more efficient than arm's-length market transactions. Firms do not flee from stringent regulatory environments; instead, they commit to them both financially and organizationally, because high asset specificity makes governance through ownership the appropriate strategic choice.

This positive baseline relationship is, however, conditional. Our moderating hypotheses reveal that transaction costs in the form of public expropriation risk and policy uncertainty act as critical boundary conditions. When host countries combine stringent climate policies with high expropriation risk, the positive association between policy stringency and investment amounts and equity stakes reverses: sunset-industry firms reduce both the amounts they invest and their equity stakes in CBAs. Under high policy uncertainty, investment amounts similarly decline. These findings provide a theoretically coherent account of why the PHH's empirical record is so mixed: studies that aggregate across national contexts, some of which pose expropriation risks and have unstable policy environments, and some of which do not, are likely to observe precisely the pattern of contradictory results that has characterized the literature. Transaction costs do not merely moderate the PHH relationship; they condition when the PHH logic is most likely to apply.

The asymmetry between hypotheses 5 and 6 is theoretically informative. Policy uncertainty negatively moderates the association between climate-policy stringency and investment amounts (supporting H5), but not equity stakes (not supporting H6), suggesting that firms manage stranded-asset risk by scaling back financial exposure, while preserving organizational control. This decouples two dimensions that TCE typically treats as jointly determined: how much to risk and how much to control (Williamson, 1985). Under policy uncertainty, for sunset-industry firms, governance flexibility (the capacity to direct, adapt, or exit the foreign operation) appears to take priority over financial commitment.

5.1. Limitations and Future Research

Despite its scope, our study has two key limitations that open up areas for future inquiry. First, while we based our classification of sunset industries on their polluting and declining

nature, these industries are not monolithic; sectors, such as mining or chemicals, may be more sensitive to climate policies than other sectors (Verbeke & Simoes, 2026). Future research could explore how different sectors within sunset industries respond to climate policies and transaction costs. Second, our study focuses exclusively on CBAs. Future research could compare these findings with greenfield investments and the outsourcing and offshoring of production, both of which involve different levels of asset specificity compared to CBAs.

6. Conclusion

The PHH predicts that stringent climate policies will encourage polluting firms to re-locate to countries with weaker standards. For sunset-industry firms, which are highly polluting, technologically mature, capital intensive, and exposed to stranded-asset risk, this prediction appears especially relevant. Our findings, drawn from up to 21,442 CBAs across 60 countries between 2006 and 2022, show that the PHH requires some boundary conditions, and that its policy implications become more nuanced once transaction costs are taken into consideration.

Stringent host-country climate policies attract rather than deter sunset-industry firms' CBAs; they are associated with larger financial outlays and higher equity stakes. The internalization logic of TCE explains why. For sunset-industry firms whose assets are capital intensive and compliance dependent, adherence to stringent policies deepens asset specificity, making ownership a more efficient governance response than market-based alternatives. Hence, countries with stringent climate policies show increased CBA activity in terms of acquisition amounts and ownership stakes.

These associations are, however, conditional on transaction costs. For sunset-industry firms, the associations reverse when host countries combine stringent climate policies with high expropriation risk, and investment amounts decline when policy uncertainty is high. Therefore, stringent climate policies require low transaction costs – in the form of low expropriation risks and low policy uncertainty – to be effective. While not feasible for all governments, those that seek to de-carbonize sunset-industry firms should consider governance quality and policy stability as complements to climate-policy stringency. For policymakers, this means that climate-policy ambitions that lack credible commitments to private property and existing policies will not support de-carbonization. A government that adopts stringent climate policies, but that does not commit to protecting foreign assets or that does not create a stable policy environment is likely to attract less foreign investment from sunset-industry firms.

For corporate strategists in sunset industries, our findings identify a set of strategic distinctions that standard CBA frameworks may obscure. Sunset-industry firms' CBAs are not only exposed to the general risks of FDI, but they also face a distinctive combination of host-state and policy risks whose consequences are amplified by the asset-specificity and stranded-asset hazards that are intrinsic to sunset-industry firms with capital-intensive, technologically mature assets.

The first implication is that managers in sunset-industry firms should not consider stringent climate policies as a deterrent to acquisition. Indeed, for sunset-industry firms, complying with stringent policies requires long-term, capital-intensive investments that increase the asset specificity and irreversibility of their CBAs. Therefore, host countries with stringent climate policies may represent sounder acquisition environments than countries with lax

policies, because the governance logic of ownership rather than market contracting becomes more appropriate. Managers who assess host-country climate policy primarily as a cost to be minimized may systematically underestimate the governance advantages of operating in well-regulated environments.

The second implication highlights the importance of disaggregating transaction-cost risks. Both the threat of host-country expropriation and policy uncertainty raise the stranded-asset risk of capital-intensive CBAs. However, they do so through distinct mechanisms that call for different strategic responses. At any given level of climate-policy stringency, if expropriation risks are high, sunset-industry firms in our sample invest less in CBAs and acquire lower equity stakes, limiting their exposure to state opportunism and preserving their exit options. This implies a preference for partial over full acquisitions, with governance arrangements that minimize asset lock-in and preserve flexibility.

At any given level of climate-policy stringency, if policy uncertainty is high, sunset-industry firms invest less in CBAs, but maintain the level of their equity stakes. Sunset-industry firms appear, then, to de-couple financial exposure from organizational control, scaling back the capital committed, but preserving their ability to influence the acquired firm. This suggests sunset-industry firms are more cautious in acquiring foreign assets, but, when they do carry out CBAs, they have the same level of control over those acquisitions as they do when policy uncertainty is lower. This may align with the defensive strategies of some sunset-industry firms: the combination of stringent climate policies and policy uncertainty may deter investments, but may not influence their level of control over CBAs, as they are locked into controlling current technical solutions.

Taken together, our findings emphasize a broader point about the strategic situation of sunset-industry firms under global climate pressure. The challenge for such firms is not simply to minimize the cost of regulation, but when to invest in CBAs and how to govern those acquisitions whose specificity, irreversibility, stranded-asset risks, and political salience create distinctive exposure to state opportunism and policy instability. The investment and governance choices that sunset-industry firms make will have important implications for climate policies and global heating.

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Table 1. Distribution of the sample by sectors

Sectors	**SIC Codes**	**n**	**%**
Non-metallic minerals	1400-1499	395	1.84
Construction	1500-1800	1714	7.99
Food production	2000-2099	3,083	14.38
Tobacco products	2100-2199	54	0.25
Textile	2200-2299	359	1.67
Wood and wood products	2400-2499	323	1.51
Manufacture of furniture	2500-2599	267	1.25
Pulp and paper	2600-2699	866	4.04
Publishing and printing	2700-2799	1,013	4.72
Chemicals	2800-2899	5,437	25.36
Refined petrol	2900-2999	214	1.00
Rubber and plastic	3000-3099	1,068	4.98
Basic metals	3300-3399	1,045	4.87
Metal prod	3400-3499	1,516	7.07
Motor vehicles	3700-3799	1,745	8.14
Electricity, gas, steam	4900-4999	2,343	10.93
Total		*21,442*	*100*

Table 2. Descriptive statistics and correlations

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
n	8070	21442	21442	13887	13887	19964	19964	21442	21442	21442	21442	21442	21442	21442	21442	21442	21442	21442	21442	21442	21442	21442
mean	3.57	80.13	10.21	1.41	0.29	5.46	10.23	1.98	2.55	76.07	78.31	0.74	0.97	2.34	2.06	-	-	-	-	-	4.59	4.93
s.d.	2.40	31.94	4.82	1.51	0.15	4.08	4.83	1.52	1.22	6.03	5.54	0.54	0.93	3.57	3.42	-	-	-	-	-	6.51	6.78
min	-5.13	0.01	0.00	0.00	0.06	0.00	0.00	0.10	0.54	52.00	0.00	0.22	0.00	-28.76	-28.76	0	0	0	0	0	0.01	0.00
max	11.53	100.00	19.74	20.71	0.73	18.79	19.74	7.27	6.92	91.50	91.50	4.37	4.43	24.48	24.48	1	1	1	1	1	25.74	25.74
1. Total investment	1																					
2. Level of equity stakes	.253**	1																				
3. Host's climate-policy stringency	-.024*	-.009	1																			
4. Policy uncertainty host	.054**	.032**	.035**	1																		
5. Expropriation risk host	-.163**	-.232**	-.074**	-.051**	1																	
6. Climate policy distance	.041**	-.004	-.188**	.071**	.071**	1																
7. Climate policy home	.034**	.022**	-.008	.032**	-.061**	-.168**	1															
8. Institutional distance	-.169**	-.263**	.047**	-.035**	.613**	.006	.022**	1														
9. Cultural distance	-.034**	-.196**	.088**	-.007	.152**	-.086**	.111**	.440**	1													
10. Country risk host	.092**	.165**	.155**	-.068**	-.636**	-.046**	.043**	-.412**	-.158**	1												
11. Country risk home	-.030**	-.026**	.037**	.015	.017	-.104**	.133**	-.034**	.021**	.084**	1											
12. Trade openness host	-.032**	.004	.097**	-.094**	-.247**	-.152**	.052**	-.050**	.120**	.339**	-.030**	1										
13. Trade openness home	-.143**	-.147**	.100**	-.064**	.224**	-.162**	.146**	.221**	.006	-.063**	.410**	.008	1									
14. GDP growth host	-.096**	-.087**	.061**	-.110**	.228**	-.016*	-.036**	.230**	.049**	.062**	.139**	.093**	.150**	1								
15. GDP growth home	-.022*	.001	-.010	-.030**	-.026**	-.046**	.005	.112**	.012	.107**	.124**	.042**	.139**	.480**	1							
16. Deal attitude (friendly/not)	.012	.275**	-.003	.019*	-.086**	.009	-.005	-.099**	-.056**	.059**	-.016*	-.025**	-.067**	-.024**	-.004	1						
17. Industry relatedness	.094**	.063**	-.040**	.003	-.004	-.006	.003	-.010	-.003	-.016*	-.055**	-.014*	-.084**	-.014*	-.022**	.034**	1					
18. Climate sensitivity	.115**	-.017*	-.020**	.003	.010	.035**	-.011	-.009	.001	-.018**	-.006	-.026**	-.025**	-.004	-.012	-.003	.082**	1				
19. Public status target (private/not)	-.163**	.173**	-.027**	.029**	-.068**	.005	-.009	-.074**	-.083**	.019**	-.021**	-.026**	-.075**	-.011	.006	.067**	.022**	-.071**	1			
20. Public status acq. (private/not)	-.108**	.020**	.024**	.003	-.008	-.008	.015**	.004	-.022**	-.006	-.054**	.014*	.032**	-.046**	-.024**	-.018**	-.093**	-.054**	-.029**	1		
21. Developing level of home	.110**	.096**	-.237**	-.081**	.121**	.187**	.010	-.096**	-.209**	-.042**	-.071**	-.441**	.021**	.036**	.021**	.048**	.023**	.063**	.037**	-.057**	1	
22. Developing level of host	.127**	.098**	.025**	.036**	-.125**	.172**	-.340**	-.072**	-.136**	.078**	-.268**	.005	-.443**	.009	.026**	.033**	-.027**	.028**	.042**	.007	-.149**	1

* p<.05; ** p<.01

Table 3. Multilevel regression results for total investment

Variables	Total Investment							
	Model 1		Model 2		Model 3		Model 4	
Independent and moderator variables								
Host's climate-policy stringency	.018***	*(.005)*	.017**	*(.006)*	.014*	*(.006)*	.021**	*(.006)*
Expropriation risk host			-1.302***	*(.345)*	-.983**	*(.360)*	-1.343***	*(.345)*
Policy uncertainty host			.096***	*(.024)*	.088***	*(.024)*	.119***	*(.025)*
Interaction terms								
Climate policy x Expropriation risk					-.156**	*(.050)*		
Climate policy x Policy uncertainty							-.013**	*(.004)*
Control variables								
Institutional distance	-.087***	*(.023)*	-.049	*(.032)*	-.028*	*(.033)*	-.051	*(.032)*
Cultural distance	.038	*(.026)*	.034	*(.034)*	.018***	*(.034)*	.031	*(.034)*
Country risk host	.020***	*(.005)*	.010	*(.008)*	.018**	*(.009)*	.011	*(.008)*
Country risk home	.019*	*(.009)*	.024*	*(.010)*	.024**	*(.010)*	.024*	*(.010)*
Trade openness host	.108*	*(.052)*	.099	*(.084)*	.039	*(.086)*	.106	*(.084)*
Trade openness home	-.164	*(.100)*	-.043	*(.103)*	-.039	*(.102)*	-.044	*(.102)*
GDP growth host	-.060***	*(.010)*	-.043**	*(.016)*	-.036*	*(.016)*	-.050***	*(.016)*
GDP growth home	-.002	*(.012)*	-.010	*(.016)*	-.010*	*(.016)*	-.010	*(.016)*
Deal attitude (friendly or not)	-.174	*(.100)*	-.304*	*(.137)*	-.296	*(.137)*	-.304*	*(.137)*
Industry relatedness	.190***	*(.056)*	.223**	*(.071)*	.231	*(.071)*	.223**	*(.071)*
Climate sensitivity	.281***	*(.051)*	.247***	*(.064)*	.246*	*(.064)*	.244***	*(.064)*
Public status target (private or not)	-.809***	*(.050)*	-.933***	*(.064)*	-.934	*(.064)*	-.928***	*(.064)*
Public status acquirer (private or not)	-.765***	*(.069)*	-.784***	*(.087)*	-.776*	*(.087)*	-.782***	*(.087)*
Developing level of home country	.047***	*(.004)*	.053***	*(.005)*	.053***	*(.005)*	.054***	*(.005)*
Developing level of host country	.042**	*(.016)*	.056**	*(.019)*	.055***	*(.019)*	.056**	*(.019)*
Constant	.452	*(.806)*	1.042	*(1.006)*	.435	*(1.022)*	.984	*(1.003)*
Year fixed effects	Yes		Yes		Yes		Yes	
Random part								
Home Country	.364***	*(.097)*	.273***	*(.091)*	.265***	*(.089)*	.266***	*(.089)*
Acquirer Firm	2.273***	*(.092)*	2.263***	*(.119)*	2.246***	*(.119)*	2.251***	*(.119)*
Residual	2.457***	*(.063)*	2.446***	*(.086)*	2.450***	*(.086)*	2.447***	*(.086)*
Number of CBA (n)	8070		5038		5038		5038	
Log likelihood	-17260.3		-10817.8		-10812.9		-10813.1	
Log likelihood chi-square (LR test vs linear model)	1296,15***		635.05***		628.10***		630.42***	
ICC_1 (Home Country)	.071***	*(.018)*	.055***	*(.017)*	.053***	*(.017)*	.054***	*(.017)*
ICC_2 (Acquirer Firm)	.517***	*(.016)*	.509***	*(.020)*	.506***	*(.020)*	.507***	*(.020)*
Mean VIF	1.33		1.50		1.57		1.49	

*p<.05, **p<.01, ***p<.001; Standard errors are given in parentheses.

Table 4. Multilevel regression results for level of equity stakes

Variables	Level of equity stakes							
	Model 1		**Model 2**		**Model 3**		**Model 4**	
Independent and moderator variables								
Host's climate-policy stringency	.117**	*(.042)*	.124*	*(.050)*	.125*	*(.050)*	.133**	*(.050)*
Expropriation risk host			-13.304***	*(2.651)*	-10.155**	*(2.701)*	-13.302***	*(2.651)*
Policy uncertainty host			.429**	*(.169)*	.320	*(.169)*	.524**	*(.177)*
Interaction term								
Climate policy x Expropriation risk					-2.275***	*(.382)*		
Climate policy x Policy uncertainty							-.056	*(.032)*
Control variables								
Institutional distance	-1.732***	*(.189)*	-1.115***	*(.261)*	-.886**	*(.264)*	-1.131***	*(.262)*
Cultural distance	-1.253***	*(.222)*	-1.461***	*(.274)*	-1.676***	*(.276)*	-1.462***	*(.274)*
Country risk host	.321***	*(.041)*	.125*	*(.064)*	.211**	*(.065)*	.132*	*(.064)*
Country risk home	.137	*(.092)*	.126	*(.110)*	.132	*(.110)*	.130	*(.110)*
Trade openness host	1.703***	*(.453)*	3.045***	*(.676)*	2.358**	*(.685)*	3.100***	*(.676)*
Trade openness home	-.600	*(1.131)*	-.849	*(1.311)*	-.833	*(1.304)*	-.876	*(1.309)*
GDP growth host	-.604***	*(.078)*	-.612***	*(.114)*	-.500***	*(.116)*	-.643***	*(.116)*
GDP growth home	.074	*(.103)*	-.055	*(.129)*	-.052	*(.129)*	-.052	*(.129)*
Deal attitude (friendly or not)	31.996***	*(.981)*	32.406***	*(1.301)*	32.548***	*(1.300)*	32.395***	*(1.301)*
Industry relatedness	2.798***	*(.452)*	2.487***	*(.539)*	2.519***	*(.538)*	2.485***	*(.539)*
Climate sensitivity	-1.254**	*(.415)*	-.444	*(.491)*	-.409	*(.491)*	-.448	*(.491)*
Public status target (private or not)	6.207***	*(.386)*	5.483***	*(.461)*	5.481***	*(.460)*	5.512***	*(.461)*
Public status acquirer (private or not)	2.388***	*(.496)*	2.815***	*(.577)*	2.807***	*(.576)*	2.814***	*(.577)*
Developing level of home country	.393***	*(.037)*	.423***	*(.043)*	.431***	*(.043)*	.424***	*(.043)*
Developing level of host country	.498***	*(.143)*	.324	*(.187)*	.299	*(.186)*	.324	*(.187)*
Constant	8.556	*(7.682)*	27.430**	*(9.529)*	20.469*	*(9.574)*	26.703**	*(9.534)*
Year fixed effects	*Yes*		*Yes*		*Yes*		*Yes*	
Random part								
Home Country	68.076***	*(16.592)*	74.706***	*(20.374)*	73.500***	*(20.275)*	74.441***	*(20.297)*
Acquirer Firm	311.403***	*(9.830)*	287.729***	*(11.386)*	285.609***	*(11.355)*	287.379***	*(11.382)*
Residual	505.263***	*(7.388)*	461.702***	*(8.815)*	461.440***	*(8.811)*	461.792***	*(8.816)*
Number of CBA (n)	21442		13887		13887		13887	
Log likelihood	-101281.2		-65104.6		-65086.9		-65103.7	
Log likelihood chi-square (LR test vs linear model)	2402.5***		1474.6***		1448.4***		1473.5***	
ICC_1 (Home Country)	.077***	*(.017)*	.090***	*(.022)*	.089***	*(.022)*	.090***	*(.022)*
ICC_2 (Acquirer Firm)	.428***	*(.013)*	.439***	*(.017)*	.437***	*(.017)*	.439***	*(.017)*
Mean VIF	1.30		1.47		1.50		1.46	

*p<.05, **p<.01, ***p<.001; Standard errors are given in parentheses.

Table 5. Complementary Gate and Chain Analysis

Climate stringency		Level of Equity Stakes		Total investment	
Host	Home	Number of CBA	Mean equity stakes per CBA	Number of CBA	Mean total investment per CBA
L	L	9003	78.177[a]	3163	334.942[a]
H	L	5245	79.709[b]	1927	343.170[a]
L	H	5358	80.565[b]	1957	473.593[b]
H	H	8814	84.326[c]	2931	482.432[b]
Total		*28420*	*80.817*	*9978*	*407.049*
F statistic		*59.802****		*3.051**	
df		*3*		*3*	

*p<.05, **p<.01, ***p<.001; H: high, L: Low; To test the differences between groups, the Duncan test was used under the assumption of heterogeneous variance.

Table 6. Robustness test: Lagged models

Variables	Total investment			Level of equity stakes		
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Independent variable						
Host's climate-policy stringency	.012**	.010	.015**	.093*	.104**	.094+
Interaction terms						
Host's climate-policy stringency x Expropriation risk		-.153**			*-1.67****	
Host's climate-policy stringency x Policy uncertainty			-.019***			-.033
Moderator variables	*included*	*included*	*included*	*included*	*included*	*included*
Control variables	*included*	*included*	*included*	*included*	*included*	*included*
Year fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Home country and Acquirer firm random effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Log Likelihood	*-17255.9*	-10804.5	*-10802.7*	-65007.5	-64994.8	-65007.1

*p<.05, **p<.01, ***p<.001

Table 7. Robustness test: The moderator effects of home country climate policy and policy distances

Variables	Total investment				Level of equity stakes			
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
Independent and moderator variables								
Host's climate-policy stringency	.019***	.022***	.020***	.020***	.100*	.135**	.122**	.119**
Climate policy distance (host-home)	-.009	-.009			-.147**	-.149**		
Climate policy home			.010	.010			.046	.076
Interaction term								
Host's climate-policy stringency x policy distance		-.001		.001		-.017+		
Host's climate-policy stringency x climate policy home								.023**
Control variables	*included*	*included*	*included*	*included*	*included*	*included*	*included*	*included*
Constant	*1.290*	*1.316*	*1.355*	*1.362*	*15.451*	*15.996**	*15.923**	*15.892**
Year fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Random part								
Home Country	.373***	.367***	.360***	.362***	44.065***	43.651***	43.403***	43.512***
Acquirer Firm	2.229***	2.229***	2.228***	2.230***	293.05***	293.096***	293.321***	293.003***
Residual	2.470***	2.469***	2.470***	2.470***	492.657***	492.535***	492.729***	492.649***
Number of CBA (n)	7163	7163	7163	7163	19964	19964	19964	19964
Log likelihood	-15296.1	-15295.4	-15296.0	-15295.8	-93919.1	-93917.4	-93922.2	-93918.2***
Log likelihood chi-square (LR test vs linear model)	1180.1***	1160.6***	1142.2***	1142.1***	2246.2***	2214.1***	2204.7***	2205.5***
ICC_1 (Home Country)	.073***	.072***	.071***	.071***	.053***	.053***	.052***	.052***
ICC_2 (Acquirer Firm)	.513***	.512***	.511***	.512***	.406***	.406***	.406***	.406***

+p<.10, *p<.05, **p<.01, ***p<.001

Figure 1. Impact of interaction between host country's climate policy stringency and expropriation on total investment

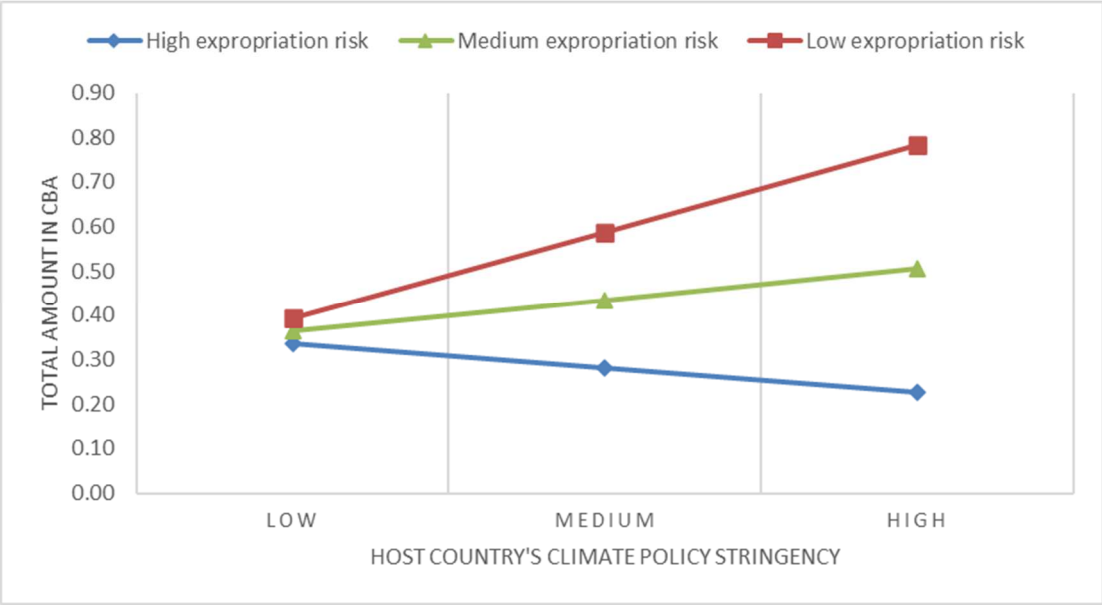


Figure 2. Impact of interaction between host country's climate policy stringency and policy uncertainty on total investment

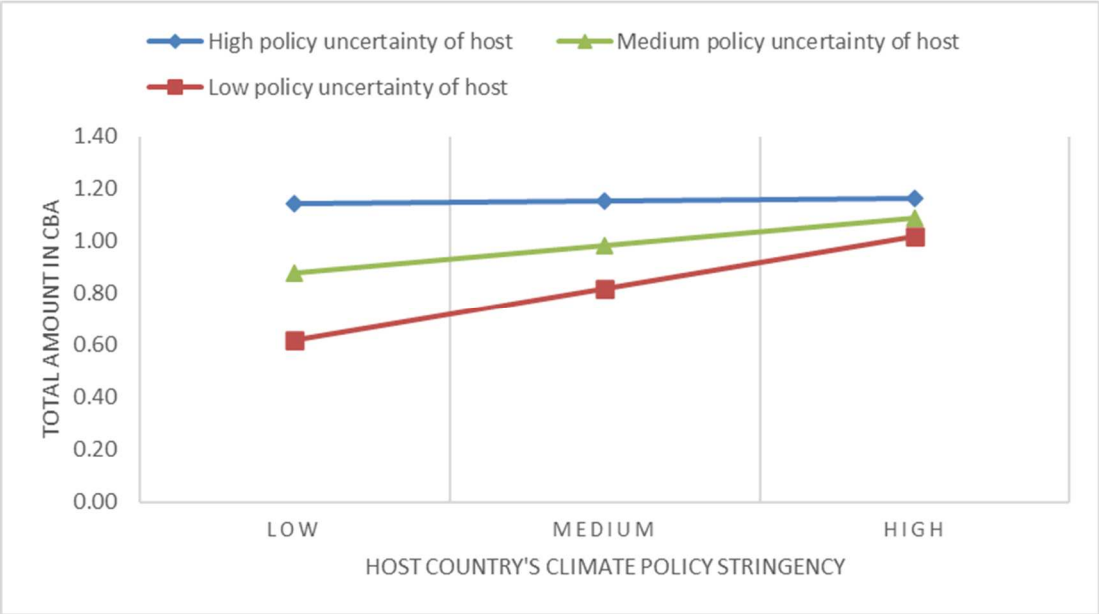


Figure 3. Impact of interaction between host country's climate policy stringency and expropriation risk on level of equity stakes

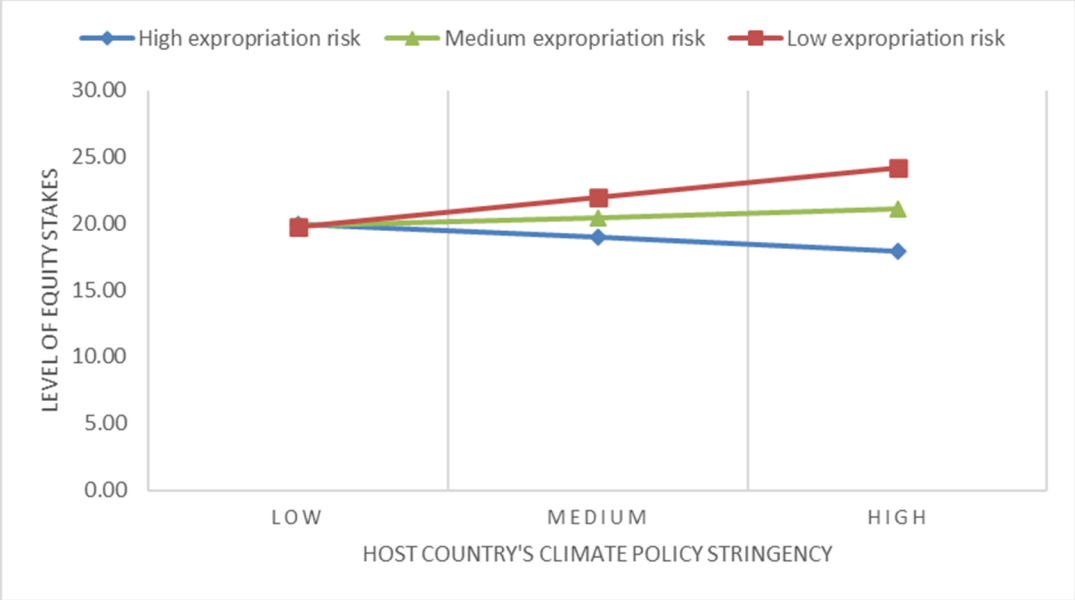
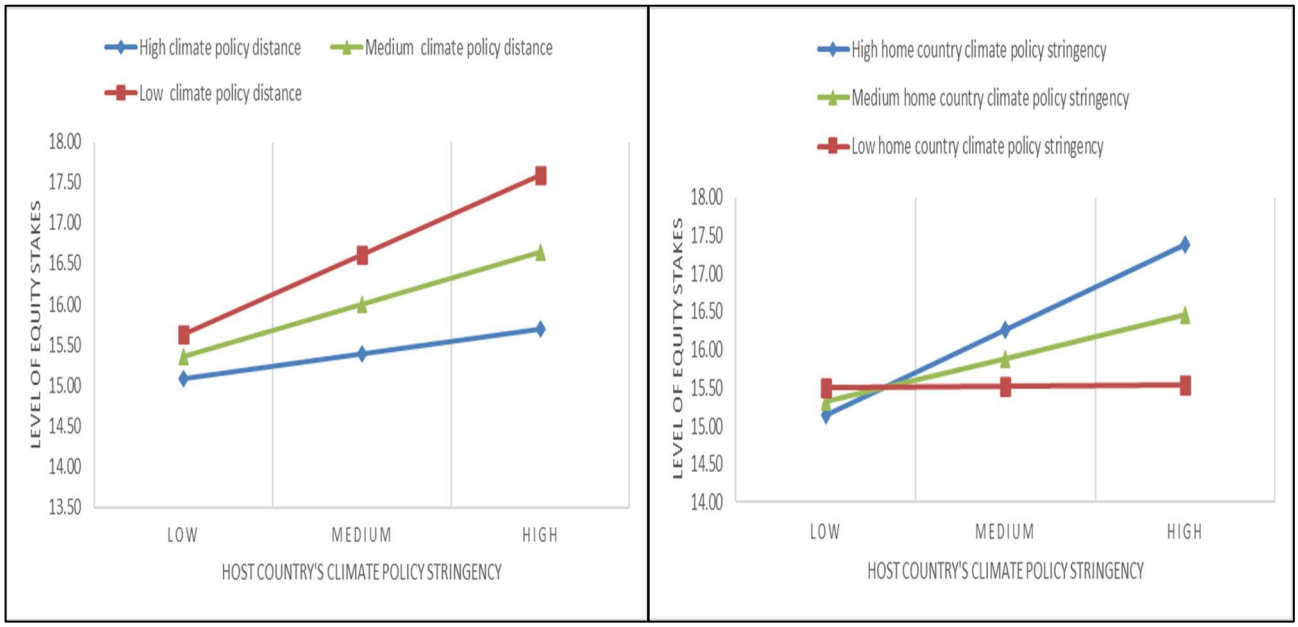


Figure 4 Home- and host-country climate-policy stringency, climate policy distance, and investment amounts and equity stakes



Appendix

Appendix Table 1. Robustness Test: Excluding 'Food Production' and 'Chemical' Sectors from Analysis

Variables	Total investment			Level of equity stakes		
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Independent variable						
Host's climate-policy stringency	.020**	.016	.023**	.123*	.124*	.134*
Interaction terms						
Host's climate-policy stringency x Expropriation risk		-.199**			*-2.32****	
Host's climate-policy stringency x Policy uncertainty			-.015**			-.088*
Moderator variables	*included*	*included*	*included*	*included*	*included*	*included*
Control variables	*included*	*included*	*included*	*included*	*included*	*included*
Year fixed effect	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Home country and Acquirer firm random effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Log Likelihood	*-5936.33*	-5931.93	*-5933.04*	-38768.53	-38757.12	-38766.24
Number of observations		*2756*			8301	

*p<.05 **p<.01 ***p<.001

Appendix Table 2. Robustness Test: Models with Industry Fixed Effects

Variables	Total investment				Level of equity stakes			
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**	**Model 8**
Independent variable								
Host's climate-policy stringency	.014*	.014*	.011+	.017**	.085*	.075	.077	.081+
Moderator variables								
Expropriation risk		-1.31***	-1.01**	-1.34***		-13.75***	-10.87	-13.75***
Policy uncertainty		.088***	.081***	.109***		.395**	.296	.459**
Interaction terms								
Host's climate-policy stringency x Expropriation risk			-.142**				*-2.08****	
Host's climate-policy stringency x Policy uncertainty				-.011**				-.037
Control variables	*included*	*included*	*included*	*included*	*included*	*included*	*included*	*included*
Year fixed effecst	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Industry fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Home country and Acquirer firm random effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Log Likelihood	*-17000.7*	*-10646.3*	-10642.2	-10642.4	-101074	-64913.8	-64898.8	-64913.1

*p<.05 **p<.01 ***p<.001